Developing a Relationship with the Computer in Nursing Practice: A Grounded Theory

by

Barbara L. Cross
Bachelor of Science in Nursing, University of Victoria, 1992

A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of
MASTERS IN NURSING
in the School of Nursing, Faculty of Human and Social Development

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Supervisory Committee

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Supervisor

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Elizabeth Borycki, RN, PhD, Assistant Professor, (Faculty of Human and Social Development, School of Health Information Science, Adjunct Professor, School of Nursing)
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Abstract

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Background: Computerization and the automation of nursing practice have evolved discretely and concurrently in this local health authority. During the early years when computers were first introduced into the clinical areas, computer technology was deployed with little or no consideration of the relationship between nurses and their requirements for access to information. With limited education and training, computer adoption rates among nurses have varied and have not yet achieved the desired level of uptake to optimize the use of computer technology in nursing practice.

Aim: The purpose of this grounded theory research study was to gain a theoretical understanding about how nurses’ understand and manage computer integration in their clinical practice.

Method: Grounded Theory methods were used to examine the data acquired through semi-structured interviews of 12 RN participants, currently practicing in two acute care, tertiary hospitals. Using the constant-comparative method of analysis, all data were collected and analyzed concurrently. Memo-writing was used extensively throughout the data collection and analysis process to further analyze and engage with the data.

Findings: The findings demonstrate that nurses experience the integration of computers in their practice with varying speeds and degrees of adoption. They all engaged in the social process identified in this thesis as “Developing a Relationship with the Computer in Nursing Practice”. Conditions and contingencies such as Prior Experiences contribute to the nurses’ ability to Synthesize Values in their practice. Synthesizing Values is a process that requires nurses to identify and acknowledge their practice values in relation to the integration of computer technology in the context of patient care. The extent to which the nurse is able to synthesize values, determines her/his ability to realize the benefits of integrating computer technology and subsequently manage the barriers. The extent to which nurses realize benefits and manage the
barriers further defines whether they, "adopt", "adapt" or "ignore" the computer technology. This process is continuous and dynamic. As the nurses engage in new experiences associated with computerization, their acknowledgment of and ability to synthesize values and thus to realize benefits and/or manage the barriers becomes that much more informed. In the end, the nurse may transition from a state of "ignoring" to a state of "adopting" depending on the outcome of her or his ability to realize benefits and manage the barriers.

Conclusions: The participants in this study illuminated the importance of the organization attending to a diverse nursing community when introducing computer technology in their respective practice environments. Consideration of nurses' prior experiences particularly in the areas of computer experiences, bio-medical technology experiences, learning, organizational discourses and professional discourses, will better inform future computerization initiatives requiring computer adoption and the inclusion of related clinical information systems. The participants in this study reveal the basic social process of **DEVELOPING A RELATIONSHIP WITH THE COMPUTER IN NURSING PRACTICE** when confronted with computerization in their practice.

Keywords: Synthesizing Values, Computer Technology, Integration, Adopt, Adapt, Ignore
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There are times in people’s lives when they experience an overwhelming sense of strength and support from others and this was definitely one of those times for me personally. I am extremely grateful for the incredible support from my husband, my daughters, my family, my friends and my colleagues — thank you all so very much for waiting for me. To the research study participants, I couldn’t have completed this without you. To the members of the Grounded Theory Club, my committee, and especially to my supervisor, you truly have the wisdom I needed and the “Patience of Job”; words cannot define my appreciation…Thank you all for enabling my learning journey.

“Where there is a will, there is a way...” author unknown
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<td>HA</td>
<td>Health Authority</td>
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<td>HIS</td>
<td>Health Information System</td>
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<td>EHR</td>
<td>Electronic Health Record</td>
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<td>End-User</td>
<td>User of the computer technology, recipient of the computerization initiative</td>
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<tr>
<td>High Technology Use Areas</td>
<td>Those areas typically described as critical care areas where in addition to the technologies, devices such as cardiac monitors, dialysis machines, ventilators assist in the daily care delivery processes</td>
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<tr>
<td>Moderate Technology Use Areas</td>
<td>Those areas where infusion pumps, pain pumps and non-invasive vital sign bio-medical devices are used to augment care delivery</td>
</tr>
<tr>
<td>Source of Truth</td>
<td>Most reliable resource for information generated and/or stored from/in its place of origin</td>
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Chapter 1 - Introduction

Background and Problem

Information technology, specifically computers and information systems, have been integrated in the clinical care arena in several acute care, residential care, and home and community care service areas throughout the three geographical regions (south, centre, and north) of a regional Health Authority (HA) in British Columbia, Canada. This study focuses on two of the HA’s local acute care facilities and the nurses who have practiced in selected clinical areas within these facilities.

In the early days of computerization, Information Technology (IT) departments were responsible for initiating discussions with clinical leaders and determining the deployment strategies for the integration of computer technology to the clinical areas. Typically, there was minimal engagement with clinical leaders during these early computer deployment initiatives to discuss the information needs of practitioners. Furthermore, staff of IT departments, mainly comprising computer technicians, possessed limited understanding about physical space impacts of integrating computer technology into the clinical area, computer technology education requirements for staff, and the effects on practitioners of automating clinical practice and workflow processes. They also did not appear to recognize the potential adverse impacts on practice resulting from the limitations of technology such as desktop computers. For the most part, only stationary desktop computers were initially deployed to the all of the clinical areas, which resulted in limited staff access to the electronic applications that could have been incorporated into the clinical care processes.

Historically, the presence of this computer technology in the clinical care areas provided opportunities for some nurse leaders and others to access disparate clinical information systems
for the purposes of reporting client-related data, creating population-based databases, abstracting statistical information, and using electronic mailing and communications applications (Hannah, Ball & Edwards, 1999; Hebda & Czar, 2009; McBride, 2006; Staggers, Thompson & Snyder-Halpern, 2001). In the HA, however, few direct care nurses or ancillary and clerical support staff accessed the computer technologies and related clinical information systems. Although there appears to be innumerable reasons for this lack of computer technology adoption, the most significant explanation seemed to be the lack of understanding by the IT departments and nurse leaders about the potential for positive impacts of computer technology and related clinical information systems on clinical practice (Hannah, Ball & Edwards, 1999; Hebda & Czar, 2009).

In addition, IT staff and organizational leaders had misconceptions about computer technology and its relationship to clinical practice. Another major factor in the lack of technology use in clinical practice was the continuation of automatically printing patient information and the propagation of the paper-based health record, despite its availability in the patient’s electronic health record. This ongoing duplication of information did not create any incentives for staff members to learn about or begin to use the computer technology in their practice because the paper-based health record, with which they were more familiar and comfortable, continued to be available. Thus, individual nurses and others had the opportunity either to ignore or adopt the computer technology and the related electronic clinical information systems. Consequently, and most notably since the early 2000’s, computer technology had still not been well integrated throughout the Health Authority’s (HA) clinical communities.

For the past ten years, deployments of computer technology in clinical practice areas throughout the HA’s three geographical regions have enabled nurses, physicians, and ancillary staff to access and record patient information using multiple and disparate electronic clinical
information systems. In the southern region of the HA, an integrated suite of clinical applications, which collectively make up the electronic health record (EHR), was implemented in 2001. The data available through these applications included: emergency triage and tracking documentation, laboratory and radiology result reports, transcribed documents, and patient demographic information. By contrast, in the central and northern regions of the HA, electronic information systems varied based on preferred vendors and desired functionality; these information systems were not as well integrated as the suite of applications in the southern region. For the purposes of this study, a “well integrated” suite of electronic applications refers to a single platform upon which a number of functional applications, such as laboratory results, radiology results, clinical documentation and patient demographics comprise the electronic health record, which is subsequently accessed via a single means of user authentication.

Although the south region’s electronic applications have become more robust and clinically relevant since the initial implementation in 2001, the deployment strategy for computer technology and the uptake of this technology by nurses, in particular, remains questionable and has been sporadic at best, primarily as a result of the continuation of both paper and electronic result reporting processes. This realization was made explicit during a recent internal analysis of nurse-user statistics from selected clinical areas within the southern HA facilities. The internal audit confirmed that many nurses continued to rely on paper and manual processes when obtaining clinical results and reports, even after the introduction of the EHR and additional deployment of mobile computer technologies. The lack of EHR use by nurses seems both ironic and concerning, given that the southern HA facilities had experienced a phased-in implementation of the enterprise-wide electronic health record system since the year 2001.
Unfortunately the phased-in strategy, which was intended to facilitate a gradual learning and uptake of computer technology by staff and eventually result in the elimination of automated paper-printing of duplicate information found in the EHR, did not have that effect. The continuation of this parallel paper and electronic EHR process in the HA evoked particular concerns by nursing leaders and the clinical informatics team when errors attributable to the parallel reporting system were occurring. Mihailidis, Krones and Boger (2006) suggest that patient risk increases when clinicians have difficulty determining the accuracy and currency of patient information, which may be the result of timing and sequencing conflicts that are likely to occur in parallel paper and electronic reporting environments. In such situations, clinicians may have difficulty discerning which report represents the most current and accurate representation of the patient’s status. As a result, errors can occur that place patients at risk.

In the HA, clinical inefficiencies in care processes have been observed, such as waiting for printed diagnostic results, in addition to the time it takes to file paper-based result reports in the patient’s paper health record. Also, the limited access to computer technology in the clinical areas and the recent enhancements to the HA’s now regional electronic health record has inspired the need to understand further the integration process when deploying computer technology in nursing practice.

In January of 2007, the HA’s Information Technology/Information Management teams embarked on the regionalization of its Core Clinical Information Systems (Cerner Millennium Suite, 2007), specifically the electronic health record platform and its related clinical suite of applications. This was a very exciting and yet daunting regionalization initiative. It involved substantial changes throughout the HA’s acute care facilities and services in the north and centre acute, residential and mental health care communities. These included changes to: patient
registration, clinical data entry from ancillary and selected clinical care areas, information system access, and health records management. Simultaneously, the south region acute care facilities had received enhancements to the existing functionality as well as the addition of clinical applications for selected areas such as pharmacy and health records.

The regionalization plan also included the decommissioning of all extant patient registration and clinical information systems previously established in facilities in the north and central regions; these systems were to be replaced by the Cerner Millennium Suite of Clinical Information Systems, (Cerner Corp, 2007). Most notably, the regionalization plan also included the introduction of the Hybrid Health Record in the centre and north region acute and residential care facilities. The hybrid health record is a health record in which the patient’s information originates and/or is stored in a single-sourced medium, either electronic or paper-based. These combined electronic and paper-based sources encompass the patient’s health record which would be accessed by clinicians and others, depending on the type of patient data required. Accessing patient information in this way eliminates the need for automated, duplicate printing of clinical data recorded in the EHR.

The HA’s south region will be introduced to the hybrid health record at a later date because it will require similar and significant reviews of clinical practice processes, computer technology device requirements, and clinical change management strategy design. The overall goal for the HA was to implement the foundational EHR and the hybrid health record in the centre and north regions, stabilize them, then circle back to the south region to complete the introduction of the hybrid health record and decommission the automatic printing of duplicate patient information from the EHR.
My experiences in working with nurses in the southern region who practice in a parallel-sourced health record environment, and experiences with leading the implementation of the EHR and the hybrid health record in the north and centre regions of the HA, lead me on an inquisitive journey to learn more about the integration of computer technology in nursing practice. While engaged in the north and centre island regionalization project, I had little time to truly understand the nurses’ perceptions of computers in their practice. Literature reviews conducted prior to the regionalization endeavor revealed limited understandings of what nurses experienced during times of computerization, their perceptions of computer integration in their clinical practice and the impact on practice. Therefore, prior to the implementation of additional computer technologies and enhancements to the EHR in the southern region, I initiated this study to explicate the nurses’ perceptions about computerization in their practice and how this influenced their practice.

The focus of this study is specific to the experiences and perceptions of the HA’s south region nurses who had experienced the deployment of computer technology and the EHR prior to the regionalization project in the north and centre regions of the HA; and includes those nurses who continue to work with south region’s duplicate paper-based and electronic (parallel-sourced) health records.

**Purpose of Study**

The purpose of this study was to gain an understanding about how nurses understood and managed computer integration in their clinical practice. Grounded theory methodology, according to Strauss and Corbin (1990; 1998), was used to develop a substantive theory that describes and explains the social process of “How nurses use computers in their clinical practice.” A primary objective of this study was also to identify the barriers to integration and
illuminates opportunities for enhancing the nurse’s relationship with computer technology and access to information that supports safe and appropriate clinical care.

**Significance of Study**

This research aimed to contribute to the enhancement and automation of nurses’ clinical care processes, which in turn, are anticipated to facilitate more accurate and timely patient care decisions and create efficiencies in the provision of patient care. It is anticipated that the overall result will contribute to the enrichment of nursing knowledge achieved through more timely access to clinical decision supports, and patient information.

An additional significance of this study as it pertains to the Health Authority specifically is that it may provide the theoretical foundation for furthering the regionalization of computer technology and enhanced clinical information systems. The grounded theory produced will provide the foundation for the establishment of new electronically supportive processes in clinical care when nurses integrate computer technology into their clinical practice. I anticipate that this study may inform future computerization strategies for nurses nationally and internationally as nurse informaticians continue to establish the taxonomies and nomenclature standards that represent nursing knowledge through electronic documentation by nurses in the electronic health record.

**Outline of the Thesis**

In this thesis, I describe the grounded theory of “Developing a Relationship with the Computer in Nursing Practice” which explains the basis social process of how nurses perceive and manage computer integration in their practice. In Chapter One, I provide some background on the origin of the study and its purpose. Chapter Two presents my review of the literature on
the topic of computer integration and the use of technology in nursing practice. This review provides the rationale for the study.

Chapter Three provides a complete description of the research methodology, which includes the ontological and epistemological underpinnings, a description of the participants and sampling, data collection methods, the constant-comparative method of analysis, procedures to ensure rigour and the ethical considerations of this study. In Chapter Four I present the findings of the study in the form of a substantive grounded theory.

In Chapter Five I discuss the analysis and findings as they pertain to the original research aim. In addition, I present a discussion of the implications of these findings to nursing practice, nursing education, organizations and further research related to computerization in nursing practice. Finally, the conclusions of this study will be explicated.
Chapter 2 – Review of the Literature

Grounded Theory and the Literature Review

Mason (2002) writes about the inclusion of literature and other sources of knowledge, such as extant texts or objects to assist the researcher in understanding “… what they say about or how they are constituted in people’s individual or collective meanings” (p.56). In slight contrast, Strauss and Corbin (1998) suggest that the use of literature in Grounded Theory should be used to “… enhance, rather than constrain, theory development” (pp. 49) meaning that ideas from the literature do not drive the research process. According to Charmaz (2006) and McGhee, Marland and Atkinson (2007), reviewing the literature prior to beginning grounded theory research may be controversial on the basis of the early writings by Glaser and Strauss (1967), Glaser (1992), Strauss and Corbin (1990, 1998), and Corbin and Strauss (2008). Glaser (1992, 1998) cited in Charmaz (2006) maintains, “…Grounded Theorists should keep themselves uncontaminated by extant ideas” (p.165). Conversely, Charmaz (2006), Corbin and Strauss (2008), Strauss and Corbin (1998) support the idea that the literature review can strengthen the research focus and “enhance rather than constrain theory development” (Strauss & Corbin, 1998, p. 49). The challenge is to ensure that concepts and ideas from the literature do not drive data collection and analysis, but support and enhance it. It is the concepts and ideas emerging from the data that must ultimately drive the study.

As a result, the literature cited in this review has been used to inform and enhance the research process, specifically as it pertains to the formulation of my research focus and interview questions. Literature will also be referenced throughout the analysis of the data through comparisons of the data to ideas in the literature; this method is consistent with the essence of the constant comparative nature of grounded theory. This perspective on the place of the literature
review in a grounded theory study is consistent with Strauss and Corbin (1990, 1998) and Charmaz (2006).

The Literature Review

I conducted a literature search using Health Source - Nursing/Academic Edition, CINAHL and OVID MEDLINE databases (1985-present) during the initial stages of this study to further my understanding of how the literature represented nurses’ perceptions about computerization in their practice. Key words such as computers, attitudes, nurses, integrating and technology were used to narrow the search to my area of interest. I also searched for literature that explored nurses’ perceptions and experiences of integrating bio-medical technology into their practice because I had been pondering the notion that there may be a great deal of similarity between the processes of integrating bio-medical technology and computer technology in practice. In my practice, I had had plenty of experiences with integrating bio-medical technology, and had often wondered if there were relationships between the two processes that had been identified in the literature.

At this stage, I possessed very little knowledge about the literature on the subject of computerization in nursing and as a result had hoped to learn enough from the literature to aid in focusing my research topic prior to commencing the participant interviews. McGhee et al. (2007) concluded that literature reviews may be appropriate in grounded theory in identifying gaps and “...avoiding conceptual and methodological pitfalls” (p. 339). Norton (1999) describes these methodological pitfalls as deriving from the relationships among ontology, epistemology and research methodology. Ontology refers to the researcher’s assumptions about reality; epistemology explores how knowledge about reality is realized; and methodology refers to how the researcher will go about learning about what ought to be known. As I strived to maintain
research integrity, I found the literature to be particularly helpful in sorting out these issues and avoiding the pitfalls. My perspectives pertaining to ontology, epistemology, and grounded theory methodology will be further explicated in Chapter three.

In the remainder of this literature review I present the findings from previous studies in the areas of: historical perspectives on computer technology in nursing practice, nurses’ attitudes towards computer technology, and risks associated with ignoring the computer technology. Technology and information literature specifically pertaining to nurses’ adoption experiences with bio-medical technology as well as their experiences with accessing information from parallel-sourced health records were also explored. These literature topics were selected as a result of my own curiosity and theorizing about how the literature has represented the integration of computer technology in nursing practice and how they have contributed to my research aim.

Computerization in Nursing Practice

**Historical Perspective**

As far back as the late 1950’s, Blumberg (1958) cited in Hanna, Ball and Edwards (2006), suggested that computers “of the day” could facilitate the automation of “selected nursing activities” but at the time there was very little uptake in that regard (p.29). Nursing leaders of the day were not particularly knowledgeable about this “cumbersome technology”, and both computer hardware and software companies were not producing for the health care market because they were focusing primarily on the business and financial sectors. Only a few of the larger, more innovative United States (U.S.) hospital centres had developed some of the first clinical information systems. Pioneering hospitals such as Massachusetts General Hospital, Duke University Hospital, and Latter-day Saints Hospital in Salt Lake City embarked on this technology endeavour which began to move away from the finance-centric applications to more
patient-centered clinical information systems (Clemmer, 2004; Hannah et al., 2006; Simpson, 2003).

Staggers, Thompson and Snyder-Halpern (2001), suggested that it really wasn’t until the 1960’s and 1970’s that healthcare leaders began to investigate the use of computer technology and computer software applications for the purposes of developing health information systems (HIS), the early version of the electronic health record. Decision support tools such as on-line references for nurses and physicians and other care providers as well as communication and messaging tools arrived later in 1980’s with the introduction of the Intel Pentium processor.

In the 1990’s, Buus-Frank (1999) purported that the “…proliferation of technology is occurring at unparalleled rates” (p.433). This perception of the burgeoning information age in health care was further realized with the introduction of web-based functionality, client/server architecture and the advancements with the World Wide Web (Hannah et al, 2006). Access to new and ever-changing information about clinical care was made accessible in real-time to nurses and others, thereby creating opportunities to access the most current and relevant information for clinical care.

Buus-Frank (1999) further suggested that nursing’s survival depended on embracing the change as well as the technology. The significance of this conviction was further explicated in her beliefs that “As the volume of information increases, the half-life of knowledge is decreasing” (Buus-Frank, 1999, p.433). Unfortunately, as Simpson (2003) suggests, nurses were slow to adopt computer technology, which meant that the conception of the clinical information systems “…were designed with little nursing input…nursing-specific language lagged…thus nursing’s input went unrecorded and unrecognized” (p.115). These statements were representative of the chicken and egg metaphor that seems somewhat contributory to the
computer technology contradiction experienced by nurses today. That is, if nurses do not believe that clinical information systems are relevant to or reflective of their uptake of evidenced-based practice and the delivery of patient care, will they still be inclined to incorporate the computer technology in their practice?

A 21st century perspective by Hebda and Czar (2009) confirmed Buus-Frank’s (1999) beliefs, because they suggested that nurses not only work in an information-intensive environment, but continue to be responsible for the on-going assessment, planning and communication of patient information to families, allied partners, physicians and others. The fast-paced, rapidly changing and increasingly complex health care environments challenge nurses to think fast, and practice fast while still providing safe, high quality care. “In the struggle to do more with less, new methods and technologies have become essential tools for administrators and practitioners alike” (Nagle & Ryan, 1996, p.25). Without technology, nurses and other care providers would not be able to achieve the high output demands of health care consumers and governments (Borycki, Lemieux-Charles, 2009; Nagle, & Esynbach, 2009; Hebda & Czar, 2009; Nagle & Ryan, 1996; Simpson, 2003).

There are a multitude of computer technologies and clinical information systems in health care today, and although most nurses embrace them, there are still many nurses that have not. The absence of motivation by some nurses to embrace computer technology in their practice may be the unintended result of the selection of computer hardware and the design of the software applications or clinical information systems that do not meet their needs. Additionally, health care and Information Technology (IT) administrators may have based their understandings about how nurses would use computer technology in their practice on their current manual, paper-based processes and therefore designed the computer technology implementation strategies with
that in mind. This particular gap in understanding the impact of automating nurses’ practice by introducing computer technology and the related clinical information systems necessitates further contemplation from the nurses’ perspective in this area.

*Nurses’ attitudes and understandings about computer technology*

The early literature on computer technology and nursing has unfavourably represented nurses’ attitudes and understanding about computers. These negative attitudes might well have been anticipated in the early days of computerization in nursing practice given the cumbersome technology hardware, the absence of nurses’ participation in the development of the clinical information systems, and a lack of nursing language about the phenomenon. The result was nurses’ slow and limited uptake of the technology in practice (Simpson, 2003; Timmons, 2003).

Unfortunately, these learnings were not fully realized or captured in our early days of research in this area. The use of quantitative research methods dominated the research world at that time and were used to measure nurses’ attitudes towards computer technology and their computer literacy (Hillan, McGuire, & Cooper, 1998; Hobbs, 2002; Jayasuriya & Caputi, 1996; Marasovic, Kenney, Elliott & Sindhushake, 1997; McBride & Nagle, 1996; Murphy, Maynard & Morgan, 1994; Scarpa, Smeltzer & Jasion, 1992; Schweirian, Malone, Stone, Nunley, & Francisco, 1989; Stronge & Brodt, 1985; Thomas, 1990). These quantitative studies measured nurses’ attitudes and made comparisons based on predetermined attributes assumed or hypothesized to predict the nurses’ acceptance or adoption of the computer technology in their practice. Regrettably, these early studies did not explore nurses’ understandings of and experiences with computer technology and thus we did not learn much about the qualitative value that computerization brought to nursing practice. Without the use of qualitative methods there was no way to fully appreciate the nursing perspective in this regard.
Studies such as the one conducted by Marasovic, Kenney, Elliott and Sindhushake (1997) described nurses’ attitudes based on the survey outcomes of Burke’s (1991) questionnaire, known as the Nurses’ Computer-Use Attitude Questionnaire. According to Marasovic et al. (1997), this questionnaire was based on Burke’s (1991) adaptation of Vroom’s (1964) expectancy model which defined three constructs of an attitude to include: the nurse’s satisfaction with the outcome when using a clinical information system, belief that the nurse would experience satisfaction when using the system, and the motivation to use the clinical information system. Marasovic et al. (1997) found that nurses’ attitudes about computers “…are influenced by age, education, previous use, and years of experience in the health field” (p.93). These authors believed that if nurses had a positive perspective about technology as well as an understanding about the clinical information system, then the measurement indicators would predict nurses’ uptake of the computer.

Unfortunately, there was a low correlation between these pre-identified variables of age, education, nursing experience and years of intensive care unit experience and nurses’ satisfaction, belief, motivation and a desire to use or access the clinical information systems. Because of the use of quantitative measurements, these studies were limited in their ability to account for the influences on computerization in the clinical practice context as it pertained to divergent practice areas, patient populations and service delivery requirements, and the nurses’ prior experiences with learning about technology in general. Additionally, quantitative studies conducted at the time were not able to capture the dynamic nature of the organizational supports such as staff replacement for education and staff engagement during the implementation of computers and policy directives, all of which may have contributed to the nurses’ uptake, or lack of uptake of computer technology.
Sadly, and despite numerous attempts by other researchers (Hobbs, 2002; Jayasuriya & Caputi, 1996, Scarpa et al, 1992), quantitative studies using instruments measuring nurses’ attitudes similar to those described above, remain inconclusive in their predictions about nurses’ adoption of the computer technology or the factors contributing to it. Again, the need for a qualitative study examining the clinical practice context as well as the nurses’ perceptions about their relationships with computer technology would better enhance our understanding of this phenomenon. The pervading message from the literature seemed to be that “negative nurses’ attitudes” were to blame for the failure to conform to or adopt computer technology in practice. There was no attempt to account for whether the computer device fit with nurses’ needs or was relevant to the clinical information systems available to them at the time.

Interestingly, many of the previous studies were predicated on the notion that nurses’ experiences could be reduced to quantifiable variables. Charmaz (2006), references this interpretation in her section about the emergence of qualitative study “…at a time when the positivist perspective and quantitative research dominated “(p5). The notion that, throughout the 20th century, quantitative research methodologies remained dominant suggests that to conduct research using qualitative methods to address the gaps in understanding social processes, was not going to be legitimized in the same way. The recognition and value of qualitative methods and specifically, constructivist ontology for exploring human problems or social process issues in nursing would not be realized until the latter part of the 20th century.

While much of the historical literature on nurses’ adoption of computer technology focused on the measurement of nurses’ attitudes and computer literacy, McBride and Nagle (1997) and Timmons (2003), were among the very few researchers at the time to question the relevance and validity of the instruments of the day. They suggested that there was a significant
relationship between nurses and computer technology, which influenced the quality of their practice, and was not being captured by existing methods. I was particularly encouraged by Timmons' (2003) research, who believed that there were more influences on nurses' integration of computer technology than the variables identified in measurement instruments. He, along with Bauer (1995, cited in Timmons, 2003), questioned the quantifiable measurement of "resistance" identified in previous studies, and suggested that "...understanding resistance in terms of the fit between the systems and existing work practice would be a more fruitful basis for inquiry" (p.258).

The Timmons (2003) research was particularly thought-provoking because it was one of the first qualitative research studies that I found that suggested there were significant realizations and interpretations missing from our present day understanding about nurses' relationships with computer technology and the related clinical information systems. This was indeed a turning point for me and at that moment my research aim and methodology became abundantly clear. I believed that the most effective way to understand the social phenomenon of how nurses perceived and managed the integration of computer technology in their practice was to apply grounded theory methods to my research question.

Further exploration of the 'nurse-computer technology phenomenon' in the literature helped me to appreciate that others were also discovering new results through the use of qualitative methods (Alpay and Russell, 2002; Copnell and Bruni, 2006; Darbyshire, 2004; McNeil, Elfrink, Beyea, Pierce, and Bickford, 2006; O'Keefe-McCarthy, 2009; Sandelowski, 2002; Timmons, 2003). This cross-section of inquiries communicated the contemporary voice of nurses, nurse leaders, and educators as they conveyed their experiences with computer technology, clinical information systems, clinical practice change, and nursing education as it
pertains to computer and information literacy and moral agency. O'Keefe-McCarthy (2009) defines moral agency as, "physical action and motivation directed to some moral end" (p.787).

While these studies focused on different aspects of the nurse-computer phenomenon, similar themes emerged. These themes were expressed by nurses as the need to find their voices in the clinical application and technology designs as well as in how and when these new "tools of the trade" would be implemented. Alpay and Russell (2002) support these stated requirements in their study about the impact of information technology education on primary nurses' practice. They emphasized the need to further understand and ensure that nursing intelligence and/or the integration of nursing knowledge and practice/workflow is reflected in the clinical information systems and advancing computer technologies. Additional themes explicited in these studies included the correlation between positive nursing attitudes and the importance of thoughtful considerations to timing, modality, and duration of educational preparation pertaining to computers and related clinical information systems as well as access to computer technologies to ensure successful integration of computer technology in their practice (Alpay and Russell, 2002; Copnell and Bruni, 2006; Darbyshire, 2004; McNeil, Elfrink, Beyea, Pierce, and Bickford, 2006; Timmons, 2003). All of these key areas reflected nurses' values related to computer technology that have not been represented in previously identified quantitative studies.

The study conducted by O'Keefe-McCarthy et al (2009) examined the impact of technology on moral agency and the findings suggested that technology adversely impacts and constrains the nurses' ability to enact their moral agency, particularly in "technology-mediated" care environments, such as critical care areas where nurses are believed to be particularly reliant on technology. In this instance, O'Keefe-McCarthy et al (2009) refer to this technology reliance in practice as "unexamined technology" which presumes that if we do not critically examine and
define the role and relationships among patient-nurse-technology, there may be an inherent risk or tendency for the nurse to situate the technology ahead of patients and their personal illness experiences.

Sandelowski (2002) references the ideal of moral agency with respect to the decline in the presence and proximity of the nurse to the patient in the “post human” era. She further defines this era as one in which “...nurses increasingly presented themselves as the boundary workers between two disparate and always potentially irreconcilable forces: technology/touch and humanism care” (p.63). Given that there is overwhelming evidence to suggest that technology-mediated care environments will continue to proliferate, researchers like Malone (2003) and Sandelowski (2002) fear that the patient-nurse therapeutic relationship will not be sustainable as a result of the burgeoning nurse-technology relationship and nurses’ diminishing moral agency.

These two studies resonated with me because I felt conflicted with the idea that technology would be construed as a “trespasser” in the nurse-patient relationship. I had spent much of my nursing career practicing in critical care areas that necessitated the integration of and reliance on bio-medical technology to augment my physical and emotional connection with the patient. Upon reflection, I realized I had relied on bio-medical technology as a mere trigger to cue me when I was unable to be at the patient’s bedside or when I needed to be involved in multiple and concurrent activities, assessments or interventions. Additionally, I had appreciated and valued the visual images that the technology was able to convey in a way that my own eyes could not abstract from the patient’s physical body, i.e., electrocardiographic monitor tracings. In this regard, I had never questioned the authentic source of truth with respect to patient information to be anything but from the patients themselves. If I had any question or concern
with the validity of the electronic data, I naturally found myself following up with the patient directly, at the bedside; this action either substantiated or refuted the data transmitted from the biomedical technology. My beliefs and experiences are in contrast with Sandelowski’s (2002) concerns about nurses’ relationships with technology in the context of the nurse-patient-technology relationship.

Sandelowski (2002) suggested that, “Even nurses espousing the existence of a harmony between technology and care depict technology as something nurses must work with and work around in order to make it compatible with nursing care” (p.63). This statement suggests that despite the commonplace roles of technologies in many care environments, nurses remain challenged to find ways to ensure that the patient and the patient’s illness experience remains at the forefront of the patient–nurse relationship. For me the patient-nurse-technology relationship was never a question of moral agency or human caring; particularly since I’d only ever acknowledged the technology as a device that augmented my knowledge about the patient’s physiological parameters that could not be otherwise visually realized as an information resource for my nursing practice. The patient in this scenario was always considered the source of truth for information about themselves.

The ethical ideal related to moral agency in the patient-nurse-technology realm is one of particular interest to me and would require further examination beyond the scope of this study. However, because I am interested in understanding how nurses use computers in their practice, I wanted to further explore my underlying beliefs about technology as it was used in my practice experiences prior to computerization. I also wanted to further understand how the literature explicates the correlation between the patient-nurse relationship and technology in general regardless of the technology type; for example bio-medical or computer technology.
Risks Associated with ‘Ignoring’ the Computer Technology

Several authors (Buus-Frank, 1999; Hebda & Czar, 2009; Mihailidis, Krones, & Boger, 2006) suggest that nurses work in one of the most knowledge intense industries; they are required to know more than ever before and must remain current at all times. This can be challenging given the burgeoning research evidence base, the constantly changing state of the clinical practice environments, new legislative requirements for clinical care and, most significantly, the ever-changing, ever-increasing and unpredictable demands for information about patient status. In order to manage the volumes of data and information, electronic devices such as computer and bio-medical technology offer invaluable ‘smart’ solutions to this inordinate demand for information currency, knowledge construction, and standardized meaning of the data.

Mihailidis, Krones and Boger (2006), discuss the notion of ‘assistive computing technology’ as a mechanism to reduce error/incident to patient care by seeking to understand the nurses’ perceptions of device design. Kushniruk, Borycki, Kuwata and Kannry (2006) examined the impact of users’ usability of computer technology and clinical applications during simulation testing. They posit that “...the need to reduce medical error has become a driving force and motivation for the widespread deployment of healthcare information systems” (p.114). As a result, establishing the use of the most appropriate computer technology as a vehicle for retrieving relevant information near or at the point of care could potentially mitigate that risk.

Alternatively, in the same study conducted by Kushniruk et al (2006), simulation testing, similar to that used in the aviation/aeronautics industry was carried out. During these simulations the researchers introduced physicians and nurses to an automated electronic medication administration simulation, using computer technology, bar-code scanning and a computerized
provider order entry system similar to those already implemented in hospital environments. The working hypothesis was that by introducing computer technology and clinical information systems together, they could minimize or mitigate adverse outcomes pertaining to medication administration related errors.

However, after reviewing the simulation data, Kushniruk et al learned that, depending on the complexity of the information technology requirements, automation of these manual processes did not necessarily minimize or mitigate the risk. In fact, in many ways, this type of simulation revealed increased end-user dissatisfaction and the potential for end-users to by-pass the computerized system altogether, due to the cumbersome and time intensive requirements to administer the medications. This study substantiated the need to increase the use of simulation trials before introducing technology and clinical information systems into the live health care setting in order to decrease technology-induced errors. At the same time, it also illuminated the need to attend to the inadequacies of computer technology devices and information systems for nurses, with respect to the representation of their knowledge and information needs.

Overall, one might conclude from the literature that if we do not ensure appropriate and timely access to relevant clinical information systems via the most appropriately identified computer device, there would be no safe way in which nurses will be able to provide care. Conversely, we must also attend to the potential risks associated with poorly designed clinical information systems that may contribute to technology-induced errors. In this regard, application design must include and represent nursing intelligence, which Alpay and Russell (2002) aptly describe as involving the application of knowledge, practice, and the nursing role in relation to patient care. These beliefs would then situate the computer technology and clinical information system as relevant and meaningful to nurses and their practice.
Technology and Information in Nursing Practice

The literature referenced in this section was particularly informative to me because it enhanced my understanding about how nurses experienced the integration of biomedical technology; some of this understanding was formulated based on literature referencing nurses' integration experiences with biomedical technology prior to widespread computerization. I also needed to further understand how the impact of computerization in conjunction with the advent of the electronic health record, and transitional state of a parallel-sourced (electronic and paper based) health record may have implications on nurses' practice. This collection of information from the literature informed the basis of my interview questions in this area.

Adopting biomedical technology

Nurses have worked with technology since the advent of the stethoscope in the early 1960s. Sandelowski (1999) describes instruments such as thermometers and other items as "tools of the trade" (p.52). My initial thinking about nurses' adoption of biomedical technology was consistent with the idea that integration of these "tools of the trade" is a natural evolution that occurs in everyday nursing practice.

This perception of 'change' as a natural occurrence was consistent with Copnell and Bruni's (2006), examination of critical care nurse perceptions of the concept of change as naturally occurring; these nurses offered an alternate perspective as they contextualized the notion of change in their practice. These authors suggested that the idea of stasis versus change as well as planned versus unplanned change was interpreted individually and based on the nurses' practice realities. Nurses tended to perceive the notion of everyday change as a dominant, natural occurrence. As a result, the nurses expressed difficulty defining changes in their practice,
which included the integration of (biomedical) technology, because it was perceived as an everyday requisite to maintain safe practice and support care delivery.

Marasovic, Kenney, Elliott and Sindhusake’s (1997) study adapted Vroom’s (1964) Expectancy Model to further understand critical care nurses’ attitudes pertaining to the integration of biomedical and computer technology in their practice. This study suggested that a strong positive correlation existed between nurses’ satisfaction, beliefs and motivation and nurses’ adoption of technology. For example, nurses who were motivated by their beliefs that the technology would be assistive to them when providing care, as well as those who were motivated to learn, would naturally incorporate the technology in their practice. They further concluded that there was an inconclusive correlation between the notion of computerization and the related clinical applications contributing to new knowledge and the nurses’ uptake of the technology. At the conclusion of the study, Marasovic et al (1997) suggested that education content should be focused on optimizing the beliefs and motivations of nurses related to the incorporation of technology.

Studies conducted by Fulton (1996) and Maxwell (1995) illuminated the impact of how organizational context and implementation design and diffusion strategies, as defined and supported by the organizational leaders and educators, contributed to nurses’ adoption of or resistance to new bio-medical technology. Both studies suggested that organizational context and diffusion strategies played a significant role in nurses’ adoption of bio-medical technology. Maxwell (1995) referenced Lewin’s (1951) theory of change as a way to understand adoption of an innovation such as the intravenous patient-controlled analgesia pump (IV PCA). Lewin’s (1951) theory of change suggests that change could only occur if the requirements for change surpassed or equaled the resisting forces. Maxwell (1995) further explicated five stages in the
process of adopting this innovation and related them back to Lewin’s theory of change: “not knowing anything” and “working toward transition” were similar to Lewin’s “unfreezing” stage, the notion of “becoming accustomed to it” and “problem solving” correlated with Lewin’s “moving” stage, and the stage of “being an expert” was similar to Lewin’s “refreezing” stage.

What is interesting is that these studies moved beyond the reliance on quantitative methodologies and measurement instruments examining nurses’ attitudes and began to describe the nurses’ voice in their change experience, regardless of the innovation or change type. They began to explicate the correlation between organizational context and nurses’ values and beliefs as well as the necessity to further examine their present day understandings about fundamental care concepts like pain prior to introducing a change or innovation. Interestingly, the idea that one might suggest that “in general”, nurses are reluctant to incorporate technology such as computers in their practice is perplexing to me, particularly when reluctance or resistance has been singled-out in the literature as a derivative of change/innovation without further understanding the context in which the change or innovation is occurring.

**Parallel-Sourced Health Records (Electronic and Paper-based)**

There is a great deal of current literature espousing the virtues of EHRs, including the influence of design and meaning to the practice of health care providers, and nurses in particular. Many of the benefits of EHRs include: concurrent, timely and secured access to longitudinal information by multiple users; alerts and decision support functionality; standardized nomenclature and data reporting; and links to related data and knowledge bases (Lorence, Spink and Richards, 2002 p.358). There is less literature that examines workflow and the practice implications of introducing the EHR when the paper-based health record still exists. This section
will explore some of the research conducted to date that examines nurses’ workflow challenges experienced when practicing within a parallel-sourced\(^1\) or hybrid health record.

Hybrid health records are defined in the southern region of the HA in which this study takes place, as parallel-sourced health records. The southern region’s conception of the hybrid health record is in contrast to the definition previously cited in this thesis and in the computerization initiatives in the central and northern regions of the HA. In the southern region of the HA, the health records are comprised of both paper-based and electronic media, both of which amass selected portions of clinical and decision-support information. The electronic health record also has the ability to generate patient data that is automatically uploaded from interfacing technologies such as lab analyzers and other biomedical technologies. For nurses, this means that they are able to access or retrieve the same types of patient information in either the electronic or the paper-based systems. In other iterations of the hybrid health record, it may also mean that information originating or stored in the electronic health record will not be represented in the traditional paper-based record. For the purposes of this study, the participants are currently practicing in a parallel-sourced health record environment.

Hebda and Czar (2009) state that there is “…no standard term” that defines the EHR, and defers to the Healthcare Information and Management Systems Society (HIMSS) 2007 definition as “a longitudinal electronic record of patient health-information generated by one or more encounters in any care delivery setting” (p. 295). Lorence, Spink and Richards (2002) further suggest that EHRs not only maintain an individual’s lifetime health information, but that they also “…facilitate the capture, storage, processing, communication, security, and presentation of non-redundant health information” (p.358). Finally, Fitzpatrick (2004) posits that the electronic

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\(^1\)Parallel-Sourced Health Records are health records comprised of both paper and electronic media, both of which contain the same clinical patient data/information.
health record "...is often conceptualized in the same way as the paper-based record – as a passive information repository" (p.292). Collectively, these conceptions denote particular understandings about the present day version of the EHR that may not be entirely accurate.

Borycki, Lemieux-Charles, Nagle, and Eysenbach (2009) suggest that information-seeking remains a significant determinant to ensuring timely access to critical and much needed information to support care. However, information may be difficult to find, outdated, presented in a format or language that is not easily interpretable, or simply too difficult for timely access because it is located away from the point of care. Collectively these factors contribute to the increasing risks to patient safety associated with the nurse’s inability to access critical information that supports clinical decision-making and appropriate care planning at or near the point of care. Increasingly, as more health organizations adopt electronic health records, decision support resources can be imbedded in them to facilitate more timely and enhanced decision-making (Borycki et al, 2009). These kinds of information systems are destined to become an integral component of the nurse’s information source and are not the passive information systems as experienced in previous iterations of the EHR.

The extent to which health organizations are able to achieve a fully integrated electronic health record varies with the health organization’s commitment and their respective budgets. Complete integration of computer technology and clinical information systems, including the electronic health record, is extremely expensive and often unattainable in the current economic climate (Borycki et al, 2009; Hebda and Czar, 2009). The HA in question is no exception to that rule. So what does this mean to the nurse? It means that, despite best efforts to ensure a safe and appropriate platform for generating, storing, and retrieving clinical information, the system will likely remain in a hybrid-electronic and paper-based state. The nurse’s reliance on and ability to
incorporate both paper-based and computerized information will continue to be a challenge unless the cost-benefits associated with the EHR can be more attainable.

**Summary**

In this section, the literature reviewed enhanced my understanding of what had been previously examined with respect to nurses integrating biomedical and computer technology in their practice. This literature represented some of the key focus areas under study during the latter part of the 20th century, which primarily examined nurses’ attitudes and aptitudes pertaining to computers and computer literacy.

These predominantly quantitative research studies conducted between 1985 to 1995, revealed that computer uptake by nurses was much slower than by their business and industrial counterparts for many reasons. Some of the reasons for this included the limited availability of computer technology in the clinical areas, the lack of nurses’ computer knowledge, and the cumbersome or unrelated-to-practice information systems. Some of these studies also identified the nurse’s age, experience and motivation to use computers as barriers or conditions that influenced whether nurses used computers in their practice. These studies proved to be inconclusive because there was ongoing debate about the validity of the measurement tools. In addition, these studies conveyed an implicit and somewhat negative message that nurses who “resisted” the technology were “bad nurses” when compared to those nurses or other non-health care providers who embraced computer technology.

By the late 1990s and the early 2000s, researchers began to utilize qualitative research methods to explore nurses’ perceptions about integrating computer technology in their practice and study the process of how nurses adopted computer technology. Change theories were utilized in these studies to provide a theoretical foundation to understand how to improve adoption of
new-age technologies. These studies illuminated the significance of nurses' perceptions and the contextual nature of organizational processes that support the integration of biomedical and computer technology in nursing practice. Supportive organizational practices were integral to successful innovation adoption.

Finally, although literature in the early part of the 21st century has revealed qualitative studies that have introduced new knowledge about nurses' perspectives on computer technology in their practice, more explicit research is needed. Qualitative studies conducted in key areas such as: understanding the nurse-patient-technology relationship from an ethical perspective, and about how nurses learn about technology in their practice will be necessary to attend to the ethical and educational requirements for nurses as they continue to practice in the technology enriched practice environments. Additionally, and most importantly, there has been little evidence of research in the area of understanding nurses' workflow relationships with computer technology and clinical information systems when they are introduced into parallel-sourced health record environments. This gap in the literature is significant and provides evidence that further inquiry is needed to ensure that the voices of nurses are documented and better reflect the context of their practice requirements while attempting to access clinical information from both paper-based and computer-based information systems, which are intended to support patient care delivery in a technology-mediated care environment.
Chapter 3- Research Methodology

In chapter three I describe the research methodology, the rationale for its use and the philosophical underpinnings of this research study. A description of the sampling method, data collection and data analysis techniques will also be presented. A brief discussion of rigour in grounded theory and the ethical considerations applied in this study will be described.

The Grounded Theory Research Design

Grounded theory is a qualitative, inductive approach to research, originally developed by Glaser and Strauss (1967), and focuses on the “…process of generating theory rather than a particular theoretical content” (Patton, 2002, p.125). Strauss and Corbin (1998) suggested that, in contrast to quantitative research, grounded theory researchers do not set out to test a preconceived theory; rather they start with an area of inquiry or research aim and allow whatever is theoretically relevant to emerge from analysis of the data and ultimately generate a theory that explains the actions under study.

To learn how nurses experience and manage integrating computers in their practice was the aim of this study. The social phenomenon of nurses adopting, adapting or ignoring the computer technology was examined by conducting semi-structured interviews centered on their experiences with computers and computerization in their practice. Grounded theory methodology was used to develop a theoretical understanding of this social psychological process as well as the social structural processes and social conditions that influence those processes (MacDonald, 2001, p.114). Grounded theory, a qualitative, inductive method that explores these social processes from the perspective of participants, was selected as the preferred methodology. The purpose of grounded theory in this case was to build a substantive theory that was “…faithful to and illuminated this area under study” (Strauss and Corbin, 1990, p.24).
Lomborg and Kirkevold (2003) suggest that grounded theory has become one of the most frequently used methodological approaches in nursing research due to its pragmatic appeal and its emphasis on “human action and interaction” (p. 190). Pragmatism, a philosophy that is concerned with defining “truths” and one that “…assumes society, reality, and self are constructed through interaction and thus rely on language and communication” (Charmaz, 2006, p.7) is the root of the symbolic interactionists’ epistemology. Symbolic Interactionism will be further defined later in this section. Data collection and analysis proceed concurrently, and the emerging theoretical conceptualizations guide ongoing data collection.

Data are analyzed using the constant comparative method resulting in a grounded substantive theory that explains the phenomenon of interest. Charmaz (2006) and Corbin and Strauss (1998), define the constant comparative method as the analytical process whereby comparisons are made between the individual participant data, the participant’s data itself at different times throughout the data collection, the comparison of data to categories, and categories to other categories. Glaser and Strauss (1967) differentiate between a substantive and a formal theory and conclude that a substantive theory explains a particular phenomenon within a single context, whereas a formal theory explains a phenomenon within multiple contexts. Based on these definitions, this study has generated a substantive theory that explicates the experiences of the participants, who volunteered for this study, in integrating computers into their practice.

I have conducted this research using grounded theory methodology (Charmaz, 2006; Strauss & Corbin, 1990, 1998), which is rooted in Symbolic Interactionism. Symbolic Interactionism, “…derived from the philosophy of pragmatism…” illuminates the relationship between individuals and society, “… thus, symbolic interactionists’ view human beings as active participants and creators of the world in which they live” (MacDonald, 2001, p.116 & 117). This
epistemology is consistent with a relativist ontology which is fitting from a methodological perspective with grounded theory (Charmaz, 2006; Strauss & Corbin, 1990, 1998). Based on the work originated by Mead (1934), and further developed by Blumer (1969), pragmatism pertains to “human action and interaction and the construction and reconstruction of meaning within levels of context” (MacDonald & Schreiber, 2001, p.42).

In grounded theory from this perspective, reality is socially and culturally constructed. The intent of using the grounded theory approach in this study was to understand the nature of human behaviour, in this case, the experiences and understandings of nurses. The result is the creation of a substantive theory about the process of nurses integrating computer technology in their practice. The focus of this study was intended to understand the individual nurses’ experience, but also sought to describe the social and psychological processes the nurses as a group experienced to achieve adoption of computer technology in their practice. Therefore, I anticipate that the results of this study will assist in informing the future computerization initiatives in the HA, and will support the automation and future enhancements to nurses’ practice, specifically nursing’s practice processes and access to information.

**Reflections of the Researcher: Theoretical Sensitivity**

Consistent with Blumer (1969) cited in Charmaz (2006), grounded theorists’ “background assumptions and disciplinary perspectives” (p.16), often provide the basis and general concepts for the area of study. Strauss and Corbin (1998) describe theoretical sensitivity as “having insight into, and being able to give meaning to, the events and happenings in the data” (p. 46). My role in this study was to remain immersed in the data, using the constant comparative method to ensure that I was not only comparing participant data but also that I remained open to
emerging ideas (Charmaz 2006). These emerging ideas evolved from participant interviews, my personal experiences and the literature.

It was clear to me very early in this research process that my prior experiences in practice and in my current role could potentially bias or impede my ability to remain open and allow the "analysis to drive the data collection" (Strauss and Corbin, 1998, p.42). However, throughout this research endeavor, I experienced the exact opposite outcome. I was so eager to learn and understand from the participants, that I found myself so immersed in their responses that I had to remind myself that I was part of this process (Charmaz, 2006; Strauss and Corbin, 1998). I could not wait to get to the next interview so that I could explore new meaning with the next participant, about another participant’s experience or perceptions. I believed I was experiencing Strauss and Corbin’s (1998) version of “the constant interplay between the researcher and the research act” (p.42).

My personal perspectives about integrating computer technology in nursing practice stem from my current role within the health authority. This role not only requires me to establish and support the organizational direction associated with the design and implementation of the electronic health record, it also requires me to design and introduce clinical transformation initiatives that support nurses, physicians and other health care providers through the automation of their practice as well as practice process redesign. This includes the adoption of computer technologies in their practice.

Throughout this research experience, I have relied on my knowledge and experience in this area to seek clarification from the participants and to gain further insight into their perspectives. This reliance proved to be particularly helpful when the participant would reference certain terms and phrases pertaining to the HA’s computer and clinical information initiatives,
such as on-line decision support resources and computer technologies. This connection with the participants added to my interviewer confidence to seek clarification earlier on in the interview.

In addition to my current role, my experiences with respect to computer technology initially occurred when I was first introduced to computers back in 1989 at the purchasing of my first home computer. I had to purchase a computer to complete my baccalaureate degree in nursing. Until that time, I had never used a computer device personally or professionally. I was so excited to learn how to use the computer, despite the fact that I had never engaged in formal computer education. Needless to say, with a computer manual in hand, I felt somewhat overwhelmed during my initial learning experience with this technology. For whatever reason, I recall reflecting on all of the times I had worked with biomedical technology and how it had augmented my understanding about the patient's physiological status. I remember thinking, "If I could learn about that technology, then I could certainly learn how to use a computer".

This moment of reflection came to the forefront during the initial phase of my research and proved to play a significant role in my inquiry during the interviews with the participants. As a result, questions that I had pondered prior to this research study became embedded in the research experience. I had often wondered how computer technology could enhance my ability to provide care to patients and families. If I was working in an environment where computer technology interaction was required, how different would I perceive a computer device as compared to a biomedical device? I was making the assumption that if I could become proficient with biomedical technology, then I could become proficient with the computer. Again, these same thoughts proved to be invaluable as it formed the basis of an interview question about biomedical technology compared to computer technology. During the interview experience all
participants responded with insightful “ah-ha” responses, suggesting that they had just realized that a link between biomedical technology and computer technology existed.

**Participant Identification and Recruitment**

*Research Sample*

The grounded theory methodology requires that participants have experiences with the phenomenon under study. In this research study, the criteria required that all participants be practicing registered nurses with a minimum of six months of nursing practice experience, who currently provide direct care to patients and families and have access to computers in clinical areas located in two of the major acute care facilities in the Health Authority. My assumption was, which was later confirmed, that these particular Registered Nurse participants represented a purposeful sample of nurses of all ages and experiences and who would be able to articulate their understandings about the integration of computer technology in nursing practice.

The selection of the targeted clinical areas included in this study was based on the premise that computer technology was available and most likely accessed by nursing staff and others, such as physicians and paramedical staff. Additionally, I believed and it was later confirmed, that these nurses interacted with biomedical technology on a regular basis, and would therefore be able to reflect on comparisons between the integration of computer and biomedical technology in their practice. Because this had been an experience that contributed to enhancing my personal confidence about integrating computers in my practice, I wanted to understand whether research participants perceived bio-medical technology similarly in their computer integration experiences and if so, how did they perceive these similarities in their adoption or adoption of computers in their practice?

I was particularly interested in 'how' this group of participants perceived their relationship with computer technology during their clinical practice. For example, I wanted to
know about their computer knowledge and experiences, how they might interact with the computer, and how they had integrated a computer device or information technology into their daily clinical practice while engaging with patients/families.

To date, Registered Nurses continue to represent the only health care providers who connect with patients and families twenty-four hours a day, seven days a week. In the HA under study, Registered Nurses are required to access electronically-generated and stored patient information for the purposes of making timely and accurate care delivery decisions. Registered Nurses are one of many provider groups impacted in terms of providing safe and appropriate care when electronically generated and/or stored information is not available, particularly when this same information is not automatically printed on paper. It is therefore imperative to understand 'how' nurses use computer technology in their clinical practice in order to support advancements in future computer technology deployments. A Registered Nurse's ability to work well and efficiently with the right computer device in their practice has important implications for the quality and safety of patient care.

In grounded theory, it is not possible to predict the exact number of participants needed in advance; scholars such as Charmaz (2006) and Strauss and Corbin (1998) suggest that at least ten to fifteen participants would be necessary to achieve saturation of the data. At the conclusion of the recruitment process, at least three to four Registered Nurse participants were selected from each of the targeted clinical areas. Interview data obtained from twelve nurse participants were able to saturate the categories that emerged.

**Participant Recruitment**

Because of my current position with the HA, where I am the regional manager of clinical informatics, there was the potential for participants to perceive a power-over relationship. My role requires me to lead and manage the day-to-day operations of the regional
clinical informatics services, and to collaborate with clinicians from all health disciplines about their practice opportunities related to the integration of computer technology and electronic information systems. While in my role, there may have been a requirement for me to provide information or education over time to some or all of the participants. At no time, however, had I ever been in a position of direct-line reporting or been involved with the evaluation of the participants’ practice or performance.

While I believe there was no intentional risk of a power-over relationship, I recognized that participants may possibly have felt compelled to volunteer for the study or participate in a particular way by virtue of my role. To mitigate this risk, I incorporated the use of a third party recruiter during the recruitment phase of this research process and at any time that I needed to recruit additional participants. I retained the responsibilities of principal investigator to ensure consistency in the interview process and be able to adjust/adapt the interview questions as required.

The recruiter agreed to participate in a voluntary, unpaid capacity. She is a baccalaureate prepared Registered Nurse, who possesses extensive knowledge and skills associated with research, ethics, and participant recruitment as a result of her current research assistant role with the HA. I particularly appreciated that this recruiter consistently demonstrated a calm and well informed communication style with others regardless of the communication medium used (e.g., telephone, e-mail or face-to-face). I informed the recruiter about her role and emphasized that it was important to ensure that prospective participants were selected from among the volunteer participants who self-identified as willing to participate. The recruiter was not to select them individually. This method is consistent with purposive sampling used in grounded theory studies. Throughout the recruitment process, all names of prospective participants were withheld from
me until the consent to participate had been obtained and participants were informed about this research process.

Ensuring confidentiality of the participants throughout the recruitment phase to the fullest extent is integral to the ethical requirements in this study. Prospective participants were recruited using “Request for participant” posters, which introduced the study and me as the principal investigator (refer to Appendix E). These posters also conveyed the third party recruiter’s contact information, in addition to information pertaining to the process of becoming a participant (refer to the Information Letter, Appendix B, Participant Consent Form, Appendix C, and the Recruitment Poster, Appendix E). This information facilitated the prospective participants’ ability to self-identify and communicate directly with the recruiter. That is to say, when the prospective participant read the poster and determined that they were interested in participating in the study, they would then personally contact the recruiter by referencing the contact information from the poster.

In addition to poster distributions throughout the targeted clinical areas, the third party recruiter also communicated with each of the respective clinical area leaders to inform them that if there was a need for further information about this study, that she was available to provide that information upon request. There were no further information sessions required and prospective participants self-identified via telephone or e-mail to the recruiter as directed. Essentially, three to four participants who self-identified from each of the targeted areas and who agreed to participate in the study represented a purposeful sample. As soon as the desired three to four registered nurses from each of the targeted areas consented to participate, the recruitment posters were removed from the communication board locations.
Once the prospective participants identified themselves to the third party recruiter, either via e-mail, telephone or face-to-face, she conducted a brief review of their qualifying criteria as outlined on the recruitment poster, to assess participant ‘fit’ for the study (refer to Appendix E). With the prospective participants’ consents, the recruiter then obtained their contact information and read to them the content of the letter of information about the study. If the connection with the prospective participant was not face-to-face, the person was informed that a paper-copy of the letter of information about the study and their role would be forthcoming (refer to Appendix B). An in-person meeting was then mutually arranged between the recruiter and the prospective participant to facilitate the consent process (refer to Appendix C). This meeting enabled the prospective participants to ask any outstanding questions and exercise their option to sign the study consent form or abstain from the research study altogether.

In all of the instances when the recruiter met with the prospective participants face-to-face to review the letter of information, the participants expressed their willingness to participate and signed the consent form at that time. All participants were informed that they would receive a nominal gift of $25.00 to a local bookstore for agreeing to participate in the study. The gift was offered to all consenting participants as a token of my appreciation for their time. They were informed that they would retain the gift regardless of whether they remained in the study. All participants were also informed that they were free to decline and/or withdraw from the study at any time. Once the consent was obtained from the participant, the recruiter notified me and provided their name and contact information. I personally connected with all participants who had signed consents, by their preferred mode of contact, for example e-mail or telephone.

All interviews were arranged between me personally and the participant; mutually agreed upon times and locations were confirmed with attention to the need to maintain confidentiality
throughout the interview experience. Considerations to the participants’ work schedule, location and time were also incorporated into the interview plan. In all instances, participants preferred to be interviewed either before or after their work day when they would not be distracted by patient care demands and all interviews occurred in a meeting room away from their clinical area locations with only me as the interviewer and the participant present.

**Description of the Participants**

In all, twelve registered nurses, eleven female, one male, participated from a variety of patient care settings from two of the health authority’s acute care facilities. Ages of the participants ranged from 26-60 years (mean age = 45.9 years). Eleven of the twelve participants were registered nurses who held direct care responsibilities to patients requiring acute care services and one participant was practicing in a formal clinical nurse educator role. Each of the participants had nursing practice experience ranging from one to 40 years and all held nursing practice positions in clinical areas of moderate to high technology use areas (refer to table 1).

**Participant Sample**

**Table 1: Participant Sample-Demographics**

<table>
<thead>
<tr>
<th>Pseudonym</th>
<th>Age</th>
<th>Gender</th>
<th>Yrs of Nursing Practice Exp</th>
<th>Clinical Position</th>
<th>Clinical Practice Domain</th>
</tr>
</thead>
<tbody>
<tr>
<td>N - 01</td>
<td>44</td>
<td>F</td>
<td>15</td>
<td>RN</td>
<td>Cardiac Care</td>
</tr>
<tr>
<td>N - 02</td>
<td>53</td>
<td>M</td>
<td>24</td>
<td>RN</td>
<td>Renal Dialysis</td>
</tr>
<tr>
<td>N - 03</td>
<td>50</td>
<td>F</td>
<td>28</td>
<td>RN</td>
<td>PACU</td>
</tr>
<tr>
<td>N - 04</td>
<td>43</td>
<td>F</td>
<td>20</td>
<td>RN</td>
<td>Cardiac Care</td>
</tr>
<tr>
<td>N - 05</td>
<td>35</td>
<td>F</td>
<td>10</td>
<td>RN/Ed</td>
<td>Med/Surg</td>
</tr>
<tr>
<td>N - 06</td>
<td>30</td>
<td>F</td>
<td>1</td>
<td>RN</td>
<td>Med/Surg</td>
</tr>
<tr>
<td>N - 07</td>
<td>26</td>
<td>F</td>
<td>3</td>
<td>RN</td>
<td>Cardiac Care</td>
</tr>
<tr>
<td>N - 08</td>
<td>60</td>
<td>F</td>
<td>40</td>
<td>RN</td>
<td>PACU</td>
</tr>
<tr>
<td>N - 09</td>
<td>48</td>
<td>F</td>
<td>26</td>
<td>RN</td>
<td>Med/Surg</td>
</tr>
<tr>
<td>N - 10</td>
<td>51</td>
<td>F</td>
<td>21</td>
<td>RN</td>
<td>Renal Dialysis</td>
</tr>
<tr>
<td>N - 11</td>
<td>55</td>
<td>F</td>
<td>32</td>
<td>RN</td>
<td>Renal Services</td>
</tr>
<tr>
<td>N - 12</td>
<td>56</td>
<td>F</td>
<td>30+</td>
<td>RN</td>
<td>PACU</td>
</tr>
</tbody>
</table>
For the purposes of this study, moderate technology use areas were defined as those areas where infusion pumps, pain pumps and non-invasive vital sign bio-medical devices were used to augment patient assessments and care delivery. High technology use areas were defined as those areas typically described as critical care areas where, in addition to the aforementioned technologies, devices such as cardiac monitors, dialysis machines, and ventilators assist in the daily care delivery processes. None of the participants practiced in low technology use areas. All of the clinical areas had at least two computers which could be accessed by the direct care staff and physicians.

Data Collection

Data collection in grounded theory is one of the component features of the constant-comparative method but must be accomplished concurrently and in tandem with coding and analyzing through memoing, theoretical sampling and sorting (Charmaz, 2006; Corbin & Strauss, 1998; Glaser, 1998; and Schreiber, 2001). For the purposes of this thesis I will illuminate the data collection methods distinctly while describing how they were conducted using the constant-comparative method.

The Interviews

The interview process used in this qualitative study is consistent with grounded theory data collection methods outlined in Charmaz (2006), Schreiber and Stern (2001), Strauss and Corbin (1998), Wimpenny and Gass (2000). In the grounded theory method, there is a constant interplay between data collection and analysis as the researcher becomes more immersed in the data. As Strauss and Corbin (1998) suggest, the analysis drives the data collection.

In this study, semi-structured, one-hour, one-to-one interviews were scheduled at mutually arranged times and locations with each of the participants. Six general, pre-conceived,
open-ended interview questions were developed to guide the interview experience – with time provisions for additional questions to be incorporated as required (refer to Appendix D).

Charmaz, (2006), describes this method of interviewing as a “flexible” and “informal” approach to interviewing which creates opportunities to “explore, not interrogate”. Charmaz (2006) further emphasizes the need to ensure that the questioning “must fit the participant’s experience” (p.29). All questions were structured or restructured to encourage participants to share their experiences with the integration of computer technology in their practice. (Refer to Appendix D, Participant Interview Questionnaire).

Also consistent with grounded theory methodology, at the end of each interview, field notes were written, and analyzed, often resulting in the creation of new questions or new categories. These questions were added to subsequent interviews, where appropriate based on “fit”, to facilitate the pursuit of new information that may have arisen from the emerging codes identified in previous interviews. Consequently, each interview provided a foundation for all subsequent interviews. As Charmaz, (2006) suggests, “Interviewing is a flexible, emergent technique...” with new ideas and allowing for additional questioning that is relevant to the interview topic (p.29). This technique is also representative of another grounded theory technique known as theoretical sampling which will be discussed later in this chapter. All data from the interviews were coded by labeling “fragments/sections” of data with terms or codes derived from the participant’s own words. As the interviews and subsequent comparisons were completed coding resulted in new categories and emerging themes. The relationships among these eventually led to the development of a theory explaining how nurses perceive and manage the integration of computers in their practice.
**The Interview Questions**

Strauss and Corbin (1998) suggest that since the essence of grounded theory is to "...develop a theory" one must frame the research question in such a way that it will "...provide the flexibility and the freedom to explore a phenomenon in depth" (p.40). Charmaz (2006) further illuminates the significance of the researcher's guiding interests, sensitizing concepts, and disciplinary perspectives as contributors to the development of the interview questions.

With the exception of the first question, which relates to obtaining basic demographic information such as age, gender and years of experience as a registered nurse, all questions were open-ended and sought to explore the perceptions of nurses in particular situations and experiences pertaining to the integration of computer and bio-medical technology into their practice. Overall, Grounded Theory was selected as the research methodology for this study because of its usefulness in answering "how and why" type research questions in order to generate a theory that describes and explains the nurses' experiences with computer integration in their clinical practice. Mason (2002) and Norton (1999) describe this relationship as integral to the research process. The questions reflected in Appendix D were used to guide the interview experience.

**Data Analysis**

Analysis of data collected for this study was guided by the grounded theory analytic techniques as defined by Charmaz (2006) and Strauss and Corbin (1990, 1998). As previously stated, a central feature of the grounded theory method is its constant comparative method of analysis (Charmaz, 2006; Corbin & Strauss, 2008; McGhee, Marland & Atkinson, 2007; Schreiber, 2001, chapter 4; Strauss & Corbin, 1990 and 1998). At each stage of analysis, the grounded theory method requires the researcher to test and retest, compare and contrast existing
data with the participant’s understanding/perceptions. The researcher’s field notes, participant data, memos and other relevant sources such as the literature were compared and analyzed.

In this study, all participant interviews were audio taped and transcribed verbatim, which provided an essential data source for analysis throughout the research process. Immediately following each interview, I recorded on paper my observations and interpretations of the interview experiences and reflected on opportunities and ideas to explore emergent themes during subsequent interviews. Audiotapes were played back so that the participant’s tone and inflections could be part of the analysis. The data base for analysis consisted of the audio-tapes, transcribed interviews, field notes and memos.

Analysis began immediately following the first interview, using standard grounded theory coding procedures. Charmaz (2006) and Strauss and Corbin (1998), define coding in grounded theory as labeling portions of data. These labels or codes were often derived from the words of the participants. Open or initial coding proceeded by comparing incident-to-incident, incident to concept, and concept-to-concept, moving the analysis to higher levels of conceptualization (Corbin & Strauss, 1990 and 1998). Results from the initial data analysis informed the direction for subsequent interviews and comparisons. Glaser (1978) and Charmaz (2006), prescribe the following questions to be asked by the researcher during initial coding. These questions include, “What is this data a study of? What category does this incident indicate? What is actually happening in the data” (Glaser, 1978, p.57).

Using NVIVO software, I imported the interviews and commenced with open coding. The NVIVO software was particularly advantageous with respect to storing over 400 nodes (i.e., codes), related annotations and memos. The analysis of the data progressed using the constant comparative method of analysis (Charmaz, 2006; Glaser, 1978; Strauss & Corbin, 1990,
building on early categories to create more substantive categories until saturation was attained. I knew that saturation had been achieved when there were no new properties, actions, or conditions, emerging from the data (Strauss and Corbin, 1998).

Particular attention to the participant’s meaning was upheld by incorporating their words as “in vivo” codes. Charmaz (2006) defines in vivo codes as, “…codes of participants’ special terms...which help to preserve participants’ meanings of their views and action” (p. 55). Gerunds are defined by Merriam-Webster (2009) as a “noun formed from a verb; ends in ‘ing’ and designates an action or a state”, were also used to reflect the continuous rather than static state of the code and as a method to remain as close to the data as possible. Gerunds are typically used as category names in grounded theory. In this study, examples of gerunds included: finding meaning, realizing the benefits or managing the barriers.

**Theoretical Sampling**

Theoretical sampling is a grounded theory technique used to “…explore the dimensional range or varied conditions along which the properties of concepts vary” (Strauss and Corbin 1998, p.73). It involves pursuing additional data on the basis of the theoretical conceptualizations emerging from the data analysis. This became an integral component in furthering my understanding of the conditions by which nurses were able to synthesize values, realize benefits and manage the barriers when integrating computer technology in their practice.

Glaser (1978) describes the procedure of theoretical sampling as eliciting codes “from the raw data from the start of data collection through constant comparative analysis...” as the data is collected (p.36). The codes are then used to direct additional data collection as required until saturation is achieved. Charmaz (2006) suggests that theoretical sampling is different from initial sampling and describes the difference as, “initial sampling in grounded theory is where you start
whereas theoretical sampling directs you where to go” (p.100). Since theoretical sampling can only begin once the categories have begun to emerge it wasn’t until after the initial coding of the first six interviews that I was able to diagram and begin to see categories emerging.

For example, I used theoretical sampling to further my understanding about the participants’ types of experiences with computers based on years of experience. This understanding was realized by reviewing the participants’ demographic data and responses to questions obtained during the interview. During the constant comparisons among the participants, it became apparent that there was a significant difference in perception among two distinct participant groups; those who had practiced equal to or less than 15 years versus those who practiced equal to or greater than 16 years. The early codes and themes related to this later emerged as a sub-category Professional Discourses under the major category of Prior Experiences. These comparisons are further expressed in chapter 4 as Table 2.

Theoretical Sorting

Guided by Charmaz (2006) and Strauss and Corbin (1998), I began to use focused coding between the first three to six interviews after I had done a great deal of line by line, incident-to-incident coding. These early codes are identified under the categories in Fig. 1. Focused coding involves moving beyond word by word, line by line or incident-to-incident coding and requires the creation of more “directed, selective and conceptual” codes (Charmaz, 2006, p.57). I returned to the initial interview data, my field notes and memos in order to find out more about the emerging phenomena. Charmaz (2006) describes the process of “theoretical sorting” to include “...sorting, diagramming and integrating materials...” which in grounded theory “...leads to a theoretical development of their analysis” (p.115).
Further consultation with Strauss and Corbin’s (1998) version of the conditional/consequential matrix, assisted me in creating an early diagram that represented the emerging categories at that stage in the research experience. Strauss and Corbin (1998) define the conditional/consequential matrix as, “a coding device to help analysts keep in mind several analytic points” (p.182). These analytic points included: what is the emerging relationship between nurses who have adopted computers in their practice versus those who have not and what are the determinants that constitute computer integration positively. In that regard, I was hoping to gain a better understanding about the relationships among and between the categories, focusing on the context in which the conditions occurred (refer to figure 1).

![Diagram](image)

**Figure 1**-Finding *Meaning* with Computer Technology Integration in Nursing Practice

Initial and more focused coding revealed the early categories shown in *figure 1* to include: Barriers to Computer Adoption, Biomedical Device Integration, and Risks Associated with not integrating technology in clinical practice, Contextualizing Value, Knowledge Transfer, Benefits to Integrating Computer Technology and Nursing Profession Cultural Diversity.
Together these categories were beginning to point towards a central theme of Finding Meaning with Integrating Computer Technology. The categories and sub-categories represented the data acquired from the first six interviews.

Focused coding and theoretical sampling of the Benefits to Integrating Computer category spawned a new category referred to as Contextualizing Value. Codes and sub-categories pertaining to this category were originally situated with the Benefits category; however, upon further analysis of the data, the significance of this category began to emerge. When asked, all of the participants made and reflected on value statements when they responded to the first question about how they use computers. These value statements began to communicate a relational context. That is, the participants had expressed ideals and perceptions about providing care to patients and what it meant to them when incorporating computer technology in their practice.

The matrix also revealed that while there were relationships beginning to emerge between the some of the categories, there remained clear indications that these relationships were not yet defined and that the categories were not as well saturated as they needed to be. It was evident from the data that early categories such Contextualizing Value, Nursing Profession and Cultural Diversity and Barriers to Computer Adoption all had much more meaning behind them and further sampling to gather additional data would be required. The connections between and among the categories were only just beginning to emerge. Additional participant interviews were required in order to establish those relational connections.

A later conceptualization (Figure 2, p.49) of the first diagram (see Figure 1, p.47) represents the data following more focused and axial coding techniques applied to all twelve interviews. Strauss and Corbin (1998) define axial coding as "the process of relating categories
to subcategories” by converting text into concepts; these concepts “help to form more complete explanations about the phenomenon” (p. 124). In this diagram, relationships are beginning to emerge as major categories and sub-categories are revealed:

![Diagram](image)

**Figure 2-Early Depiction of Grounded Theory Diagram**

Building on each of the interviews, constantly comparing one interview to the next and leading up to the initial six interviews, further interviews and subsequent comparisons were completed. Coding resulted in emerging themes and categories and the relationships among these, which led to the development of an emerging theory that explains, “How nurses use computers in their practice”.

Leading up to the creation of this diagram, I had realized Cultural Diversity Among Nurses represented a compilation of assumptions and meanings as expressed by the participants; these references reflected their perceptions of themselves and their professional practice in
relation to patient care. For example: this category emerged from the following codes and sub categories: Generational Influences, Graduation Year, Years of practice experience, Perceiving similarly and differently. These pertained specifically to common perspectives related to practice and computerization that I believed was inherently representative of the participants’ education and training. The boxes in the diagram delineating the nurses by years of experience emerged during initial and focused coding and later emerged as Professional Discourses and Organizational Discourses under the category of Prior Experiences. They represented the differences in the cohort groups’ perceptions about computers and the integration of computers. The following statement was made by one of the nurses who had been practicing for greater than 16 years:

Computers are a box, they’re in a corner and if you choose not to use, there is always someone you can ask to do it, because it is generic, because there is always going to be some young pup around that you can convince to look things up, because it’ll be a hell of a lot easier than that person teaching you how to use the computer.

Prior Experiences emerged early as a higher level category and represented the significance that the nurses’ perceptions of prior experiences with technology integration (biomedical/computer) significantly contributed to how they perceived and managed the integration of computer technology in their practice. The three text boxes associated with the Prior Experiences text box included Learning, Organizational Discourses, and Bio-Medical Technology. These sub-categories represented the contributors to the nurse’s perceptions about those prior experiences. During the interviews, it became evident that participants also realized that their perceptions about their prior experiences changed as new information was made available, i.e., why the computers were implemented the way they were during the initial period of implementation. As a result, some participants expressed an altered perspective, which would
later contribute to moving forward with future computer technology integration initiatives; this provided rationale for the two-way arrows from and to Prior Experiences.

Contextualizing Value emerged as another early and major category which represented the following codes: Defining ‘value’, Beliefs about computer technology, and Beliefs about nursing practice in relation to patient care. This particular text box was significant and emerged later in the process during axial coding, as profound and most representative of the participants’ foundational understandings about whether to incorporate the computer technology and related clinical applications, into their daily practice.

The last two major categories emerged very early during the initial coding experience and remained prominent throughout all coding phases. Participants either described themselves as falling into one of two groups: a) those individuals that were more apt to realize the benefits of integrating computer technology in their practice which in turn then enabled them to be more inclined to manage the barriers when integrating computer technology, or b) those individuals who did not/could not realize the benefits enough to subsequently manage the barriers to adopt the computer technology into their daily practice because they felt the barriers were too substantial. This particular participant group went on to describe how they practice without comprehending the risks associated with ‘not’ incorporating the technology.

By the end of this early analysis phase, I realized that category saturation had not been completely achieved as evidenced by the gaps in the process and the relationships between the categories. Since there remained too many unanswered questions, additional and more focused analysis of the data was required in order to identify the basic social process of understanding how nurses perceive and manage computerization in their practice. Analysis of why the participants made assumptions about themselves and their relationships with computer
technology was still not understood and it remained unclear how the participants moved through
the process to get to the state of Adopt, Adapt, or Ignore as it pertains to integrating the computer
in their practice. This process is further explicated in the Chapter 4: The Findings section of this
study.

Memoing

Charmaz (2006) suggests that writing a memo is “the pivotal intermediate step between
data collection and writing drafts of papers” (p. 72). Memoing for me became an integral enabler
to furthering my understanding of the data and the meaning of the emerging concepts and
categories. The constant interplay between my memo writing and the emerging concepts from
the data became a ritual that assisted me to further my understanding and follow the direction of
the data. In this regard, the process of memoing enhanced my ability to remain reflexive
throughout the analysis experience by ensuring that my personal assumptions and experiences
were clearly identified in my memoing and communicated where appropriate during the
interviews. Charmaz (2006), suggests that reflexivity is evidenced when the researcher conveys
how their “… intent, positions, and assumptions influenced their inquiry” (p. 188).

Through the process of memoing I was able to free-text ideas and questions that I
identified initially as “dangling data” that did not appear to connect directly with emerging
categories. This process would later prove significant with respect to the construction of the
conditional/consequential matrix and the realization that Prior Experiences would play a
significant role in the nurses’ ability to synthesize values related to integrating computer
technology in their practice. All memos were written on loose paper, with questions and thoughts
about emerging concepts and categories: these paper documents were often clustered or bundled
with paper-clips as they pertained to each concept. NVIVO software was used initially during the
early and later stages of open and focused coding, however due to software-related challenges I was forced to revert back to recording my memos on paper. This was rather ironic since I was studying the perceptions of nurses with integrating computers in their practice and here I was experiencing computer software problems.

Ensuring Scientific Rigour

This issue of rigour in qualitative research has long been at the centre of debates among positivist and postpositivist inquirers (Patton, 2002). However, central to qualitative rigour is the analytical processes and the role of the analyst during the research experience (Charmaz, 2006; Patton, 2002). Chiovitti and Piran (2003) referenced Beck’s (1993) work on the evaluation of qualitative research in which he identified the concepts of credibility, auditability, and fittingness as standards to achieving rigour in a qualitative research study. Chiovitti and Piran (2003) define these concepts more specifically: credibility relates to trustworthiness or authenticity of the participants personal experiences; auditability pertains to the clearly explicated participant selection and analytical process; and fittingness pertains to the recognizability or transferability of the findings from the participant data and the literature to others in similar situations. Rigour in this study was achieved using the concepts defined by Chiovitti and Piran (2003) and Sandelowski (1986), credibility, auditability and fittingness.

Credibility as it pertains to trustworthiness of the data in this study was demonstrated in a variety of ways that included ensuring that the data reflected the participants’ perceptions about how they understood and managed computers in their practice. Chiovitti and Piran (2003) and Strauss and Corbin (1998), suggest that rigour and grounded theory research go hand in hand because data is derived from the participants who inform theory development rather than theory
being forced upon the participants. In grounded theory, it is the incoming data that informs the subsequent data collected.

Data collection from the participants consisted of open-ended, semi-structured interview questions which were used as a reference and to initiate discussion about the research aim. During the interviews I sought clarification from the participants when I was unclear about their meaning and would restate what I thought I had heard using their own words. Open-ended interview questions were asked of the participants to ensure that they continually guided the process. Consequently, in all of the interview experiences, I would begin the interview asking the first open-ended question and found myself not having to ask the next three questions. This provided credibility with respect to the construction of the interview questions because they were consistent with the participants’ thinking. The last three questions of the interview guide were more focused questions and provided more clarification from the participants if their initial responses necessitated more specificity. Interview transcripts were available to all participants to review and to confirm that I had accurately captured their perceptions and responses.

In order to mitigate the risk of my personal biases, values, beliefs and assumptions I used memoing and theoretical sampling techniques throughout the research experience to further my understanding about the relationships within the data. Again the need to be critically reflexive throughout this process, particularly with respect to the relationship between my personal experiences with integrating technology in my practice and the participants' experiences was integral. Analysis of the data involved reviewing the emerging theoretical findings against the actual data as described in Chapter Four and the literature was used to support the emergent themes as presented in Chapter Five.
Finally, I worked closely with my thesis supervisor who helped to guide the research study, provide me with support as required and ensured that each step of the research study was of high quality and remained consistent with the grounded theory methodology. Through peer debriefing with experts in grounded theory from the grounded theory club (GTC) at the University of Victoria, I received peer support and was challenged in my analysis; this process represented another form of reflexivity as I was confronted with questions about how my personal experiences with technology were suggestive or influenced those of the participants.

The group met once every two weeks to discuss and help problem solve theoretical and methodological issues of participants. Through the GTC group, I received support at each stage of the study, such as assistance developing codes and feedback on the developing process, as well as specific solutions to problems with the use of terminology. Again, the process of remaining critically reflexive throughout these peer-supported experiences was essential to ensure that the quality and integrity of the research process was maintained.

Auditability is another criterion of rigour, which involves making the research process explicit to ensure that another researcher could follow my process. Sandelowski (1986) likened auditability to one researcher following the decisions of the another researcher and coming up with a similar outcome. With respect to this concept, I demonstrated auditability by remaining consistent with grounded theory analytic techniques, such as using the constant-comparative method throughout the various stages of the research process. Questions such as those identified by Charmaz (2006) and Chiovitti and Piran (2003) were also used as a guide when addressing the data; questions such as, what is occurring in the data? What does the action in the data represent? What do I call what is occurring in the data? How do the participants describe what is occurring? What are the relationships between the codes? What are the conditions or
consequences occurring in the data? Additionally, memoing also provides an audit trail of analytic processes and decisions; memoing was used extensively throughout this research experience.

Fittingness, the third criterion of rigour, is a concept that roughly parallels the notion of external validity as defined in quantitative research, although the two concepts are quite different. Fittingness is evidenced when the findings of the study are transferrable across contexts and will most likely “have meaning to others in similar situations” (Chiovitti & Parin, 2003, p. 433). Fittingness is enhanced when the context in which the participants describe their meaning or intent can be applied to the other participants’ experiences. This concept was demonstrated substantially when participants described how prior experiences with technology directly correlated with how they were able to synthesize the values related to technology and computerization in their practice. In this regard, a method consistent with grounded theory known as member checking was incorporated. For example, if a new code or category began to emerge, I would check in with another participant to determine a shared perspective or not. This method became particularly significant when attempting to understand nurses’ perspectives about each other. The literature was also used to support the emergent themes as described in Chapter Five of this document.

**Ethical Considerations**

A variety of strategies as defined in the Research Ethics Application, were applied to the research process to ensure that all necessary ethical considerations were considered and incorporated into the research design. This section describes the actions taken to ensure that ethical requirements for this study were met in relation to: ethics approval from the University of
Victoria and the Health Authority, participant recruitment and power-over, nominal $25.00 gift token, informed consent and confidentiality/anonymity and dissemination of results.

Ethics approval was obtained from the Joint Sub-Committee of the University of Victoria and the Health Authority Research and Ethics review board, prior to the commencement of participant recruitment (refer to Appendix G). Once ethics approval was obtained, the participant recruitment process began using a third party recruiter in order to attend to the potential risks associated with the participant's perception of power-over. Participant recruitment and power-over have been described earlier in this chapter.

Ethical considerations were also implemented with respect to the nominal gift given to all participants who agreed to participate in this study. Each participant was given a $25.00 gift certificate to a local bookstore as a gesture of my personal appreciation for her or his participation. While none of the participants withdrew from the study, had anyone of them decided to withdraw at any time during the study, they would have been entitled to keep the gift certificate as instructed. All participants were apprised of the purpose of the gift token at the time of their consent to participate and all participants followed through with their interview commitments.

Confidentiality of the prospective participants, their unique identifying information, and their data was maintained by incorporating the following steps:

1) Assigning a research pseudonym to each of the participants,

2) Ensuring all consent forms, hand-written and electronically generated via e-mail were password protected and secured in a private and locked location,

3) Interviews were conducted in a mutually agreed upon location that ensured privacy protection to the participant,
4) Audio-taped recordings and hard-copy documents requiring participant identification reflected only the participant’s research pseudonym and were stored in the password protected electronic data-base and locked file drawer, accessible only by the principal investigator,

5) Upon completion of the research defense, audiotapes and back-up discs will be destroyed and paper data will be shredded. Only the electronic data will be maintained and accessible by unique authentication through password protection using the principal investigator’s laptop device. This data store will be accessed for the purposes of future submissions of this study for publication.

Summary

In this chapter I presented an overview of grounded theory as the research methodology for this study. I defined the philosophical underpinnings used to ground the research activities associated with understanding how nurses use and manage computerization in their practice. Sample selection, interview structure, questions as well as interview techniques were described and representative of the data collection methods. Data analysis methods were described and illuminated the importance and relevance of memoing, theoretical sorting as well as theoretical sampling in order to explicate the codes to categories. Scientific rigour was described and evidenced throughout the research process and addressed principles associated with fittingness, auditability, and credibility. Finally, a description of ethical considerations was presented. This description included participant recruitment using a third party recruiter, acquisition of consent, assurance of participant confidentiality, and security of data during and after the study had concluded.
Chapter 4 - Research Findings

In this study, the basic social problem of how nurses perceive and manage the integration of computer technology in their practice was examined. Grounded theory methodology was used to define the social process of how nurses **DEVELOP A RELATIONSHIP WITH COMPUTERS IN THEIR CLINICAL PRACTICE**. As presented in the previous chapter, a brief description of the each of the participants provided the context in which their perspectives on the process of computerization in their practice were experienced.

This chapter describes the findings resulting from my analysis of the participant experiences and their perceptions of this social problem under study. The participants’ journeys through their experiences with integrating computers in their practice have been explicates based on the findings grounded in the data from the interviews as well as my interpretation and analysis of the data. The findings revealed the basic social process of **DEVELOPING A RELATIONSHIP WITH COMPUTERS IN NURSING PRACTICE** (refer to figure 3).
An Overview of the Grounded Theory

The following quote from one of the participants captures the essence of this basic social process in her initial response to the computer arriving on her unit:

We received no training that was it, I remember the day they came, at the community dialysis clinic. The new computer arrived... I actually said to my boss, I hope you don’t think I’m going to use that, because it’s not happening because I’m done with having to do extra things, I’m done, and my boss just looked at me...and I say what I think and she didn’t say anything... and then I found out what I could get out of that machine (computer), which was instant lab values, no more of this waiting for paper, waiting for
that, and I saw the value instantly and I became the crusader of the computer in my clinical area.

Based on this quote and additional data revealed during the interview, this participant acknowledges that her PRIOR EXPERIENCES and perceptions about computer technology influenced her initial response to the computer. This initializing event evoked feelings of work fatigue and overload. She held the perception that computers were used for clerical purposes rather than as tools to augment her nursing practice. When confronted with computer technology in her practice, she immediately and consciously connected with her prior, negative experiences about learning new technologies, her views about computers as devices used primarily by clerks to fulfill data entry functions, and about her ability to access the computer in relation to patient care. Self reflection on PRIOR EXPERIENCES became the foundational trigger for this nurse to reconnect with her core values about her practice in relation to providing patient care.

In this scenario, following an initial demonstration and education about the computer and the related clinical applications, she was able to move beyond her negative PRIOR EXPERIENCES by engaging with her core practice values with respect to patient care. She then began to REALIZE THE BENEFITS that computer technology and subsequent access to the electronic health record and clinical resources would contribute to her ability to provide safe patient care in her practice area. The process of SYNTHESIZING THE VALUES allowed her to be able to remain open to learning about the computer and realize the opportunities that computerization could contribute to her practice and patient care processes.

As a result, this participant has since begun to MANAGE any perceived BARRIERS to incorporating the computer in her practice, while REALIZING the many BENEFITS of this new clinically relevant technology. The OUTCOME of this social process for this participant is
consistent with my interpretation of the participants' depiction of a nurse who has begun to
ADAPT this computer technology to fit into her every day practice.

DEVELOPING A RELATIONSHIP WITH THE COMPUTER IN NURSING
PRACTICE: A GROUNDED THEORY

This next section provides a comprehensive overview of the basic social process and will
be followed by a more in depth description of the findings in each of the categories associated
with the basic social process. To represent the model and distinguish the first, second and third
level categories, I have differentiated the font styles. The basic social process DEVELOPING A
RELATIONSHIP WITH THE COMPUTER IN NURSING PRACTICE is uppercased, bold
print and underlined. Major or first level categories such as CONFRONTING
COMPUTERIZATION, PRIOR EXPERIENCES, SYNTHESIZING VALUES,
REALIZING THE BENEFITS, AND MANAGING THE BARRIERS, and OUTCOMES:
ADOPT, ADAPT or IGNORE are represented in bold print and uppercased; second level
categories such as Experiences with Computers, Experiences with Bio-Medical
Technologies, Learning and Organizational Discourses and Professional Discourses, are
represented in bold print, capitalized and underlined. The third level category, New
Computerization Experiences is represented in bold print, capitalized and italicized. Extended
arrows have been incorporated from the bottom of the diagram flowing to the top of the diagram
to depict the non-linear and non-static relationships between the participant's prior experiences,
synthesizing values and subsequent outcomes; this basic social process has the potential to
change for each of the participants as they gain New Computerization Experiences in their
practice.
The Basic Social Process: An Overview

The basic social process of **DEVELOPING A RELATIONSHIP WITH THE COMPUTER IN NURSING PRACTICE** consists of six major categories: **CONFRONTING COMPUTERIZATION, PRIOR EXPERIENCES, SYNTHESIZING VALUES, REALIZING THE BENEFITS, MANAGING THE BARRIERS** and **OUTCOMES**:

**ADOPT, ADAPT or IGNORE.** While each major category represents a distinct experience and process, they collectively illustrate the phases of the basic social process that participants' engage in, in order to determine how they will define their relationship with the computer — that is, whether they will adopt, adapt or ignore the computer in their practice.

**CONFRONTING COMPUTERIZATION** is a first level category that represents the initializing event that participants’ describe when computers are introduced into the clinical areas at the HA. This initializing event is depicted in a slightly raised presentation in the diagram with a two-way arrow pointing towards **PRIOR EXPERIENCES** and back towards Confronting Computerization. The back and forth arrows represent the dynamic relationship experienced when participants first confront the computer technology which then triggers their reflections of Prior Experiences. The participants describe this event as one that evoked responses of **Acting** or **Reacting** and one that elicited memories about their Prior Experiences when confronting computerization. The downward arrow back to the initializing event represents the participants’ reconnection with Confronting Computerization. How participants experienced Confronting Computerization at the HA, for example positively or negatively, impacted the speed at which they were able to move through the next stage of the social process, **SYNTHESIZING VALUES**.
Foundational to the entire basic social process is the second of the six major categories; this is represented as the participants’ PRIOR EXPERIENCES. This first level category is an amalgamation of conditions or contingencies that influences the entire basic social process as experienced by the participants. These second level categories were expressed by the participants in the form of reflections of prior experiences in the following areas: Experiences with Computers, Experiences with Bio-Medical Technology, Learning, Organizational Discourses and Professional Discourses. These conditions provide the context that explains the participant’s path through the social process after confronting the computerization.

SYNTHEIZING VALUES is the third of the three major categories which represents the process of nurses connecting with their values related to their practice in the context of providing patient care. This process is triggered by the introduction or requirement to confront a change in their practice, for example the introduction of computer technology. At this stage, participants’ described how they consciously engaged with the value-based aspects of their nursing practice as they pertain to their ability to provide safe patient care. Based on my understanding and analysis of the participant data, this category proved to be one of the most significant aspects of the entire process. Participants revealed that the more they felt connected to and aware of their core values about nursing practice as it pertains to their ability to provide patient care, the more they were able to comprehend the meaning and relevance of the introduction of computers in their practice. In this instance, finding relevance and finding meaning were identified as second level categories in which core values were expressed by the participants as requirements to preserve the nurse-patient relationship when providing care.

REALIZING THE BENEFITS was identified as the fourth major category. This category represented the stage at which the nurse engaged with the process of Discovering
Enhancements in relation to computerization. Participants described how they explored new knowledge, practice, and workflow realities associated with the computer technology and the resulting enhancements to their ability to provide safe, timely, and more informed patient care. This was significant because the more they were able to connect with their core values about practice in relation to patient care, the more proficiently they were able to relate to the positive contributions that computerization could bring to the nurse-patient-technology relationship.

Some of the many benefits identified by the participants included having access to the patient’s health information and to clinically relevant information that enhanced their knowledge about patient care needs. This, in turn, enhanced their ability to make safe and appropriate care decisions. Other benefits included knowing how to search for the information, and experiencing timely access to the computer technology at or close to the patient or point of care.

MANAGING THE BARRIERS is the fifth major category which represents the experiences that the participants described when attempting to navigate the myriad of obstructive processes that adversely impacted their ability to use the computer. Barriers were identified by the participants as: organizationally prescribed processes; knowledge gaps; aspects of the care process that made it difficult to use the computer; not knowing how to search or find information; or not having timely access to the computer technology which ultimately made it difficult to realize the benefits of the computer technology in the nurse-patient-technology relationship.

The sixth major category was represented as the OUTCOMES of the process of DEVELOPING A RELATIONSHIP WITH THE COMPUTER. These include ADOPTING, ADAPTING or IGNORING which are associated with the participants’ conclusions about how the computer would be defined within the context of the nurse-patient-
technology relationship. Specifically, **ADOPT, ADAPT, or IGNORE** are the outcomes or derivatives of the participants’ experiences related to synthesizing values, realizing the benefits and managing the barriers. These outcomes are distinct for each of the participants and are described as dynamic, meaning that the outcomes could change with the introduction of *New Computerization Experiences*.

This process is a continuous one, as depicted in the elongated arrows in the diagram. The participants had *New Experiences* associated with computer technology, which eventually became “new” prior experiences that influenced their subsequent engagement with computer technology. This newly initiated cycle starts the process all over again and causes the participants to re-engage with their new experiences, synthesize their values associated with practice in the context of providing care, realize the benefits of computerization and manage the barriers. This new cycle results in the participants’ transitioning from a state of ignoring to a state of adapting or adopting the computer technology in their practice, or a state of maintaining their current level of adoption.

For all of the participants there emerged a very clear and common social patterning that defined the process they experienced when confronting computerization in their practice. This social process is about **DEVELOPING A RELATIONSHIP WITH THE COMPUTER IN NURSING PRACTICE**.

Appendix A provides an overview of the process of **DEVELOPING A RELATIONSHIP WITH THE COMPUTER IN NURSING PRACTICE** and depicts each of the categories in detail. The tables in Appendix A identify the six major or first level categories in the process: **CONFRONTING COMPUTERIZATION, PRIOR EXPERIENCES, SYNTHESIZING VALUES, REALIZING THE BENEFITS, MANAGING THE**
BARRIERS and OUTCOMES: ADOPT, ADAPT, or IGNORE along with their respective second and third level categories, conditions and consequences. Strauss and Corbin (1998) and Charmaz (2006) define conditions as those circumstances or happenings that describe why or how participants respond in particular ways; whereas consequences were defined as the outcomes of actions/interactions to particular circumstances or happenings.

Describing the Categories in Detail

An overview of the basic social process and all components of the various categories have been presented. I am now going to describe each category with its subcategories in detail, drawing on the data to illustrate the basic social process in its entirety.

ENCOUNTERING COMPUTERTIZATION IN THEIR PRACTICE: CONFRONTING THE TECHNOLOGY

Computerization in the HA and nursing practice initiatives have, for the most part, been introduced in stages and phases of automation. For all of the participants in this study, they too have experienced computerization in similar ways. Health care organizations have traditionally made decisions about how best to introduce and support this technology in clinical practice. As presented in Chapter 2, many factors have been identified as influencing the computer adoption by nurses and others. These include the computer type selected, the location of the computer, the clinical applications and their relationship to nursing practice as it pertains to providing care, in addition to how and when computer education was provided. Present day perceptions and feelings about computerization expressed by the participants remain as diverse as in those early days of computer deployment.

Participants’ identified Confronting Computerization as the initializing event in the basic social process of DEVELOPING A RELATIONSHIP WITH THE COMPUTER IN
**NURSING PRACTICE.** This first-level category is defined as the trigger event that initiates a cascade of experiences that the participants engage with when determining their relationship with the computer in their practice. Following this initializing event, participants' engaged in five major components of this basic social process: reflecting on prior experiences and synthesizing values, realizing the benefits, and managing the barriers. From the moment participants' experienced the initializing event of confronting computerization, they immediately began to translate the introductory messages as communicated by the practice leaders and/or project implementation team leaders about the computers and computerization and reflect on all aspects of their prior experiences with computerization. The process of synthesizing values, realizing the benefits, and managing the barriers followed shortly thereafter.

![CONFRONTING COMPUTERIZATION](image)

**Figure 4 Confronting Computerization**

In this phase of the basic social process, the conditions upon which participants' experiences with confronting computerization were realized, were based on their years of nursing practice experience, types of experiences pertaining to the integration of computer and bio-medical technology, learning experiences and the organizational discourses associated with the computerization initiative; all of which contributed to their initial perceptions when confronted with computerization at the HA. Confronting computerization is composed of two
sub-categories: *Reacting to the Technology* and *Acting and “Getting on with it”* (integration of the computer technology). A range of participant responses were expressed when they were asked the first interview question, “Tell me about your experiences with computers”. Both of these sub-categories represents the essence of the participant experiences with confronting computerization at the HA.

*Reacting to the Technology*

*Reacting to the Technology* is a sub-category that participants describe as part of the process they experienced when initially confronted with computerization at the HA. Although many of the participants had prior experiences from home or workplaces outside of the HA, some did not and for these participants, their first experiences with computers occurred at the HA. Of those participants’ who had prior experiences before arriving at the HA, they described how those experiences influenced their perceptions about computerization at the HA:

> It’s interesting; I’ve had experiences working with computers in three different provinces now. At one location the computer systems were different than here (at this HA) where all of the manuals were on line, which I really like. I didn’t have to flip through all of the paper like I do here.

Other participants who had only experienced computerization at the HA, expressed their perspectives about confronting computerization in this way:

> In my practice we haven’t had computers a whole lot, so they’re actually pretty, fairly new to our area, probably just the last two to five years we’ve had computers and it’s been a very gradual start. We had the computers, it’s the unit clerk that works on it, doing statistics and then we’ve had the internet access, access to pharmacy, and some manuals. I’ve used it a couple of times for the IV Manual, I love that, once somebody showed me how to do it.

Each of these participants expressed a range of feelings and emotions as they pertained to the process of confronting computerization at the HA and the aforementioned examples illuminated just a couple of these responses. These emotions included feeling intimidated which was attributed to the fact that they had never used the computer before or because of their
unfamiliarity with the clinical information systems in general. Other participants expressed feelings of frustration because of the belief that they had “no choice” when to use the computer, how they learned about the computer, or because the HA had been so far behind other health care organizations with respect to on-line clinical resources and robust clinical information systems. Participants also communicated a feeling of being overwhelmed by the notion of bringing on new technology. They attributed this feeling to a perception about increasing workload demands that included “taking on one more piece of ‘unfamiliar’ technology”. Conversely, some participants expressed feelings of enthusiasm as they were finally moving forward with advancing the use of computer technology and related clinical information systems in their practice.

**Organizational Discourses** and subsequent decisions associated with the distribution, placement and rules about the use of computers also contributed to how the participants responded to the introduction of computerization. For example, participants emphasized that the computer uptake by nurses tended to be compromised if their prior experiences, were more negative than positive. Additionally, the HA decisions about the number of computers and location of the computers were not perceived as supporting their practice which negatively influenced the participants. The opposite was true if they had more positive prior experiences and the organizational decisions about the computerization initiative were supportive of their practice values. In this regard, participants based these determinations on their reflection about their nursing practice in relation to patient care; an example of the nurse-patient-technology relationship, and their ability to ensure that information via the technology was going to be near or at the point of care, when they needed it. In summary, all of these influencing factors and
emotions were informed by their prior experiences as well as the organizational decisions about computerization.

**Acting and “Getting on with it”**

Initial experiences pertaining to *Acting and “Getting on with it”* represented the actions participants demonstrated at the time of the initial computerization experiences at the HA. Emotional responses were initiated and based on their prior experiences in conjunction with organizational decisions. These contributed to participants’ actions associated with moving beyond this initializing experience so that they could begin to process ‘how’ the computerization initiative was going to make sense in their practice as it pertains to providing patient care. This process is referred to as Synthesizing the Value of computerization in Nursing Practice and will be discussed in more detail in the next section.

An example of *Acting and “Getting on with it”* was best described by one of the participants in this way:

Initially it did intimidate me and it made me feel silly, like why wasn’t I getting it, and then all of these other people seemed to be able to get. I think it made me try harder. It gave me sense of pride that I was actually able to do it and I never again walked into a new technology afraid.

In this example, the participant is describing what it was like for her at the time she confronted the introduction of computers in her practice. This participants’ experience was similarly shared by most of the other participants, however not all addressed their computerization experience with as much enthusiasm. This was an example of the participants who while initially intimidated, committed to learning and “**Getting on with it**”. For these participants, this meant that they immediately moved into determining how this computerization experience was going to assist them in practicing differently with enhanced access to information where and when they needed it and on the effect it would have in improving their ability to make better care decisions.
for safe patient care. Other participants who had been practicing for longer periods and had none
to little experience with computers tended to take more time to move beyond the initializing
event and described their version of “getting on with it” as “feeling stuck”. For these participants
they described feeling stuck in the context of getting on with it to mean they did not spend a
great deal of time figuring out how to incorporate the computer in their practice and as a result,
only used it when they had time to work with someone to help them access the information. For
all of the participants, it wasn’t until the next phase of the basic social process that they were
able to move beyond their initial thoughts about confronting computerization and find the clarity
they needed to proceed through the next steps of this process.

PRIOR EXPERIENCES

Prior Experiences represents the second major category in the basic social process:

DEVELOPING A RELATIONSHIP WITH THE COMPUTER IN NURSING

PRACTICE, (see to figure 3). Prior experiences is the category that describes the participants’
reflections about their experiences with computerization and how they perceived these
experiences to have impacted their ability to integrate computers into their practice. In this study,
the scope of prior experiences is defined as those experiences with computerization that occurred
up to and including their last experience at the HA.
This second major substantive category is comprised of five foundational components or second-level categories that collectively have been identified by the participants as influencing their experiences through the entire basic social process when confronted with computer technology. These components influenced the participants' experiences with computerization at the HA, and have ultimately influenced their overall experiences with respect to how they understand their professional practice in relation to providing safe patient care in an automated care environment. As *New Experiences* with computerization were realized, new experiences were established which may have altered the perceptions of the participants in one area or another. (Refer to figure 3, *New Experiences*). For example, if the participant did not have a great deal of prior experiences to reflect on, then all changes related to computerization were perceived as "new experiences"; unlike their more experienced colleagues whose perceptions of change and computerization would be based on years of positive or negative experiences in the area of introducing technology in their practice.

Based on my interpretation of the participants' interview responses, these sometimes negative and sometimes positive influencing conditions informed the way in which participants
were able to engage with and understand their practice relationship values with respect to providing patient care. For the participants, these values were depicted as the essence of what they believed to be relevant and meaningful to their practice in relation to providing patient care. For example, if an identified organizational computer change was, in their view, relevant and meaningful, and the participants' prior experiences in this regard were positive, then they were more apt to realize the benefits of the organizational change as it relates to technology, and subsequently manage the barriers associated with the change initiative. This notion of values will be explicated further in the section on synthesizing values.

The four types of PRIOR EXPERIENCES identified in this segment of the basic social process include: Experiences with Computers, Experiences with Bio-Medical technology, Learning, Organizational Discourses and Professional Discourses. Each of these sub-categories represents a focused prior experience that contributed to the participants' perceptions and response when confronting computers in their practice. Each of these prior experience types will be discussed in further detail.

**Experiences with Computers**

This sub-category represents the process that participants' underwent when reflecting on their prior experiences with computers. The findings showed that when participants described their experiences with computers, they talked about them in the past tense. Participants' described their experiences with computers as Using the Computer Technology or Ignoring the Computer. Using the Computer Technology was further described as "Experiencing Computers at Home" or "Experiencing Computers at Work". Participants talked about "Experiencing Computers at Home" as predominantly positive experiences because they could take the time to learn about the computer in their own way, learn about searching for information, as well as
fulfill household responsibilities such as planning family activities, banking or shopping on-line. They described these experiences as enhancing their lifestyle as they were able to gain efficiencies with on-line planning, registration for programs and activities, paying bills, or going back to school.

I still use my computer at home, like I rarely go to the bank, I do all my banking on-line, including registration stuff on-line for the rec centre. I don’t know what I would do without it.

Prior negative home computer experiences resulted from negative learning experiences such as: their inability to connect with computer support resources when the computer was “acting up”, challenges in attempting to learn about how to search for information, or difficulties in taking their first computer course because they were going back to school. In these scenarios, participants described their increased anxiety levels when learning from family or strangers, and increasing frustration that there were limited or no ongoing resources to assist with computer support needs.

I had to take a beginner course, I hired somebody to come into my home, but it wasn’t really truly that useful, I guess I didn’t have a good teacher.

Overall, participants’ indicated that these home-based positive and negative prior experiences with computers contributed to their perceptions about how they perceived and managed computerization at work.

Participants’ also described their prior experiences using “Computers at Work”. These negative or positive experiences resulted either from experiences with computers from previous hospitals where they had practiced before or from their previous experiences with computerization initiatives within the HA. Those who had positive experiences reported having feelings of excitement related to technology and having realized that there was a connection between the computer and clinical relevance. Some grieved the loss of computerization benefits
from their previous workplace experiences, which they did not experience initially in this HA.

Two of the participants’ describe these positive experiences in this way:

The first experience I had was in the United States where I had to do computer charting. It was an absolutely positive experience because the electronic charting provided me with reminders about what to document...I loved it.

So there we were doing everything, we were able to log on, one entry log on which is way better than what we have here. I literally left there just within weeks of on-line charting. Then I came here and we had none of the medications on-line and you’d have to look them up the long old fashioned way.

Finally, some participants also described how they Ignored the Computer as a way of being able to control the pace with which they were going to learn about or incorporate the computer into their practice. For these participants, Ignoring the Computer became a coping response to maintaining some control of their practice ‘change’ requirements. Essentially, this meant that, given that the HA’s maintenance of the paper-based health record in its entirety, the participants felt that incorporation of the computer into their practice was optional. They were also comfortable with the idea that if they were no longer able to access the necessary information for their practice, that they might then choose how to use the computer.

I don’t need to know about the computer because the lab results keep coming up on paper everyday. You know, we have our paper trail and that’s really all I as a bedside nurse would use the computer for...If we stop the printing; I guess I will need to learn.

Overall, the process of reflecting on prior experiences with computers, affected how participants engaged with computers in their practice when they were initially confronted with the opportunity to use them. Those participants who had positive prior experiences indicated that they were more likely to use computers and accept new computerization initiatives at the HA. The opposite was true for those who had negative prior experiences with computers. In addition, participants who had positive prior experiences expressed feelings of motivation and willingness to try new experiences related to computer technology. Those who encountered negative prior
experiences expressed resentment, denial, intimidation or less motivation to try new experiences pertaining to computer technology. Examples of these negative prior experiences were expressed by some of the participants:

I mean coming from where I worked in Toronto, just the lay outs of the floor were horrible, like to get access to a computer you would have to walk all the way down the other end of the hall. This meant to look something up, well, I probably wouldn’t because of the time factor, and it just wasn’t feasible.

I was in denial; I just didn’t understand the importance of technology, the importance of where it was leading to. You know, we had our paper trail with lab results and that’s really all as a bedside nurse that I needed.

Experiences with Bio-Medical Technology

This second category illuminated the participants’ reflections on their prior experiences with Bio-Medical Technology and how they influenced their experiences with confronting computerization in their practice. Reflecting on these previous experiences elicited feelings that ranged from excitement, “I adapt to change very easily and I like technology so I’m not afraid of the computer” to fear, “It did intimidate me initially and it made me feel silly, like why wasn’t I getting it?”. These statements represented their emotions associated with their prior experiences when confronting bio-medical technology as well as subsequent experiences with integrating computers in their practice. Most of the participants suggested that there was a similarity between integrating bio-medical technologies and computer technologies since they both support patient care and decision making, and efficiencies in their practice and workflows:

It’s kind of all the same. It’s just using the technology and once you look at it, somebody teaches you, they show you how to use it in your practice. It takes time to learn and it and I use it all of the time.

Participants who did not “grow up with computer technology” describe the significance of this conception about technology in general and suggest that prior experiences pertaining to how they learned about and integrated the bio-medical technology in their practice positively or negatively
impacted their perceptions about computers. These perceptions will be further explicated in the subsequent paragraphs.

Participants' described their **Beliefs About Bio-Medical Technology** and their reflections about **Using the Bio-Medical Technology**. They go on to emphasize that integrating this technology is a care requirement which augments safe and appropriate practice. Participants expressed their **Beliefs About Bio-Medical Technology** and described their experiences **Using the Bio-Medical Technology** based on their years of practice experiences with bio-medical technology. Participants with years of practice experience compared themselves to those nurses who grew up with computer technology and would have possessed less experience with bio-medical technology as not having the same prior experiences. Both of these prior experience conditions contributed positively or negatively to their perspectives about confronting computerization in their practice. In other words, if their prior experiences were predominantly focused on incorporating bio-medical technology with little to no use of computer technology, and their prior experiences with bio-medical were negative, their beliefs about technology in general, including computer technology were negative. The opposite effect of computerization resulted if their prior experiences with bio-medical technology were typically positive among those participants.

**Beliefs about Bio-Medical Technology** represents the participants' perceptions about what they believe and think about bio-medical technology in general. In this regard, participants felt that this technology, unlike some participants' perspectives about computers fulfilled an immediate and focused purpose for the patient, meaning that typically these devices served a particular monitoring or single-multi dimensional purpose. In addition, participants' illustrated how the technology augmented their ability to provide safe and appropriate care through ongoing
physiological monitoring and administration of medications/solutions. In all instances
participants stated that while there may have been “no choice” but to adopt or incorporate the
bio-medical technology into their practice because of mandatory organizational policies and/or
procedures, they could appreciate the purpose and value that they brought to the nurse-patient-
technology relationship.

In this instance, participants’ conveyed their perceptions about the technology providing
them with opportunities to be freed up to complete concurrent and related patient care activities
while trusting that the bio-medical technology was performing its alerting and monitoring
functions appropriately and safely. In this instance, participants learned to appreciate the value
that this technology contributed to their ability to provide safe patient care. As a result, this prior
experience “value” relationship between technology and care delivery became the expected norm
as it pertained to adopting subsequent technologies in their practice. If this value relationship
could not be explicated during the education about the computer technology, then participants
did not perceive computerization as enhancing their practice. Conversely, with respect to
participants who had multiple prior experiences with computer technology, the value relationship
was already realized and therefore did not have to made explicit during the introduction of the
computer.

Participants also reflected on their beliefs about and experiences with mandatory
education and certification standards that were imposed on them prior to incorporating selected
bio-medical technologies in their practice. Unlike computer technology use in practice, these
technologies and certification standards were deemed to be consistent with ensuring safe practice
and were often attributed to being related to higher acuity monitoring or infusion type activities
usually seen in critical care and higher acuity medical/surgical units. In this regard, participants
were consistent in their beliefs and perceptions about the serious implications if the nurse did not complete the necessary education and certification requirements. Participants believed that although sometimes these strict requirements were demanding and challenging to complete, they shared a common belief that a defined level of knowledge and practice proficiency was expected prior to using the bio-medical technology in their practice. As one participant stated:

You had to be certified to use the device, you had be able to be to know be competent to use, to hang a heparin drip it was often a life and death thing. You had to know how to use that equipment or there could be serious injury...and when learning that technology, it was often almost one to one or in small groups and there was a lot of support...you practiced and learned it and you were doing it everyday until you aced it.

**Using the Bio-Medical Technology** represented participant reflections about their prior experiences with *Using the Bio-Medical Technology* in their practice. Based on their purpose and function; participants’ felt that the introduction of bio-medical technology was a “given” as a result of the ongoing, increasingly complex and demanding workloads. Participants’ related these prior experiences as being similar to that of “expected” or “ongoing change”. Curiously, the more experienced nurses reflected a great deal on the earlier times in their careers when they were practicing in high-technology use areas like the intensive care unit where they would spend hours assembling cumbersome and complicated equipment which was supported by older versions of bio-medical technologies. These occurrences were challenging and extremely time consuming and as a result, often left the nurse with feelings of anxiousness and concern in the context of their increasingly complex patient assignments and workload demands. For these participants, prior experiences associated with bio-medical technologies contributed positively or negatively to their early perceptions about computerization in their practice. These same participants also revealed that advancements in bio-medical technologies have definitely made a difference in terms of how they now perceive the use of these complex devices and admit that
although they recognize the value to patient care delivery, when confronted new technologies in general, they are often reminded of those difficult times. For the lesser experienced, newer nurse participants, they revealed that they would not have shared these same types of prior experiences and therefore indicated that they had less anxiety or feelings of fear or concern when confronting new bio-medical technologies.

"Trusting the technology", another third level category, was expressed by the participants similarly and differently. To clarify, participants with multiple years of experiences trusted the technology less than participants with fewer years of experiences. The findings suggest that this variance had more to do with the prior experiences of the more experienced participants who, over time have realized the denigration of bio-medical technology maintenance standards, inferior technology products and overall challenges related to maintaining ongoing and/or remedial education on the devices.

In this instance, both experienced and newer nurse participants expressed varied statements about their experiences with ongoing maintenance and calibration requirements needed to ensure that the devices were functioning properly. The participants with more years with these types of experiences were less inclined to trust the technology and expressed more negative experiences than their colleagues who were more trusting and therefore more reliant on the bio-medical technology data outputs, for example, automated vital signs. One participant expressed her concerns about the newer nurses and her perceptions about their increased reliance on bio-medical technology in this way:

I find a whole bunch of young ones, they’ll do a blood pressure using the “nurse on a stick” (automated blood pressure machine) and they’ll look at that and give the medication…they don’t even know if the machine is working or picking up the patient’s blood pressure properly.
The more experienced participant validated that the patient had an underlying arrhythmia which was not easily or accurately interpreted by an automated blood pressure machine; she indicated that a manual blood pressure would have been much more accurate. More experienced participants believed that they had a better sense about when they could rely on bio-medical technology and when to more appropriately question the technology than their less experienced colleagues. Conversely, less experienced participants indicated that although they did not necessarily share the same types of or quantity of experiences as their more seasoned colleagues, they did feel confident in knowing when to question the technology. One of the lesser experienced participant stated:

I would say that as a newer nurse, because our practices aren’t rooted so much in things, we might have an easier time trusting in bio-medical technology…but when I’m not sure, I will always go back to my patient.

In summary, participants described their prior experiences with the use of bio-medical technology as necessary technology that augmented their every day practice and ability to provide safe and appropriate patient care. These experiences positively or negatively contributed to their beliefs about technology in general as well as their capacity to positively confront computerization in their practice. This belief was expressed by one participant who compared her perceptions about bio-medical technology with computer technology:

Computer technology does not support life like bio-medical technology, but it supports the data from those devices when entered into the electronic health record, it helps me make decisions about patient care which is life-saving.

Participants’ prior experiences associated with learning about and being able differentiate the scope and function of the bio-medical technology resulted in early adoption and incorporation of computers into their practice. Additionally, participants unanimously agreed unlike computers, bio-medical technologies provided a single or multi purposed function that
was clearly delineated, combined with the frequency within which they were required to use the devices based on patient need, it was perceived that these devices were much easier to incorporate into their everyday practice. In contrast, prior experiences associated with learning about and incorporating computers into everyday practice was perceived as different because of the frequency within which they accessed electronic patient information from the EHR.

With the IV pump, there is only one way to program it, and I use it all of the time. Whereas when I search for information on the computer, there are so many ways to get from point A to point B.

Finally, ongoing challenges related to the lack of bio-medical technology support, technology related quality controls and inferior products made it more difficult for nurses to trust the technology. One of the participants described this technology support as being integral for her to trust that any technological device will do what it is supposed to do where and when she needs it. For some of the participants, these prior experiences with bio-medical technologies negatively impacted their ability to realize the value and subsequently realize the benefits and manage the barriers associated with adopting the computer technology.

**Learning**

Learning is the third second-level category associated with PRIOR EXPERIENCES that captured the essence of the participant’s prior education and training experiences. These education and training experiences were related to bio-medical and/or computer technologies and the related clinical information systems, for example the EHR. These learning experiences took place at home, in the work place in the HA or at other facilities they may have worked at prior to arriving at the HA. Again the participants’ responses were diverse but similarities pertaining to the impact of prior learning experiences as they related to their perceived need to learn, time to
learn, and space to learn were all integral to helping them gain new knowledge and comfort with the technology.

The findings showed that the second-level categories related to learning were identified by the participants as *Experiences with Learning* and *Taking the Time to Learn*. These sub-categories explain the participants’ experiences with learning that impacted their perceptions about future learning experiences about computerization at the HA, either positively or negatively. These negative or positive prior learning experiences influenced the participants’ process of synthesizing their values related to nursing practice when providing patient care. In this stage of the basic social process, participants’ described how negative or positive learning experiences affected the extent to which they were either inspired to incorporate new ways of practicing as they pertain to the nurse-patient-technology relationship and patient care, or by causing them to hold onto their “old ways” of practicing if given the choice not to integrate the new learnings about computerization.

One of the ways in which participants exercised their option to hold onto “old ways” of practicing, was demonstrated as a result of the HA continuing to automatically print the same clinical information that was reflected in the EHR. Some participants who experienced negative prior learning experiences interpreted this organizational decision as “giving them the option” to refer to paper-based clinical information or electronically generated/stored clinical information; thereby giving those participants the option to choose to incorporate the computer in their practice or not. Unfortunately, if the participant’s prior learning experiences did not include relevant information about the risks and benefits associated with computer adoption and the inherent safety outcomes associated with currency of the clinical information electronically
generated/stored in the EHR, then as some of the participants’ indicated, it would seem logical that they would choose the familiar ‘old way’ of practicing.

In this scenario, participants attributed the negative prior learning experiences to their experiences when synthesizing values related to nursing practice and patient care. Some participants described how difficult it was to see the relevance to patient care when learning about and subsequently adopting the computer technology. These perceptions not only emphasized that participants held values related to maintaining “old ways” but that these values impeded their ability to realize the benefits and manage the barriers associated with incorporating computer technology in their practice. The opposite was true if the participant had experienced positive learning experiences about technology which led them to engage with their values associated with providing care to patients, in such a way that they would be receptive to learning “new ways” of practicing. This process positively enhanced their ability to realize the benefits and manage the barriers and subsequent adapting or adoption the new computer technology into their practice.

These perceptions were consequentially identified as affecting the outcomes associated with adopting, adapting, or ignoring the proposed practice change introduced at the time of education and/or training related to computerization in their practice. That is to say, if the participants’ perceived that they had a negative learning experience, for example, if they were unable to comprehend the new information, the proposed practice change or take the time to learn about the education materials related to the technology, then they would experience significant difficulties or challenges with the uptake or adoption of the computer; the opposite would be true if the learning experience was a positive one.

Experiences with Learning
Their learning experiences were described as pertaining to learning about computer technology, bio-medical technology and clinical information systems. These experiences were also described with the emphasis on the relationship between the learner and learning locations such as: learning in a classroom, in the clinical area, just-in-time learning immediately prior to implementation of the technology, or through on-the-job mentoring at the bedside. Additionally, participants’ equated different types of learning modalities with different types of technologies. For example, they indicated that for bio-medical technologies there was higher incidence of “just-in-time” learning, learning on the clinical unit and on-the-job mentoring. Whereas, learning about computers and clinical information systems tended to take place away from the clinical units in formal classrooms. Some of the participants described feeling intimidated to learn with their more computer literate colleagues, and for others, experiencing education about technology away from the clinical area was “not as familiar” to them and they consequently found it difficult to absorb.

The difference there has been larger groups, less time to learn, there is no one-to-one, or small groups like two or three people. Everyone is at different levels, some people can walk in they’ve got years of experience on a computer and pick it up like that, and there’s people like me who walk in and the classroom setting with lots of people and tons of questions don’t work for me at all, ever.

Perspectives about prior learning experiences and relationships to the different types of technologies were described. For example, participants’ who identified themselves as having little experience with computers prior to their introduction to computerization in the HA felt that learning about bio-medical technologies, regardless of the education location, was easier or “less intimidating” than learning about computer technologies. They believed that bio-medical technologies were directly linked to patient care, patient monitoring and safe medication or fluid administration whereas computers did not have that direct link to safe patient care.
Interestingly, I find learning bio-medical devices less intimidating, so it's the computer that scares me because I could push the wrong button and crash the system and lose all of the information! You know, that's what you were taught right when the computers first came out.

With bio-medical technology you have no choice but to learn it because you can't put that ownership on anyone else, you can't ask the unit clerk, you can't ask another nurse or whatever to do it, there's often not that freedom, you either learn it or you're going to fail.

Additionally, participants with less computer experiences than some of their more computer experienced colleagues, described their learning experiences about computer technology as being of lesser priority than bio-medical technology because they still "had a choice" to incorporate the computer or not. This perception was also linked to those participants who had yet to fully embrace computer technology in their practice (adapt) as a result of their inability to realize the clinical relevance (synthesizing value, realizing the benefits).

With bio-medical technology, the onus to learn is on the nurse, she has no choice because it is needed to provide care to the patient, its sink or swim and either you adopt the technology or fail to provide safe care. With computers, there is still a perception of choice because we still have paper printing.

Those participants who had multiple prior experiences with computer technologies could see the similarities between learning about computer technologies and learning about bio-medical technologies. In this regard, these participants emphasized the importance and clinical relevance of both technologies and how much easier it was for them to use the technologies if they understood the foundational components of each device. For these participants, transitioning form one device type to another was "easy" and as a result, they equated their prior learning experiences similarly in terms of necessity and uptake of new information related to computerization (adopt).

Conversely, participants' who identified themselves as having more nursing practice experience and little prior learning experiences associated with computers versus those
participants with less practice experience and more computer experiences revealed that they experienced more challenges with realizing the benefits of learning about computer technology. In this regard, the positive and/or negative prior experiences associated with learning about biomedical and/or computer technology, affected their perceptions about Relevance and Meaning (synthesizing values).

When we were trained as students, I can remember learning how to set up arterial lines that took us good God, it took us two hours. It was a major frigging production; we had to close down half of ICU.

Consequently, feelings about workplace fatigue and associated perceptions about the efforts associated with learning, combined with the added pressures to absorb new information about the technology evoked a perception about prior learning experiences that was not conducive to easy computer uptake or integration into practice. This sub-category was significantly impactful to the participants because prior experiences related to learning shaped the way in which they were able to understand the use of computers in the clinical setting and nursing practice processes as they pertained to the nurse-patient-technology relationship.

Taking the Time to Learn

Taking the Time to Learn represented the participants’ perceptions about taking and having the time to learn. Participants’ experiences in this regard ranged from descriptions about how they would continually seek out learning opportunities, feel excited about broadening their understandings about computers, or about how they would avoid learning about new technologies if they felt there was a choice to do that. The findings showed that some participants attributed their prior learning experiences about computers or bio-medical technology with feelings of fear or anxiousness as a result of the added burden to their workload. For these participants, Taking the Time to Learn was realized, contrary to their colleagues who
identified themselves as being excited to learn more as a result of their positive learning experiences.

Overall, Taking the Time to Learn was also described by the participants as the way in which they engaged with learning about new technologies. While some of the participants, particularly those who had prior experiences with computers or those who experienced predominantly positive learning experiences associated with technology, were able to adapt to the pre-defined learning modality offered at the time. Conversely, the participants who had extensive nursing practice experience, more negative learning experiences and may have had less computer experience, described how they required more time to learn and synthesize the values associated with computers in their practice than their colleagues who had more positive experiences learning about computers. For these participants, they described feeling “embarrassed” about not being able to learn about computers as quickly or easily as their colleagues. These participants realized that if they were going to learn about computers, they would need to establish alternatives to the standard education delivery such as “learning from home whenever possible” and “learning when there was less distraction or stress related to patient care while at work”. Participants who shared these perspectives emphasized the importance of ensuring that enough time and multiple options are available to accommodate diverse learner groups if they are to be successful in their learning outcomes. Participants described these experiences in this way:

I go home at night almost nightly and try and see if I can find another way to learn something new, I have an idea how to get to somewhere, and then I come to work and it takes a little less time.

We're just starting to get a computer in one area between four patients so if you have a quiet moment you can maybe go on. I've used a couple of times for the IV Manual; I love that, once somebody showed me how to search for the information that was really neat.
In summary, prior learning experiences have been described by the participants as positively or negatively contributing to their perceptions about how they will engage with and experience new learnings that support new care delivery practices. Participants identified that positive prior learning experiences contributed to feeling excited, less intimidated and eager to learn “new ways” to practice. Whereas negative prior learning experiences contributed to feeling afraid, intimidated and less able to Find Relevance or Meaning; this led to participants’ feeling less eager to learn and subsequently maintain their “old ways”.

Professional Discourses and Organizational Discourses.

Professional Discourses and Organizational Discourses represent the collective thinking about ways in which the participants’ perceive each other and how they perceive their actions based on their social construction within the organization. In this regard, the findings show that participants believe both professional and organizational discourses are interdependent, and they are also realized distinctly in their practice experiences. This section presents the participants’ perceptions about professional discourses and organizational discourses in the context of the overarching basic social process.

The category of Professional Discourses revealed diversity and sometimes tension among the participants’ who had less nursing practice experience but more computer experiences and those nurses with more nursing practice experience but less computer experiences. These differences and subsequent tensions were identified as professional discourses because they influenced how participants perceived and made assumptions about one another in their workplace. These perceptions and assumptions are delineated in Table 2, pg. 92, and are intended to represent their sometimes binary opposing perceptions in their practice environments.
This sub-category was comprised of three third-level categories: *Practicing Similarly and Differently*, *Mentoring and Supporting*, and *Experiencing Transitions*. Collectively and respectively, these categories described 1) how nurses perceived each other in context of their practice relationships with computerization and patient care, and 2) how they supported each other or not, during times of changes in their practice, specifically the introduction of the computer technology. In this regard, participants’ reflected on their prior experiences as they pertained to the professional discourses that influenced their openness to transition to a new way of practicing in an automated care environment; this was realized during the process of synthesizing their practice values pertaining to patient care. As a result, depending on the positive or negative influencing factors associated with *Practicing Similarly and Differently*, *Mentoring and Supporting*, and *Experiencing Transitions*, participants adopted, adapted or ignored the computerization initiative.

*Practicing Similarly and Differently* is a sub-category that represents how nurses perceived and made assumptions about each other in the context of their practice relationships with computerization and patient care. In this regard, participants may have acted or responded to the computerization initiative in different ways (practicing differently); however, in the end, they were consciously and intuitively ensuring that safe and appropriate patient care was provided (practicing similarly). Increasing generational-graduation year tensions among the participants were attributed to this perceived practice dichotomy. This dichotomy was described by the participants as their perceptions about what participants with more years of experienced valued about the nurse-patient-technology relationship versus the participants’ with less years of practice experience. In this instance, participants with more years of nursing practice experience
described the following as integral to their practice: remaining in close proximity to their practice versus leaving the patient to access the computer, or becoming reliant on the technology versus relying on the patient to provide the information.

Conversely but also similarly, their peers with fewer years of nursing practice experience defined their practice values similarly to their more experienced colleagues but also emphasized the adjunctive role that computers and clinical information systems play in the nurse-patient-technology relationship. From their perspective, computerization creates opportunities for timely and accurate patient and clinical decision support information; a clinical tool that they did not believe they could live without in this highly demanding information age. Table 2 presents the participants' perceptions and assumptions about nurses within each of the identified groups.

Table 2-Nurses' Perceptions about Each Other

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<th>NURSES' PERCEPTIONS ABOUT EACH OTHER: Generational/Graduation Year Assumptions</th>
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<td><strong>Nurses with ≥16 years Experience</strong> (Nursing School Graduation prior to 1994)</td>
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<tr>
<td>- Less inclined to use computer technology</td>
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<tr>
<td>- Tends to perceive bio-medical technology different from computer technology</td>
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<td>- Tends to have less trust in bio-medical and computer technology</td>
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<td>- Relies more on intuition, practice knowledge and experience</td>
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<td>- Did not grow up with computer technology</td>
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<td>- Tends to take longer to incorporate computers in their practice</td>
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<td>- Less apt to transition (learn and adopt) easily from one technology</td>
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| NURSES' PERCEPTIONS ABOUT EACH OTHER:  
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<th>Generational/Graduation Year Assumptions</th>
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| **Nurses with ≥16 years Experience**  
| (Nursing School Graduation prior to 1994) | **Nurses with ≤15 years Experience**  
| (Nursing School Graduation 1994-2008) |
| device to another | to another |

Participants demonstrated Practicing *Similarly and Differently* through their incorporation of bio-medical and computer technology in their practice. While some of the participants used the bio-medical technology without hesitation and with ease, and searched for opportunities to use the computer to access clinical information, other participants described their use of technology as selective. In this instance, these participants used the bio-medical technology because they were required by organizational policy to do and/or because they associated the value of the bio-medical device to patient care. For these same participants, paper-based information such as the patients’ health record remained the primary source of data. They described the absence of organizational policy and their inability to seamlessly engage with computer technology in their practice as a result of a variety of perceived barriers such as: their limited understanding about how use the computer or search for patient information, and computer placement. In the end, both participant groups emphasized that they shared similar values related to their practice in the context of patient care; but, described associated differences with respect to ‘how/where/when’ they accessed relevant information in a technology-enabled care environment.

**Mentoring and Supporting**

The process of *Mentoring and Supporting* was described as representative of their prior experiences with colleagues with respect to how they demonstrated mentoring and supporting each other. In this regard, participants’ described their experiences with their colleagues during
the introduction of computers or new clinical information system functionality such as the EHR. Prior experiences such as “Trusting the colleague”, “Asking the Colleague”, “Resenting the Colleague” and “Helping Each Other” were all experiences described by the participants as representative of the *Mentoring and Supporting* process. In this regard, all of the participants voluntarily provided mentoring and support to their colleagues during computerization initiatives at one time or another. However, participants who were identified as having less practice experience but more computer experience were less prone to voluntarily mentor and support than their more experienced colleagues who possessed less computer experience. Participants with less practice experience expressed the notion of expectations that computerization in today’s practice environment “was a given”. Therefore, when confronted with computerization initiatives, they felt that all nurses, regardless of years of experience, should incontestably strive to engage with the computerization education and move forward with computer adoption in their practice.

Conversely, participants’ who had extensive practice experience described their perceptions about computerization and the notion of mentoring and supporting one another. In this scenario, the more experienced participants described computerization as “new” and “unfamiliar” with increasing significance in their practice, and that mentoring and supporting one another was an expectation. One participant who has practiced for over thirty plus years expressed her ideal in this way:

I’ve taken it upon myself for some of the older nurses who are in their 60’s to spend time with them when I’m working weekends so that I can show them the computer, show them how to do things and even on-line banking.

Another one of the more experienced participants, who defied the stereo-types, described her mentoring experiences with new nurses who were practicing in a high technology-use area:
They ask so many questions about the patient conditions and medications...I try not to make myself the source of truth for information,...I always say to them, let's look that up together in the computer.

Consequently, experiences with mentoring and supporting were constituted differently for each group of participants in this study.

Resulting tensions between or among the participants were also explicated in their reflections about their prior experiences. These reflections included examples of the participants with more computer experience having “feelings of frustration” with their colleagues who deferred to them to “look up the results because they did not know how”. Conversely, participants who advocated for more peer-mentoring or supportive engagement activities would see the value in the creation of new collegial alliances in the clinical practice area. Participants who relied more on their computer savvy colleagues did not see themselves as “adding to their colleagues’ workload” since they felt that “looking things up on the computer was kind of fun” and still a practice option as a result of the parallel paper-based health record processes. Conversely, participants who provided the “look-up” service for their peers felt it was as “frustrating and unnecessary” as the demands on their time only added to their already stretched workloads; this only added to the tensions between them.

Overall, the notion of Mentoring and Supporting influenced how participants perceived their future computerization initiatives. If they could not rely on their nursing colleagues to provide mentorship and support, they could not trust that they would have the access to the information they needed to move forward with their learnings about computers. On the other hand, if the participant had positive experiences with colleagues’ mentoring and supporting, they had a greater chance of feeling more positive with future computerization initiatives as well as
being able to connect or engage with their nursing practice values as they pertain to providing patient care.

*Experiencing Transitions*

*Experiencing Transitions* was also defined as a second-level category in the Professional Discourses sub-category. This category represents the participant’s prior experiences with respect to how participants sought to change their practice while incorporating the computer technology. Initially and as described in the literature in chapter two of this study pertaining to nurses’ attitudes, many of the early studies identified chronological age of the nurse as a determinant of the nurse’s ability to incorporate the computer technology in their daily practice. However, in this study the participants’ age alone was not the major factor determining the prior computer-use experiences. Participants’ demonstrated that because nurses enter the profession and graduate later in their chronological years, the qualifier of age becomes less relevant, as in the case of this study.

   Additionally, participants who had practiced for 16 years or more, described how they had more difficult times integrating the computer technology, whereas nurses who had practiced 15 years or less, had a greater tendency to integrate computer technology into their daily practice at a much faster pace. The participants’ attributed these experiences to either having “grown up with computers” or that “they had used computers when they had returned to school”.

Conversely, participants who had much more practice experience had not typically grown up with computers and had not attended post-diploma education that required the use of a computer.

   Numerous statements made by the participants from each of the generational groups in Table 2 support these findings. One of the participants who had practiced for ≥ 16 years described her experience in this way:
I think the ah, the computer itself I think it's just a matter of using it, it's like any kind of a skill...it takes a few glitches along the way and we're all older and our brains are kind of fuzzy and it just takes us a little longer.

This participant perception was shared with other participants who had practiced $\geq 16$ years and represented their beliefs that because they were "older" that using a computer and incorporating this technology into practice "...takes us a little longer" and given the space to learn and the mentoring support of their more computer savvy colleagues, they ultimately adapted the computer technology in their practice. Ironically, these participants also realized that the additional time to learn about computers provided them with more time to realize the values associated with the nurse-patient-technology relationship. This process for nurses with less computer technology experience was deemed unnecessary for their more computer literate colleagues because they had already incorporated these value relationships into their computerization experiences and they had already gained familiarity with the computer.

Another interesting perspective pertaining to the notion of *Experiencing Transitions* was described by the participants as expectations associated with the qualities of nurses.

If there is any change I find it is a brick wall. I was never as shocked as when I was first graduated, started on a floor, they were trying something new and it was like, no. I thought we're nurses we're supposed to be flexible, we're supposed to try things, and it's never ever changed. So I don't know if some of like technology, as technology changes well it was just fine the old way. I think it's fear. I think its fear of the unknown, fear of change...

This reflection was significant because once again there was a consistency amongst the participants that "ongoing change is a practice reality". This perspective was shared by all of the participants; however, when change related to technology was introduced, there were opposing perspectives among the participants who had identified themselves as possessing less computer experience and more nursing practice experience versus those participants with more computer experience.
experience and less practice experience. They valued "flexibility" in their practice but only when "being flexible" could be accommodated in their practice repertoire. This understanding was linked to the final feature of *Experiencing Transitions* which included the participant qualities of "confidence and competence".

This was an important reference to one of the early categories revealed during open coding, "Comparing Generational Confidence and Competence". This reflection was representative of the 'disconnect' experienced between and among those nurses who expressed comfort and confidence with computer technology versus those who are not. The message was really reflecting the notion that if you are not able to incorporate the computer in your practice, then you must be incompetent. One of the participants who had practiced equal to or less than 15 years remarked about nurses with equal to or more than 16 years experience; conveys empathy for her colleagues:

I think it’s hard if you’re considered in your clinical practice to be the expert (more experienced nurses) and then to realize that you’re not the expert in some aspects of your practice, so what we’ve done is, is we’ve taken an entire generation of nurses, who are our experts, and we’ve made them incompetent in an aspect of their practice...

Finally, participants’ reflected on their prior experiences associated with *Experiencing Transitions* and described the increased tensions between themselves and the organization. For some of the participants’, particularly those participants with fewer years of nursing practice experience and more computer experiences versus those with more nursing practice experience and less computer experience, described how they embraced the changes related to computerization and were expressing their desire to bring on more change; the opposite was expressed by those with more practice experience and less computer experience. These reflections were described as transitions in practice as they moved through the change and either
incorporated the computers seamlessly in their practice or with some degree of difficulty. These reflections were also consistent with previous examples of difference amongst the participants and can be related to some of the participants’ comfort with computers versus those that do not possess that degree of comfort. Overall, all of the participants expressed their frustrations about the amount of organizational change as it contributed to workload fatigue, stress and tension pertaining to competing priorities associated with incorporating new technologies into practice.

In summary, this PRIOR EXPERIENCE second-level category was a significant finding because it provided a foundational understanding about how the participants’ perceived themselves and each other. It also revealed that age cannot be a singular factor that presumes a particular outcome as it pertains to computerization. While there are generational/graduation year differences, in the end, the participants remain engaged in the basic social process that requires them to reflect on their prior experiences when confronting computerization, synthesize their values as they pertain to their practice in relation to patient care, realize the benefits and manage the barriers.

**Organizational Discourses**

Participants defined Organizational Discourses as representing all of the influencing conditions that stemmed from organizational policies and procedures, computer and bio-medical technology implementation designs, and structures and processes as delineated by the organization. These influencing conditions positively or negatively impacted the nurses’ ability to engage in the technology experience and receive the desired education and support. Organizational discourses were expressed by the participants as multi-faceted and interdependent with professional discourses as they indicated that the organizational rulings constituted their practice in particular ways. In other words, for some of the participants, they experienced a
negative workload burden in trying to incorporate the new computerization initiative in their practice as a result of their limited experiences with computer technology. For other participants the computerization initiative was perceived as introducing significant adjunctive devices that would ultimately support their practice in the context of care delivery. These participants typically had experiences with computer technology. The resulting tensions between the participants and the organization were based on the decisions made by the organization and how those decisions impacted the participants.

The experience of many participants was that the organization's discursive structures and processes, which were intended to facilitate and support the proposed initiatives and staff, often resulted in the opposite outcome. When participants' defined organizational discourses as a prior experience, they expressed them with a range of feelings of excitement to frustration, mistrust and concern and as a result, these discourses positively or negatively impacted the participants' perceptions associated with new or upcoming computerization initiatives. *Experiencing Organization Decisions* was identified as a second-level category associated with organizational discourses.

**Experiencing Organizational Decisions**

Participants described their *Experiences* with *Organization Decisions* as representing how they engaged in previous organization computerization initiatives. Participants describe these experiences to include "Experiencing Timing/Impact of Computerization Initiatives", "Accessing Computers", "Knowing Where and How to Find Needed Information", and "Experiencing Computer System Downtimes". In each of these third-level categories, participants reflected on the context and nursing practice implications associated with prior computerization initiatives. Although many of the positive and negative perceptions described were also reflected in the
realizing the benefits and managing the barriers section, it was clear that participants’ prior experiences as they related to organizational discourses positively or negatively had the potential to impact their *New Computerization Experiences*.

Prior experiences in the context of organizational discourses also impacted the participants’ process of synthesizing values as they struggled to realize the clinical relevance if the computerization initiative, which in their view, was going to diminish patient care and add to their already demanding workload. For some of the more computer savvy participants’ although they were excited about further computerization, they struggled with their past experiences in this regard because of the challenges related to lack of education/training support plans, and organizational decisions associated with how computers are deployed. As a result, finding “New Ways” to practice in an automated care environment did not always translate into enhanced practice, efficiencies realized or timely access to computers because of the organizational discourses.

*“Experiencing Timing/Impact of Computerization Initiatives”* was expressed by the participants as the challenges or opportunities associated with multiple and concurrent organizational change initiatives related to timing and coordination. Large-scale, multi-site and staged or phased-in computerization initiative designs were identified by the participants as both challenging and overwhelming at times. Both of these organizational decisions with respect to how the computerization initiative would be implemented positively or negatively affected the participants’ perceptions about computers in their practice. The participants who had supported the multi-site computerization design and the “all or nothing approach”, were able to identify the cross-site benefits of engaging in the shared experience, such as sharing of information, connecting with more available support resources, and knowing that the organizations practice
expectations were standardized regardless of where you practiced. For other participants the associated benefits did not out-weigh the risks resulting from being able sustain the level of available resources to support ongoing education and training, break-fix supports and/or availability of sufficient access to computer technology.

As a result, participants’ ability to connect with the positive attributes associated with the computerization agenda was affected. For these participants “dealing with” multiple and concurrent change initiatives in the context of providing patient care in an already information rich environment was often difficult while also trying to learn about the technology at the same time. For the participants’ who were already familiar and confident with the technology, they experienced an “easier time” incorporating the multiple changes associated with computerization, while their colleagues with less computer experience were left feeling overwhelmed and frustrated. These PRIOR EXPERIENCES either limited or constrained the participants’ uptake and subsequent adoption of the computer in their practice. One of the participants expressed her perspectives in this way:

Everything just happens all at one time. I find that disorganization puts everyone on line at once. I’m so used to working where they did a busy unit and a week or two later they would do a less busy unit, they staggered the implementations.

Other challenges identified by the participants as they pertained to Organizational Discourses included their experiences with “Accessing Computers” which was related to the absence of or lack of computers in their practice areas. These organizational decisions contributed to their negative or mistrusting perceptions about computerization initiatives. They attributed their frustrations with the organizational decisions about limiting access because of funding constraints or a lack of understanding about the nurse-patient-technology relationship. Organizational understandings about computer device type requirements, placement of the
technology, and log-on processes as organizational decisions, all contributed to the participants’ perceptions to the barriers that affect their timely access to information. This statement reflected the attitudes of some of the participants as a result of the limited computerization initiatives and how phasing in the computers and the EHR functionality is sometimes less valuable; "Well it’s like, why bother because we can’t go all of the way…"

We do not have enough computers, because we have more residents and students and they’re not in the right places. We have two roving ones but there’s no on/off button and they always get locked out, then we have to find the key to turn it off and on, it’s very frustrating.

It makes a huge difference having the computers where we need them; just the lay-outs of the floors were horrible. To get access to the computer we had to walk down to the other end of the hallway which meant that if I wanted to look something up, well, I probably wouldn’t bother.

Participants’ positive or negative PRIOR EXPERIENCES with organizational decisions about “Knowing where and how to find needed information” was described as being dependant on decisions about education and training plans which were intended to support the participants through the change experience. Participants described experiences with knowing or not knowing who and where support and information resources existed within the organization. Consequentially, if they knew how to access or search for the information or were continually informed about the source of information or the computerization initiative requirements, then they had a positive experience; if they did not feel informed, then they did not have a positive prior experience. Specific examples about how timely communications about changes in clinical information systems, websites and on-line manuals from the ancillary departments would have positively affected interdepartmental relationships, and information uptake by the participants. Therefore, if changes were made but not communicated, it made it difficult for the participants to search for the information in a timely manner. Participant examples of these scenarios further describe their experiences in this regard:
I just have to click, find the icon, and look for the medications or whatever.

You sit at a desk, you do some hands on, it’s very good, but there’s sort of no follow-up, there’s no, there’s no one to go and ask and so you go back to your peers and they’re in the dark as much as you are maybe, there may be someone that can give you a hand, but probably most people feel like they’re in the dark as much as you are.

Oh, the computer gets me sometimes more frustrated than the bio-medical device just because sometimes I know that information is there, but I don’t where to get it.

"Experiencing Computer System Downtimes" was also described by the participants as often times dealing with the unknown. Participants defined these experiences as finding out unexpectedly, searching for support, feeling frustrated with system downtimes and the idea that they had to return to paper-based processes. For some of the participants,

I get somebody else to try, really, because sometimes that works. I just make sure that it’s not something I’m doing and sometimes, I don’t know why they work and sometimes they won’t let anybody logon and then you go to the next computer across the room and it will work.

We know it going to become more and more computerized but what happens when the power goes out, or the generators don’t work what do we do then.

In summary, this section described the participants’ perceptions of Experiencing Organizational Decisions about computerization as the second-level category associated with Operational Discourses. Participants’ described these prior experiences with learning about computers and technology in general as positive or negative events and the tensions resulting from organizationally defined policies, procedures and processes.

SYNTHESIZING THE VALUE OF COMPUTERIZATION

IN NURSING PRACTICE

This substantive category proved to be one of the most significant and central phases in defining the basic social process of this grounded theory. As represented in Figure 3, this category is depicted as the fulcrum or pivot point for realizing the benefits and managing the
barriers to use computers in practice. This means that in order for participants to realize the benefits and manage the barriers, they must first re-engage with their core practice values as they pertain to providing patient care. Participants synthesize these values in order to understand how the initializing event, in this case, confronting computerization, impacts the nurse-patient relationship. Merriam Webster’s on-line (retrieved September, 2009), defines synthesis as:

The composition or combining of parts or elements so as to form a whole; the combining of often diverse conceptions into a coherent whole; the dialectic combination of thesis and antithesis into a higher stage of truth.

Therefore, it is the process of ‘synthesis that participants described as representing the culmination of their reflections about their values as they pertain to the nurse-patient-technology relationship when providing patient care. In this regard, participants expressed those values as Finding Relevance and Finding Meaning in the experience of confronting computerization in their practice. For these participants, their ability to engage with their core values about administering patient care was expressed as foundational during each and every interview. Consistent messages about their core practice values about the nurse-patient-technology relationship were expressed to include: their ability to “remain in close proximity with their patient”, “knowing what they needed to know in order to provide safe and appropriate care”, and “being able to provide the care in a safe, efficient and caring manner”. Synthesizing values as defined by these participants was an integral process that when completed, facilitated the next two interdependent phases of this basic social process which includes realizing the benefits and managing the barriers related to the integration of computers in their practice.

Finding Relevance

Participants describe the process of Finding Relevance as the moment in which they were able to connect with the clinical value of a proposed change in their practice as it pertained
to providing patient care. In this case, confronting computerization became the initializing event which triggered the need for the participants to find relevance in their relationship with the patient and the delivery of patient care when incorporating computer technology in their practice. Participants’ defined relevance as representing those aspects of a proposed change experience they could associate with in relation to their core practice values. This meant that if they were able to connect the proposed change with the clinical aspects of patient care, then it was considered, "clinically relevant". The participants who were able to realize the clinical value of the associated computerization initiatives sooner than the others, had prior experiences with computers; while those participants who had little to no prior experiences with computers either struggled with or took longer to Find Relevance in the computerization initiative. This was a critical concept to explore since their perception of 'value' appeared to determine how well they would be able to realize the benefits and manage the barriers associated with the integration of computer technology in their clinical practice: adopt, adapt, or ignore. One participant expressed her experience of Finding Relevance in this way:

When I first came here I felt a little behind, searching through paper manuals for information, it can be long and tedious which you don’t have time for. Now I search on the computer and it’s a vital tool because it’s my reference tool. This is the way I look up all of my drug compatibilities or how to mix things; it’s my source of information, source of reference for everything really, like diagnosis. If a patient has a question and it’s beyond my knowledge, I can do some research; print it up for them, from reliable sources of course.

Finding Meaning

The next step in the process of SYNTHESIZING VALUES was expressed as Finding Meaning. When confronted with computerization, participants indicated the importance of wanting to understand, "What does this mean to me and my practice?" In this regard, they explored the context of practice requirements such as: knowledge needs, decision support
resources, clinical documentation, and the effects of computerization and the impact to their ability to remain close to the patient. All of this was identified as integral to participants moving onto the next phase of the process which was about realizing the benefits, and managing the barriers. From this perspective, participants’ made comparisons between the impacts of their prior experiences and how they might be out-weighed or further supported by their perceived values related to computerization in their practice. An example of this was expressed by one of the participants who illuminated her experiences prior to computerization:

Well I was lost; I had no information, zero, and zip. We were reliant on the client to share information. If you had a good historian, but sometimes you got a little old lady, 85, pleasantly confused, she doesn’t know why she went to emergency. It would take a long time before we could gain access to the information we needed to make good care decisions.

This example described one of many of the ongoing challenges for the participants’ who had significant practice experiences prior to computerization. In this regard, participants felt that their tremendous reliance on the patient to provide accurate and historical information was difficult when they did not feel there was sufficient historical information on which to base good care decisions. All of the participants’ reflected on their experiences with Finding Meaning with computerization as significantly and positively impactful in this regard.

Participants’ further emphasized their understandings about what constituted Meaning when confronted with computerization in their practice; they expressed these as conditions for safe and appropriate practice when providing patient care. These value-based conditions were defined as:

- **Relevance** – all patient and decision support information must be clinically relevant to the care/services to patients/families based on “need”, with particular practice and patient efficiencies gained, and must contribute to positive patient care.
• **Ease of Access** – access to accurate, “source of truth” information and computer technology near or at the point of care, easy logging on and off processes to gain access to the electronic information resources – clinical information systems, the electronic health record and the type of computer technology must be easily incorporated into their practice and workflow requirements.

• **Education and Support** – time to learn (in a way that is congruent with their learning style), time to ‘synthesize’, “take it all in”, know where and how to find resources (human, technology and information resources).

• **Automation Supports Enhanced Nursing Knowledge/Practice** – reduces duplication of effort, provides best practice/decision supports, augments knowledge, defines practice process redesign, ensures patient safety, allows for entry of clinically relevant patient information.

• **Clear Vision of Impending Change** – nurses accept that change is inevitable in their everyday work. However, they want to be part of the change vision, cease the opportunities to express opinion/ideas/concerns, ensure that workflow and practice nuances are acknowledged and incorporated into the planned change, and ensure that a roadmap is constructed to convey the complete vision of the planned change.

If all of these conditions were in place during the computerization initiative, then they were deemed by the participants as positive prior experiences with computerization in their practice. In this case participants concluded that there was a greater chance that the nurse would be more receptive and motivated to realize the benefits of computerization and subsequently more inclined to manage the barriers that might get in the way of seamless integration of the computer in their practice. Conversely, if any or all of the conditions were not realized by the
participants then they would have a negative computerization experience and be less inclined to realize the benefits and manage the barriers. Subsequently, how participants realized the benefits and managed the barriers would ultimately determine whether they adopt, adapt, or ignore the computer technology in their practice. An example of the process of *Finding Meaning* was expressed by one of the participants in this way:

> So I know that I could probably find some information in the chart, but again I don’t, again it really goes back to trust and it’s that on the computer I know that what I’m seeing is up to date, it’s current, it’s what’s there now and if there is something missing on the computer then I know it’s a matter of it’s actually missing, not that I’ve lost the paperwork, or maybe it’s my mistake or maybe we’ve forgotten something.

This was a particularly powerful statement and is representative of how participants link the value of accurate information in the computer to their experiences pertaining to "trust". During the interview, participants positively responded to the question, “Do you base your "trust" in the fact that the information that is thought to be present in the computer will always be there and if it is not then there is a logical explanation?” Participants who had substantial prior experiences with computerization clarified that they had experienced all too often incomplete, inaccurate, outdated information on paper-based records and that they no longer trusted the information on paper if it was also reflected in the EHR. For these participants, source of truth as it pertained to *Relevant* information has been realized as a core value and computerization has enhanced that understanding.

All of the participants had indicated that they had either adapted or adopted computerization in their practice and that they would be more inclined to access information via the computer if *Relevant* information were available and accessible and that they experienced an “easier time” *Finding Meaning* if all of the aforementioned conditions were realized. Participants who had more prior computer experience than those who did not have as much
experience, were able to engage with their practice values associated with providing patient care, at a faster rate. Participants’ who did not have as much prior experience with computerization needed more time to synthesize the values and Find Relevance and Meaning with the computerization initiative. SYNTHESIZING VALUES then is the process of Finding Relevance and Finding Meaning to the proposed change of computerization in their future state practice.

REALIZING THE BENEFITS

REALIZING THE BENEFITS represents the fourth of the six substantive phases in this basic social process that attends to the positive aspects associated with integration of computer technology. In the highly integrated process of realizing the benefits and managing the barriers, participants first experienced the process of synthesizing the value of the computer technology. Depending on the participants’ prior experiences and their experiences with synthesizing values, participants may or may not become open to new and emergent benefits during the implementation, education and integration periods of the computerization initiative. Participants then described how they began to strive to overcome the barriers that may impede the implementation and/or incorporation of computers in their practice. Once they identified the barriers, they would seek alternatives to the barriers. Depending how early in the implementation phase of the project, and/or how much they were able to realize the benefits, would determine how early and strategic they became about managing the barriers. Nurses, who were more adept at this, became early adopters and peer champions in their respective clinical areas.

Realizing the Benefits was described by the participants’ as Experiencing the value of computers in practice and Gaining Proficiency in using the computer. Experiencing the value of computers in practice represented the experience of “Discovering Enhancements in Nursing
Practice and Patient Care. In this regard participants describe their experiences of discovering efficiencies gained with new practice and care delivery processes. *Gaining Proficiency in using the computer* represented the participants' experiences with transitioning from no experience with computers to greater experiences with computers and realizing the impact of "feeling proficient" with computers in their practice.

**Experiencing the value of computers in practice**

The process of *Experiencing the value of computers in practice* informed the participants' abilities to realize the benefits associated with computerization. Participants described this experience by realizing "efficiencies gained in clinical practice", "accessibility of relevant information near or at the point of care", and "enhancements to nursing knowledge and care planning". Realizing "efficiencies gained in clinical practice", "accessibility of relevant information near or at the point of care", and "enhancements to nursing knowledge and care planning" was described by participants who experienced increasing speed associated with accessing *relevant information*, resulting in efficiencies gained with clinical decision-making and care planning. Participants described their experiences in this way:

So you know, that (computer technology) saves me so much time, I'm more informed about this patient because obviously this patient isn't able to communicate at all, so the relevance of it is incredible in everyday practice...you (as a clinician) are opened up to a huge knowledge base that you would never have access to before. You also have more time on your hands since you do not have to dig and seek searching for information; a lot of information is at your fingertips.

For me what it meant was that when someone showed up on the floor that I have not seen before or they're going for a procedure that I'm not familiar with, that sort of thing. It's really simple to fly into the computer, click on the page and it's already there, all the information you want about this certain procedure is there and it's all up to date, (unlike paper manuals) there's no pages missing and you're not flipping through everything.

I'm 57 this year, right and so you know, I'm blessed to have this technology. I think the new people have always had it and they don't realize what it's like to be working without that.
As participants were either shown through information system education or peer-to-peer mentoring, participants’ conveyed their positive experiences with exuberance and practice satisfaction. Participants who had spent years in practice, relying and searching through the myriad of patient’s paper-based health records and the often outdated and inaccessible resource manuals expressed substantial relief when realizing the benefits of computerization. Even the participants who had just begun to work with computers in their practice, realized the benefits and expressed their thoughts in this way:

I can really see the computer being a really good valuable tool for us to get information, as long as we can get the information that we want and need, like any of the manuals, just a click and up comes the screen, that is really helpful, especially at the bedside.

Participants who may have had less nursing practice experience but more computerization experience in both their personal and professional lives conveyed their relief to see that not only had computers or computerization initiatives become part of the HA’s organizational mandate, but that they had the opportunity to build on their current understanding about the use of computers in their practice.

It would be incredible if I don’t get through a day without touching my computer. I do really like that access to a computer. I feel very comfortable with it and for me I can probably type faster than I can write. So for me, when, in those emergency situations again it is really easy for me because I value the fact that I can just, I can type, I’m not even looking at the keyboard, I’m looking at the patient, and I’m typing and things are coming out, so that is value for me. You know what else is really great about charting on computers is that you can read what the bloody person is saying. You know, how fabulous would it be if physician’s orders were on line and typed.

Gaining Proficiency in using the computer

The process of REALIZING THE BENEFITS was also experienced through Gaining Proficiency in using the computer and the clinical applications and currency of clinical information. Participants described these experiences as a result of “Learning from” prior
experiences. This part of the process was further defined as “realizing the new way” as they became more proficient using the computer technology. *Gaining Proficiency* through “learning from” prior experiences was particularly significant and represented those participants who had not yet fully embraced or adopted the computer technology in their practice. As they gained new computer experiences and learned more through education and mentoring, they began to see the possibilities in their newly enhanced everyday clinical practice. Participants who in the past were not convinced that the clinical information retrieved from the computer would become so relevant to their practice now believe that the computer is as equally important to patient care as any other technology.

I don’t have a lot of background in computers. I am learning more and more each day that I need to know because I know I need it to do my job safely. If we had no paper-based alternative and I always had to access labs on the computer and base my care on that then I would see the computer differently, then I would see the computer the same as a biomedical device.

In this regard, participants with little computer experience were beginning to *Find Meaning* as they began to synthesize the values and realize the benefits associated with computerization. These participants went on to discuss how their prior experiences and subsequent learning had contributed significantly to their motivation to begin to integrate the computer in their practice.

Participants also identified that multiple contributors to their ability to learn from prior experiences was associated with the notion of patient safety. One participant in particular described an experience shared with a number of her colleagues. They had been involved in adverse event related to a discrepancy in lab result reporting in the electronic record versus the paper-based record. In the HA, the source of truth, or most accurate and current reference for lab data, was generated and stored in the electronic health record. However, because of the HA’s parallel-sourced, paper-based and electronic health record processes, some nurses referred to the
electronic health record, typically those that were confident with computers, versus those nurses who were less confident with computers, and continued to refer to the often outdated paper-based results because they had not yet incorporated the computer in their practice workflow. The outcome revealed a significant discrepancy in a reported lab result that had not been incorporated in the paper-based print outs. This resulted in a patient unnecessarily remaining on isolation precautions for an extended period of time because the nurses had been relying on erroneous/ outdated lab information. For this participant, the source of truth, timely access to patient information, clearly defined processes and user confidence with computers are now critical to patient care and solidly ingrained into her nurse-patient-technology relationships.

Realizing the benefits represented the positive outputs from the participants’ experiences with synthesizing the values when confronting computerization in their practice. All participants experienced realizing the benefits in different ways depending on their prior experiences with computers in their practice. Subsequently, participants with less computer experience and more practice experience began to realize the benefits associated with timely access to current information, as well as the safety components associated with outdated paper-based information. They described the process of realizing the benefits as taking longer than their colleagues who were already familiar with computers in their practice as a result of the new learning, and practice-based workflow changes associated with computerization. While participants with existing comfort with computers in their practice realized and experienced the benefits associated with computerization much faster. They attributed the benefits not only to the importance of accessible and timely information and the safety aspects of source of truth, but also to the computer type and location and availability of electronic clinical decision support references, manuals and the ability to enter clinical data. In the end, the time duration and degree of
complexity associated with the participants’ ability to realize the benefits ultimately informed their ability to manage the barriers. The more adept the participants’ were at realizing the benefits the better they would be able to manage the barriers. Conversely, if participants were less able to realize the benefits, the more difficult it would be for them to manage the barriers.

MANAGING THE BARRIERS

MANAGING THE BARRIERS represents the fifth substantive category in the basic social process that completes the highly-integrated experience of confronting computerization in nursing practice. As previously indicated in the description of this basic social process, synthesizing values represents the fulcrum, realizing the benefits and managing the barriers act as the competing forces that together determine the outcome of the nurses’ experiences with computerization; adopt, adapt or ignore. All participants associated their ability to manage the barriers based on their pre-existing confidence and competence with computer technology, the degree to which they were able to synthesize the values as it pertained to computer technology in their practice, and realize the benefits of computerization. Participants described the barriers to incorporating computers in their practice as Confronting the Challenges and Succumbing to the Barriers. These second-level categories associated with managing the barriers are discussed in more detail.

Confronting the Challenges

Participants described their experiences with Confronting the Challenges as the process of finding ways to “Mitigate the Barriers” and “Exploring the Options to the Barriers”.

Participants’ experiences with finding ways to “Mitigate the Barriers” was further described as dealing with it, minimizing the fear, feeling motivated to confront the obstacles. “Exploring Options to the Barriers” was further described as finding new ways, finding work-arounds,
practicing with the computer. Therefore, “Mitigating the Barriers” and “Exploring the Options to the Barriers” represented the participants’ ability to positively manage the barriers associated with computerization.

In this regard, participants describe the barriers associated with computerization in key areas such as: 1) organizational decisions about education methodologies, 2) ongoing time constraints to learn, 3) perceived change-overload, 4) limited access to computers in the clinical areas, 5) difficulty knowing how to access information/resources, 6) space to store the computer technology, 7) lack of knowledge related to computer or clinical system downtimes, and 8) the absence of clear organizationally defined processes.

Additionally, all of the participants made references to “feeling frustrated” at times but some of the participants identified ways to mitigate these challenges. For example, participants described feeling as though they had to resort to “finding shortcuts” or “work-arounds” in order to accommodate the computer technology in their practice. Degrees of frustration were manifested based on the participant’s level of confidence and competence with computerization:

I’m always looking for the shortcut out...there’s lots of tricks out there...you just need to know where to find them.

I’m pretty comfortable with whatever device type they throw at us, it’s just a matter of playing with the button and figuring it out.

Another participant describes how she is striving to overcome the challenges associated with learning about computers and the related clinical information system:

Yes, it takes us a little longer to grasp, but once we have it, it’s well this is a piece of cake ...right now I’d say it would be the physical layout and then that big learning curve, learning the program and using it.

Other participants reflected on the challenges associated with having to share computers with others and log on and off each time:
Right now if I were at my desk it might be just me and maybe one doctor, maybe the dietician, so in terms of patient confidentiality, it may not be as much of a security risk if I left my account open because I forgot to log off. However, if this same computer was centrally located, and was used by multiple people, I would have to log off the computer each time.

Some participants were equally as explicit when describing their experiences associated with prior learning about computers. Organizational decisions about education pertaining to computer technology and the related clinical information systems was also identified by many of the participants as a barrier which they felt was often difficult to overcome. Some of the participants with less experience with computers were asked about how they managed these perceived barriers, many of them responded in similar ways to this participant:

I felt really intimidated, because I didn’t know the computers all that well and because I tend to get really nervous and forget things when I’m in a situation maybe that you feel like you’re being judged….that was a bit threatening, so I needed to sort of get away from there and get off by myself and try it, until I was comfortable with it, and it’s fine now.

Participants described the alternatives to learning modalities as a strategy that not only supported the uptake of new information associated with computerization but one that enabled them to manage the perceived barrier. This was reflective of participants of all ages and years of experience who were introduced to computer technology and the related clinical applications:

To be able to learn some of this at home particularly if we don’t have enough computers at work to learn on, or we don’t have enough time to learn, or people to relieve us, then we have to figure out another way to learn. It just gets tiring sometimes trying to find a new way to learn or how to take the time.

Other barrier-related learning experiences pertained to participants who had self-identified as confident with computers and had fully embraced the computer in their practice. These participants described how they were able to support their colleagues during a recent
computerization initiative. This example represented one of the “just-in-time” education experiences in the clinical area:

We went slowly through the computer and the electronic health record with everyone who was working on the unit. They had all already had four hours of training on the electronic health record and the new (computer) cart. We identified a few nurses who went for a bit more training, you know, just played with it more and more and more, so their comfort level was much higher and we were around to help with the transition for about the first two weeks...

Whether seeking ways to “Mitigate the Barriers” and “Explore the Options to the Barriers”, these participants emphasized their willingness to navigate the identified challenges associated with computerization. Regardless of the obstacle, participants reflected on ways in which they come together to manage the barrier or work alone to mitigate or search for alternatives. Participants attribute the willingness to do this because of the extent to which they were able to synthesize values and realize the benefits associated with computerization in their practice. For some of the participants, their capacity to Confronting the Challenges was not as easily attained; in these instances Succumbing to the barriers felt like the only option.

**Succumbing to the Barriers**

Some of the participants described their experiences with Succumbing to the Barriers as “Losing the Battle” which was further described as, Feeling as though they had “No Choice”, Unable to find meaning, Retaining old ways and making practice decisions based on out-dated information. These statements reflected their emotional connections to the situations they experienced when feeling pressured or forced to use the computer, whether they felt confident or not or whether they were able to appreciate the value and meaning of the technology. Retaining Old Ways and Making practice decisions based on out-dated information represented the
practice strategies used to control the pace of change associated with the introduction of
computers in their practice, despite the risks identified in relying on outdated information.

*Feeling as though they had "No Choice"*

The experience of *Feeling as though they had "No Choice"* was articulated by all of the
participants particularly as it pertained to the time and timing of organizational change.
Participants with more experiences and greater comfort with computerization initiatives were
confident that despite the feeling of having "no choice", the newness of the computer or
information system initiative would be disruptive in the short-term; but they were able to see the
value in the initiative and manage the barrier. "I always know that although the initial period is
frustrating, it will get better for me."

Conversely, participants who had little to some experience with computers, expressed
profound frustration and an inability to incorporate the computer initiative in their practice.
Again, because they felt as though they had the option to avoid the computer because of the
continuation of automated printing of clinical information, they could control the pace at which
they learned and incorporated the technology.

Everything seems to be introduced at the same time. I find here that they implement
everything right across the board. That kind of disorganization puts everyone in a high
stress state at once. I'm used to working in a place where they pick one location and
implement it and move onto the next one — it's very frustrating and I'm just glad we still
have printing of the results.

It's just frustrating when you're busy and you don't have time to fool around with the
computer or spend time looking things up. If I don't have to use it, I won't. However,
there are times when I am not busy or stressed so I will go onto the computer with a
colleague to look things up.

Participants who identified education modality as a barrier to their learning about
computer technology found it difficult to absorb the information and subsequently felt unable to
manage the barrier. As a result, the time constraint and diverse learning needs of others in the
classroom caused these participants to essentially “shut down” and abstain from asking questions for fear of feeling “stupid” or “behind”:

The difference there has been the larger group sizes, less time to learn; there is no opportunity for one to one or small classes like two or three people. Everyone is at different levels of computer experience, some people can walk in they’ve got years of experience on a computer and pick it up like that, and then there’s people like me who walk in and the classroom setting with lots of people and tons of questions; this does not work for me at all, ever.

Retaining Old Ways and Making practice decisions based on out-dated information

For some of the participants who had expressed a lack of confidence with the computer in their practice had resorted to, Retaining Old Ways and Making practice decisions based on out-dated information. For these participants, managing the barriers was described as reverting to manual and/or paper-based processes. For example, rather than accessing the lab information data in the electronic health record, they would resort to telephoning the lab for the result. This coping strategy propagated the idea that relying on paper, ignoring the computer, and relying on colleagues to access the most current information was acceptable.

Other examples of manual-paper-based processes included hand-writing the result on the paper result sheet and faxing the result to the physician. This was an example of one of the more experienced participants who had not yet fully embraced/adopted computer technology in her practice. She indicated that taking the extra time to figure out how to search for the result when she could “simply pick up the phone” or wait for the automated print out was a much more efficient use of her time. In the implications of fragmented or incomplete system implementations three of the more confident participants found particularly frustrating:

I find the computer frustrating because they don’t all seem to work the same. I don’t use it much because I can just pick up the phone. With the computer you have to log-on and I never remember my password, that’s getting difficult because you have to have so many in life and I don’t really know how to search for the information I need.
Managing the barriers pertaining to physical space constraints and the burgeoning computer technologies in the clinical area becomes challenging at best. Some of the participants identified strategies to managing the identified physical space barriers by ensuring that if they were mobile computers they would situate them in key locations in the hallway as close to the patient’s location, while other participants preferred to locate them in a storage room until they were needed. This meant that they would have to go to the storage room, retrieve the mobile computer device and move it closer to the desired location; the participants that were less inclined to use the computer had a greater tendency to rely on manual processes rather than search/retrieve the computer device. Again, participant adoption of the computer was dependant on the participant’s perceived value associated with the computer technology, and the associated supporting processes.

Whether it’s computerization, or just IV pumps or anything, the wheels change, is it ergonomically correct, it’s a bigger base…there is no place to put the computers. Space becomes a huge barrier so I just put the mobile computers in a storage room – we rarely use them. Technology has to meld with current building limitations.

We only have two portable computers, so if you need to look up something you have to run over to a nursing station. It takes time, some days patients think you’re like totally scatter brained, because you go to give a medication and it’s like oh, well I’ll have to go and look up your results. It would be way easier for, if we had a computer that came with us.

Some of the participants described their experiences with computers related not only to location, but with respect to access or availability of the computer in general.

That’s sort of the unit clerk’s role, she’s got her own computer at the desk and that’s her role to do statistics like patient’s time in and out time because the unit clerk had to use that (the computer). Then we were starting to get I think it was with the lab values and by that time there was a second computer and then all of a sudden now we’ve got computers sort of at the opposite ends of the room …it’s a bit frustrating right now because you’re supposed to use our own log-in on the computer…
It’s all kind of there, I feel that we’ve only got part of what we could access and I think that’s what is more frustrating. Well it’s like why bother because we can’t go all of the way which include documenting in the electronic health record. I guess it’s baby steps; we would have to learn this part before moving on...

In summary, participant abilities to manage the barriers depended on the participant’s ability to synthesize the values and realize the benefits associated with computerization in their practice. Their abilities were dependent upon the participants’ willingness to be open to incorporate computers, understand the relevance and the values and realize the decision support and workflow efficiencies associated with computerization. More specifically, for some of the participants, managing the barriers was not an organic part of their repertoire because of their steep learning curve, comfort with technology and the time it took to resolve the knowledge gaps attributed to feeling confident with the computer. Participants with greater comfort with computers in their practice were able to find alternatives to some of the timing, space and computer accessibility challenges through changing workflow patterns that better accommodated the technology and understanding the information they needed to know at what point along the care delivery process. As a result, some participants will chose to adopt, adapt, or ignore the computer in their practice.

**OUTCOMES**

OUTCOMES associated with participants’ experiences with computerization in their practice represent the final stage in the basic social process of **DEVELOPING A RELATIONSHIP WITH THE COMPUTER IN NURSING PRACTICE.** Merriam Webster’s online dictionary defines “outcomes” as, “something that follows a result or consequence”. In this regard, the outcomes are a result of the participants’ synthesizing values, realizing benefits and managing the barriers.
Table 3 presents participant characteristics using pseudonyms to maintain participant identity, demographic information such as: age, gender, and years of experience, clinical position, location of practice and their behavioural outcomes associated with confronting computerization in their practice. As indicated, not one of the twelve participants ignored the computer altogether, but two participants had indicated that they had just begun to synthesize the value of integrating the computer into their practice toolkit. Three other participants have made significant advances with computerization in their practice, while the remaining seven participants have completely adopted the computer in all aspects of their practice. The OUTCOMES of ADOPT, ADAPT or IGNORE as they pertain to these participants are further illuminated in this section.

<table>
<thead>
<tr>
<th>Pseudonym</th>
<th>Age</th>
<th>Gender</th>
<th>Yrs of Nursing Practice Exp</th>
<th>Clinical Position</th>
<th>Clinical Practice Domain</th>
<th>Confronting Computerization Adopt/Adapt/Ignore</th>
</tr>
</thead>
<tbody>
<tr>
<td>N - 01</td>
<td>44</td>
<td>F</td>
<td>15</td>
<td>RN</td>
<td>Cardiac Care</td>
<td>Adopt</td>
</tr>
<tr>
<td>N - 02</td>
<td>53</td>
<td>M</td>
<td>24</td>
<td>RN</td>
<td>Renal Dialysis</td>
<td>Adopt</td>
</tr>
<tr>
<td>N - 03</td>
<td>50</td>
<td>F</td>
<td>28</td>
<td>RN</td>
<td>PACU</td>
<td></td>
</tr>
<tr>
<td>N - 04</td>
<td>43</td>
<td>F</td>
<td>20</td>
<td>RN</td>
<td>Cardiac Care</td>
<td>Beginning to Adapt Adopt</td>
</tr>
<tr>
<td>N - 05</td>
<td>35</td>
<td>F</td>
<td>10</td>
<td>RN/Ed</td>
<td>Med/Surg</td>
<td>Adopt</td>
</tr>
<tr>
<td>N - 06</td>
<td>30</td>
<td>F</td>
<td>1</td>
<td>RN</td>
<td>Med/Surg</td>
<td>Adopt</td>
</tr>
<tr>
<td>N - 07</td>
<td>26</td>
<td>F</td>
<td>3</td>
<td>RN</td>
<td>Cardiac Care</td>
<td>Adopt</td>
</tr>
<tr>
<td>N - 08</td>
<td>60</td>
<td>F</td>
<td>40</td>
<td>RN</td>
<td>PACU</td>
<td>Beginning to Adapt</td>
</tr>
<tr>
<td>N - 09</td>
<td>48</td>
<td>F</td>
<td>26</td>
<td>RN</td>
<td>Med/Surg</td>
<td>Adopt</td>
</tr>
<tr>
<td>N - 10</td>
<td>51</td>
<td>F</td>
<td>21</td>
<td>RN</td>
<td>Renal Dialysis</td>
<td>Adopt</td>
</tr>
<tr>
<td>N - 11</td>
<td>55</td>
<td>F</td>
<td>32</td>
<td>RN</td>
<td>Renal Services</td>
<td>Adopt</td>
</tr>
<tr>
<td>N - 12</td>
<td>56</td>
<td>F</td>
<td>30+</td>
<td>RN</td>
<td>PACU</td>
<td>Adopt</td>
</tr>
</tbody>
</table>
The extent to which a nurse would adopt, adapt or ignore varied depending on the participants' perceptions about and/or personal experiences with incorporating the computer technology in their practice. The following table represents the participant's descriptions of behavioural examples depicting how they adopt, adapt, or ignore the technology:

<table>
<thead>
<tr>
<th>Table 4- Participants’ Perceptions of Adopt, Adapt or Ignore</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ADOPT</strong></td>
</tr>
<tr>
<td>Embraces computer technology more readily, i.e. accesses computer technology wherever and whenever information is needed</td>
</tr>
<tr>
<td>Accesses as much patient/clinical information as available on-line</td>
</tr>
<tr>
<td>Demonstrates initiative to retrieve patient information from the computer first rather than from the paper-based record</td>
</tr>
<tr>
<td>Searches the inter/intranet for decision support information and adds to “favourites” list</td>
</tr>
<tr>
<td>Ensures computer technology is functioning at all times – participates in the ongoing quality control of the computers and perceives the computer to be integral to care delivery</td>
</tr>
<tr>
<td>Engages with others to learn about or act as a Peer Mentor to clinical colleagues and others – takes the time to demonstrate new personal learning about computers/clinical resources/electronic health record</td>
</tr>
</tbody>
</table>
Figure 6-ADOPT

Merriam Webster's online dictionary (retrieved May 18\textsuperscript{th}, 2010), defines the word “adopt” to mean, “To take by choice in a relationship, to take up and practice or use”. Adopt according to the participants represented their ability to adopt the computer technology in their practice was aptly described by one participant as:

I use them as my daily tool to do all sorts of things...I've grown up around computers...I'm pretty comfortable around them...it's a vital tool because it's my reference tool, that's how I look up all my drug compatibilities...it's my source of information, source of reference for everything...I don't think I could do my job without the computer or the internet as efficiently as I could right now...

One of the more experienced participants provided an example of how she has not only Adopted the computer technology in her practice but how she goes beyond her personal practice experience to share the value in the technology with her colleagues.

I've taken it upon myself for some of the older nurses and I mean some of the nurses that are 65'ish in our departments to spend time when I'm working a weekend with them on the computer, show them how to do things, well let's set up your e-mail account, let's do a banking program, and I think if you approach it with let me show you what this can do for you. I think if we approach it more on a personal level for people that are afraid of this I think that is the way to go. So you know, have a class and rather than power chart, get everybody on their own person e-mail...
Adapt represents the second outcome and reflects the balancing act described by the participants, between maintaining traditional paper-based practices versus incorporating the new computer-based practice relationships with computer technology. Merriam Webster’s online dictionary (retrieved May 18th), defines the word “adapt” to mean, “To make fit”. This definition is consistent with how the participants describe this outcome derivative of the process of **SYNTHESIZING VALUES, REALIZING THE BENEFITS AND MANAGING THE BARRIERS**.

Adapt is described by the participants as the way in which they incorporate computers in the nurse-patient-technology relationship at selected times throughout their practice experience. This second-level category is characterized by two distinct sub-categories: **Gaining Familiarity and Balancing the Old with the New**. The process of **Gaining Familiarity** pertains to participant experiences with incorporating the computer in their practice at times when they feel confident and comfortable using the computer and accessing the information. Many participants described these experiences when personal confidence in their knowledge related to computer/information access to include, logging on to the computer, accessing the EHRs, and looking up selected online resources. **Gaining Familiarity** was also reflective of times when participants were uncomfortable using the computer and as a result chose to ignore the computer and wait for
another time or another colleague to access on-line resources. These instances were defined by the participants when they were providing direct patient care needed to focus on the care task and not the access to the information in the computer.

One of the more experienced participants currently practicing in an area where there are a limited number of computers reflected on her ability to adapt to computerization in her practice in the following way:

If you ever have a quiet moment you can maybe go on...you have access in an emergency. I have used it a couple of times as far as for the IV Manual, I love that, that's just, once somebody showed me how to do it, oh okay....So that was really neat...

Unfortunately for this nurse, she still perceives the primary user of computer technology in her area as unit clerk function. Since the HA in the southern area has not transitioned to a hybrid health record state, clinical data such as lab values continue to automatically print on paper.

From this nurse's perspective, since computer access is limited in her practice area, she has the option to continue to rely on the unit clerk to alert her when the lab results print or when she requires information retrieved electronically.

When you’re using it (the computer), it’s pretty valuable, but when you don’t use it, you go back to the way it was, you’re waiting for the lab to print values or you go back to the a printer...and then reef through a 100 pages...

Figure 8-Ignore
Merriam Webster's online dictionary (retrieved May 18th, 2010), defines the term ignore to mean, "To refuse to take notice of; to reject". Based on my interpretation of the interview data and this working definition, none of the participants completely ignored the computer when confronted with computerization at this HA. Participants' described the process of ignoring based on selected behavioural components associated with: times of increased stress during high volume workloads, complex or competing priorities associated with providing direct patient care, and in particular when lacking overall confidence in using the computer technology as it pertains to not knowing how to search for information on-line, or when questioning the value of the computer when Relevance and Meaning to the nurse-patient-technology relationship has not been realized. In this regard, the process of ignoring becomes a transitional or intermittent experience during selected times while they continue to incorporate New Computerization Experiences.

Interestingly, I initially interpreted this category to represent the participants' descriptions of what it means to completely ignore the computer technology in their respective practice areas. However, upon further analysis of the data and clarification from the participants, it became evident that this category actually described the participants who felt less confident than their more computer literate colleagues, in using the computer technology in their practice during selected care delivery experiences such as those reflected in the previous paragraph. Times of ignoring the computer are dependant upon the emerging practice/care situation.

The emergent category reflecting this process of ignoring resulted in some participants Maintaining Old Ways in order to preserve their ability to provide safe care and maintain the integrity of the nurse-patient relationship. Consequences of ignoring the computer resulted in a reliance on paper-based result reporting, waiting for the results to print, asking other colleagues
who were more proficient with the computer technology to look up results/reports on-line.

Participants described the adverse effects of these inconsistent practice values as creating
tensions between those nurses that were proficient and those who were not. These tense-filled
relationships are described as adding workload onto the participants who are more computer
literate versus those that are not, and increasing the missed mentoring opportunities to enhance
and support the less computer proficient nurses. One participant summarized these experiences:

It’s not a tool for them because there are some nurses on the unit that do not use the
computer at all so I don’t know what they’re going to do when everything goes on line, I
mean they were lucky that lab work was still printed. Um, there are some nurses that have
never really accessed power chart and I know that because they couldn’t figure out how
to sign on and this was yesterday and like how are you doing your job and I guess they
rely on other tools like the paper chart, or they get someone else to do the work for them
and for some reason when it comes to technology the excuse that well I don’t really know
how to use it, therefore I, we’re not going to do it. Like for example, I don’t really know
how to use the computer therefore this is how we’re going to do our charting, or this is
how we’re going to do whatever nursing thing. Um, but if I were to say well I don’t really
know how to insert a Foley catheter therefore I’m always going to get another nurse to do
it for me, like I mean that’s not acceptable, right and but for some reason when it comes
to technology nurses can just say no and refuse.

Conversely, participants who felt less proficient and who had only just begun to
incorporate the computer into their practice indicated that they felt “left behind” and that they
“hated not knowing”, particularly because they had all of this “practice experience”.

So it’s, I totally get it, it’s a huge frustration in my job because I know where we’re going
to go and the resistance their giving me is, I understand where it is coming from and lot
of what I say is I don’t want to tell you like you have to learn how to do this, I know you
don’t want to learn how to do this, I know that you find this exceptionally frustrating and
it’s not initiative and it’s taking you so much extra time and I don’t know what to tell
you, this is what’s happening, so unless you’re going to leave nursing I need you to come
with me

Summary

The basic social process of **DEVELOPING A RELATIONSHIP WITH THE**
**COMPUTER IN NURSING PRACTICE** was revealed and describes the participants’
perceptions about how they experience and manage computerization in their practice. Six major categories emerged: PRIOR EXPERIENCES, SYNTHESIZING VALUES, REALIZING THE BENEFITS AND MANAGING THE BARRIERS all of which define integral stages in the processes experienced by the participants when CONFRONTED WITH COMPUTERIZATION, the initializing event in this process. In order to reach the OUTCOMES: ADOPT, ADAPT or IGNORE associated with their computerization experience, participants reflected on their prior experiences in the areas concerning: Experiences with Computers, Experiences with Bio-Medical Technology, Learning, and Organizational Discourses and Professional Discourses. PRIOR EXPERIENCES proved to be foundational to the entire basic social process as they had a profound influence in the subsequent phases of the process as participants SYNTHESIZED VALUES, REALIZED THE BENEFITS AND MANAGED THE BARRIERS. Participants described this process as a continuous cycling of this basic social process as they are continually learning through new experiences when confronting computers and computerization initiatives.

For some of the participants the adoption of computer technology occurred at faster rates than others. For others, computer integration in their practice was constantly evolving with new education, enhanced access to the technology and organizational supports that significantly contribute to a strategic and timely automated care environment. The speed at which participants achieved adoption was predicated on the basis of prior experiences with computer technology. For two of the participants they describe their current practice associated with computers on as one that remains a distant but increasingly relevant technology. Additionally, they felt that with continued support and education their practice relationship with the computer will evolve to fully incorporate the technology into their practice —“but it will take time”.
For other participants they communicated that they have already embraced computerization and all that the technology brings to them in their practice. Table 4 provided participant examples cited during the interviews about how they have either adopted or have adapted this technology in their practice. While none of the participants completely ignored the computer technology altogether, it was evident that at all of the participants had moved forward with **DEVELOPING A RELATIONSHIP WITH THE COMPUTER IN NURSING PRACTICE.**
Chapter 5- Discussion and Conclusion

The impetus for this study was derived from my realization that although nurses practicing in the southern region of the HA had experienced computerization and implementation of the EHR six years prior to their colleagues in the central and northern regions of the HA, computer adoption rates by nurses in the southern region remain questionable. The findings in this study revealed a host of reasons for this that included the continuation of automatically printing patient information and the propagation of the paper-based health record, despite the availability of the same information in the patient’s electronic health record. Thus, individual nurses and others had the opportunity to ignore, adapt, or adopt the computer technology and the access to the related electronic clinical information systems.

In the fall of 2010, automated printing of the electronically generated patient information will cease and enhanced functionality will be implemented to improve the clinical users’ navigation through the EHR as well as provide additional workflow tools to support the integration of the computer in clinical practice. As a result, a broader understanding of the nurses’ perceptions of computerization prior to the implementation of these key initiatives in HA will be necessary to successfully move forward with these changes. This study set out to gain an understanding about how nurses perceive and manage computerization in their practice.

The findings of this grounded theory study demonstrate that when nurses confront computerization in their practice, they consciously reflect on prior experiences with computers, experiences with bio-medical technology, learning, professional discourses and organizational discourses. These prior experiences influence how nurses’ engage with, reflect on, and synthesize their practice values pertaining to patient care. The more engaged with and cognizant of their practice values, the more willing and open they will be to realize the benefits and manage
the barriers related to incorporating computers into their practice. Outcomes of the process such as adopting, adapting, or ignoring represent the consequences associated with the nurses’ ability to realize the benefits and manage the barriers. Nurses will transition from a state of ignoring the computer to adapting the computer in their practice as a result of evolving knowledge and comfort with the computer while providing patient care. New experiences facilitate new opportunities for nurses to gain new knowledge and experiences which results in a progression from adapting to fully adopting computerization in their practice. The findings reveal the basic social process of DEVELOPING A RELATIONSHIP WITH THE COMPUTER IN NURSING PRACTICE.

In this chapter I discuss the basic social process related to computerization by expounding on the findings of this study, the literature, and the participant experiences with respect to the Implications for Computerization. Implications’ pertaining to Nursing Practice is the first major section in this chapter and includes discussions about, the Age/Experience Chasm as well as the Meaning of Information Relevance, Nursing Intelligence and the Electronic Health Record. Values-based relationships associated with the participants’ interpretations of the dominant discourses about age and experience and the relevance of clinical information and technology that exist within today’s nursing profession are incorporated in this discussion.

The next major section of this chapter illuminates the Implications for Education as they pertain to both basic nursing education and continuing education to support computer competency requirements, and how the participants who are experienced nurses in the HA learn about technology which may inform future computerization initiatives. I will also present the Implications for Health Care Organizations as they pertain to the construct of future computerization initiatives which will include a discussion about nurses’ requirements for access
to clinical information in the context of their practice and workflow. Computerization Initiatives and Implementation Design, Defining Access to Clinical Information, Diffusion of Innovation and Clinical Change represent the key discussion topics in this section. Implications for further Research will also be described which will highlight research foci for future studies. Finally, I will present the limitations and conclusion of this study.

**Implications for Computerization in Nursing Practice**

*The Age/Experience Chasm*

The Age/Experience Chasm as depicted in this study is representative of the dichotomous perceptions that young-versus-old in combination with experienced-versus-less experienced nurses' beliefs about each other; participants describe these as part of the Professional Discourses that either support or hinder their adoption of computers in their practice. Discourse in this regard is based on Foucault's interpretation cited in Bullock and Trombley’s (2000) *Fontana Dictionary of Modern Thought*, which essentially means using language as a form of social practice. In this section, I describe the implications of participants' perceptions of each other and explicate the relationship between the possible discourses that have contributed to these perspectives.

According to 2008 CIHI statistics (2010), the average age of RNs working in the Canadian hospital sector was 43.4 years and the average age of RNs providing direct patient care equated to 44.6 years; this statistic is just below the median age of the participants in this study, 45.9 years. The average age of entry into the workforce has increased as regulated nurses are now often age 30 or older when they graduate and begin their nursing careers. In 2008, the 40 to 60 year age group dominated the nursing profession and constituted 58.3% of the RN workforce. These statistics are particularly significant not only because they are closely reflective of the
participants in this study, but they also represent the changing nursing landscape and dynamic within the acute care practice settings in this HA. Six of the participants in this study revealed that they are over the age of 50 years and one other participant is over the age of 45 years. This would indicate that the majority or 58% of this participant sample is over the age of 45 years, all of whom possess median years of practice totaling 29 years. Since all of the participants in this study have either adopted or are adapting the computer in their practice, this statistic is then inconsistent with the mid to later 20th century literature which suggested that nurses, based on the age demographic alone, had not embraced computerization in their practice to the extent that might have been expected. As the literature of the 21st century posits, age alone can no longer be perceived as a determinant of computer adoption or EHR use (Alpay and Russell, 2002; Copnell and Bruni, 2006; Darbyshire, 2004; McNeil, Elfrink, Beyea, Pierce, and Bickford, 2006; Timmons, 2003).

The findings as revealed by the participants in this study, suggests that how these groups of nurses perceive one another in the clinical domain is significant to transforming practice during organizational change because of the potential or actual adverse outcomes associated with the supporting or hindering behavior of colleagues (Shanley, 2007). As reflected in chapter 4, Table 2, pg. 92, nurses hold perceptions about each other that may have evolved from disparate beliefs about the meaning and value of the practice experience versus the nurse-patient-technology relationships that pre-date computerization. These tensions may be representative of the majority of those participants' predominant values placed on tacit knowledge, or the unspoken knowledge and the “Art of Nursing” which as Herbig, Büssing and Ewert (2001) suggest, “is embedded in holistic work processes, implicitly gained and an integral part of the accomplishment of working tasks” (p.688).
These participant perspectives are also consistent with Locsin (2001), Malone (2003), and Sandelowski (1999, 2002) who suggest that technology disrupts the nurse-patient relationship and gets in the way of always ensuring that the meaning of the patient experience remains at the forefront. In this regard, beliefs about caring for the patient that does not include incorporating computer technology or the access to electronic information is skewed and unfortunate in this highly intensive information. These traditional perceptions about nursing practice in the absence of computerization unfortunately perpetuate an unrealistic notion that a constant bedside vigil alone in the context of the nurse-patient relationship is sufficient in today’s complex and acute care environments. While there is no contention with nurses’ expressed values associated with the nurse-patient relationship, particularly they pertain to finding the meaning of the patient’s experience, we now know that without timely access to vital patient and supporting clinical information, patient care may be compromised (Buus-Frank, 1999; Ely, Fallon, Soar, Buikstra and Hegney, 2008; Hebda and Czar, 2009; Mihailidis, Krones, and Boger, 2006; Randell, Mitchell, Thompson, McCaughan and Dowding, 2009; Simpson, 1999; Smedley, 2005; Zuzelo, Gettis, Hansell, Thomas, 2008).

Another incongruous finding pertains to the early studies suggesting that a nurse’s chronological age was automatically indicative of their years of experience as a registered nurse. However recent studies and CIHI (2010) data have confirmed there are more individuals entering the profession of nursing as a second or late career path. Therefore, one cannot automatically assume that “older nurses versus younger nurses” display particular practice behaviours towards computerization (Fessele, 2009; Hatcher, Bleich, Connoly, Davis, Hewlett, Hill, 2006; Letvak, 2003; Med-Emerg Inc., 2005; Sherman, 2006). These findings are particularly noteworthy as one
may be inclined to draw conclusions about a colleague’s behaviour based on their chronological age or years of practice experience.

For example, nurses over forty years of age may have just entered the profession and had only a few years of nursing experience. For these nurses, they would have engaged with computers throughout their university experiences; other nurses who may be in their late fifties may also use computers extensively in both their personal lives and their professional practice. Conversely, nurses with years of practice experience and in their mid forties to mid fifties may not have been exposed to computerization at home or at work, and as a result confess to feeling frustrated and overwhelmed with the idea of integrating computers in their practice. Participants suggest that this is a result of their prior experiences related to technology in general. Subsequently, generalizing about computer adoption based on conventionally defined generational qualities alone cannot be justified. This understanding is consistent with the findings in this study and the literature (Fessele, 2009; Hatcher, Bleich, Connoly, Davis, Hewlett, Hill, 2006; Letvak, 2003; Med-Emerg Inc. 2005; Sherman, 2006).

Expert nurses, as defined by Benner (1984) and Benner and Tanner (1987), with years of tacit, intuitive knowledge and first-hand clinical practice experiences with patients and families and bio-medical technologies, have the opportunity to share and impart their expert knowledge with their less experienced nursing colleagues. At the same time less experienced nursing colleagues typically enter the profession today with an abundance of computer technology experiences, and more recently informatics competencies, which creates plenty of opportunities for them to be able to share their knowledge and expertise (Courtney, Alexander, Demiris, 2008; Saranto, Leino-Kilpi, 1997; Smedley, 2006). Front-line mentoring can be an ideal solution for those “just-in-time” clinical information needs, which include, searching ‘on-line’ for clinical
resources, accessing and navigating the electronic health record or figuring out the best way to incorporate the computer technology in their everyday practice. There is much to gain in this dynamic relationship but unless there is perception of shared values about computer technology in the context of nursing practice while providing care, there may be missed opportunities in learning from and supporting one another, striving to achieve a standard of practice together, and ensuring safe delivery of care.

With respect to “taken for granted” ideals in relation to the nurse-patient-technology relationship, the O’Keefe-McCarthy (2009) article suggests that the “unexamined use of technology” has inserted itself between patients and nurses which adversely impact the nurses’ ability to act with moral agency. She further contends that the “unquestioned” reference to the data or information emitted from the technology subsequently controls the nurses’ actions in relationship to providing care to the patient thereby diverting the patient’s illness experience to the background. In this regard, without the nurses’ critical reflection about the role of technology in this context, there is potential for the technology to “draw nursing care away from the person and divert the attention to devices (O’Keefe-McCarthy, 2009, p.795). The participants with years of practice experience support O’Keefe-McCarthy’s contention and provide additional context to the notion of the unexamined use of technology.

For participants with equal to or greater than 16 years of experience, they believed that their less experienced colleagues “were too reliant” on the clinical data elicited from the technology and as a result, the less experienced nurses often failed to take the time to question or defer back to the patient as the source of truth for accuracy. The more experienced nurses suggested that this questionable method of practice diminished over time with the less experienced nurses’ increasing knowledge and experiences with patients and technology
combined. Although the nurses with years of experience did not express their concerns in the context of “acting with moral agency” as O’Keefe-McCarthy (2009) suggests, they were adamant that the patient remain at the forefront of the assessment, not the technology. When the less experienced nurses were asked to reflect on their more experienced colleagues’ assumptions, they recanted with a resounding negative response, and stated that they believed their perceived reliance on the technology as described by their colleagues was not substantiated and therefore untrue. This professional tension would require further examination beyond the scope of this study and suggests the need to explore how nurses with years of experience versus nurses with minimal years of practice experience perceived and understood morale agency as defined by O’Keefe-McCarthy (2009) and in the context of the patient as the source of truth.

Additionally, the findings suggest that nurses with equal to or greater than 16 years experience who have had years of practice experience with bio-medical technology would have been exposed to years of inferior or overly-complicated bio-medical technologies, and minimal device support. As a result, this cohort would have a greater tendency to “question or mistrust” the data outputs from the bio-medical devices. While many of these more experienced participants have realized the adjunctive benefits to supporting safe patient care, they consistently expressed a “conflicted relationship” with the technology, which may have adversely impacted or contributed to their perceptions about computer technology and their natural reliance on the patient as the source of truth. Regardless, this study revealed that these participants had either begun to overcome these ‘trust’ issues related to the technology through improvements in bio-medical device maintenance and product enhancements.

Nurses with equal to or less than 15 years experience may not have experienced as many years of “questionable” bio-medical device generated data in the same way, or felt conflicted
with the nurse-patient-technology relationship. Two of the more experienced participants expressed their perspectives about this phenomenon in this way:

I find that a whole bunch of the young ones, they’ll do a blood pressure and they’ll look at that and give the medication...but our blood pressure machine is the electronic one, if the patient is in atrial fibrillation, then those machines don’t work for them. So I’ll go get the manual cuff to get an accurate blood pressure reading. So I find a lot of times some people are so engrossed in technology that they actually don’t see what you need to know about the patient.

Although participants’ conveyed disparate beliefs about the nurse-patient-technology relationship, all participants had either adopted or adapted the computer technology in their practice. Despite the dominant and divergent discourses of knowledge and how nursing knowledge is acquired, computer technology was beginning to be incorporated into their repertoire of values about practice in the context of patient care delivery. Regardless of age and/or years of experiences, participants’ positive perspectives about computerization is beginning to be incorporated in their practice values which in turn will enhance the access to information and build knowledge for today’s nurses in this increasingly information intensive, technology-mediated practice environments.

*The Meaning of Information Relevance, Nursing Intelligence and the Electronic Health Record*

The meaning of information relevance, nursing intelligence and the electronic health record suggests that in this highly intensive-information age, nurses and others increasingly require access to relevant information; the notion of relevance is defined by the participants as clinical and/or patient information that supports safe and appropriate care, that is easily accessible at or near the point of care delivery. The participants in this study identified and defined this in their reflections about values associated with practice in the context of providing patient care; refer to Chapter 4, page, 107. Integral to the adoption of the computer technology
and the HA’s electronic health record is the trust that not only will the end-users (nurses) engage appropriately with the technology, but that they will know how to access and believe that the related clinical information will be available where and when they need it. Lorence, Spink, and Richards (2002) state, “Above all, the trust of users must be achieved before they will give up the reliability and comfort of traditional paper-based systems of patient information storage” (p.358).

The concept of trust is significant as these participants are currently practicing in a parallel-sourced Health Record environment. Therefore, in order for the nurses who have practiced for many years in this HA to make that transition and trust that they will feel supported to learn and know where to find the information once the HA transitions to a true hybrid health record, the organization will have to demonstrate the availability of timely and knowledgeable resources. This transformational change will be further explicated under the Organizational Discourses section of this chapter. In this section, I discuss the notion of relevance and the electronic health record as it pertains to computer adoption.

The concept of Nursing Intelligence as defined by Alpay and Russell (2002) includes clinical data that is not only representative of the patient, but information that is reflective of the nurses’ role in relation to the patient. For example, nursing intelligence is realized when there is an inclusion of data elements that reflect nursing knowledge and purpose for engaging with the patient, data elements that support the nurses’ ability to effectively conduct patient assessments, opportunities for enhanced and more collaborative (interprofessional) patient care planning exist, the ability to create patient assignments and adjust workload volumes is available, and access clinical decision support tools that augment nursing knowledge are easily searched. Goorman and Berg (2000) also suggest that these advances create opportunities for nurses to value clinical
and professional relevance, and assist in nurses’ ability to ultimately embrace and adopt the computer technology in their practice.

These findings were also consistent with the findings in Copnell and Bruni (2006) study about understanding change based on the perceptions of twelve critical care nurses who also believed that there were certain amounts and particular types of change that could be expected. The participants this study concluded that they could not “possibly be at the patient’s bedside to administer parenteral medications or monitor them on a consistent basis” and were grateful to have the technology and access to the information to augment their practice. Additionally, they suggested the value of the alerting functions or visual displays of the patient’s physiological parameters were required in order to conduct complete assessments.

Doran and Sidani (2006) suggest that,

Clinical decision support systems that provide nurses with practice information automatically in response to patient-specific assessment information are suggested as a solution for increasing translation of evidence into practice (p. 4).

In this regard, participants who have adopted the computer in their practice have increasingly celebrated the access they now have related to research-based information about patient care. As a result, they realize the benefits to this “just-in-time” access to relevant information while incorporating the most appropriate decisions for care delivery. It is these nurses who are able to demonstrate to their nursing colleagues who have yet to fully adopt the computer in their practice, and realize the benefits to this increasing knowledge. In this regard, it may be plausible to suggest that there may be a substantive shift in the practice discourses associated with nurses’ values and positions of power as a result of computer literacy and proficiency among today’s nurses as well as increasing access to relevant information near or at the point of care (Smedley, 2005).
Implications for Nursing Education:

Learning Modalities and Computer Competencies

Computerization in the clinical practice arena requires 21st century nurses to be knowledgeable about and ready to incorporate their computer skills in a high-paced, knowledge-intensive, and patient-centric care environment. The implication of this practice-ready requirement suggests that nurses must have acquired computer skills and computer integration knowledge and experience in their entry-to-practice programs in addition to ongoing support and education in the workplace (Chang and Daly, 2001; Randell, Mitchell, Thompson, McCaughan, and Dowding, 2009; Saranto and Leino-Kilpi, 1997; Smedley, 2005). The implications for continuing to incorporate information technology in basic and post-basic nursing education programs is another way in which nurses will assimilate and synthesize the values of computers in their practice.

As represented in the findings, nurses who graduated from nursing schools prior to 1994 were less apt to have experienced computers in their practice, never mind in their personal lives. Simpson (2003) suggests educational institutions move beyond the traditional face-face education method and instead provide funding for the equivalent of virtualized schools of nursing. Additionally, as nurses are positively exposed to computer technology prior to their professional entry into the practice environment, they will feel more at ease in the workplace searching for on-line information, utilizing clinical information systems and incorporating this technology into their daily practice. Fetter (2008) and McNeil et al (2005) confirm this ideal in their studies about the significance of embedding nursing informatics competencies in the basic programs to ensure that knowledge pertaining information processing skills, data quality,
nomenclature standards, ethical issues and nursing intelligence are transcended and realized from the moment the nurse enters the profession.

There was also a slight variance between the nurses with more than 16 years practice experience than the nurses with equal to or less than 15 years practice experience as the concept of ‘how to’ access information via search engines and/or clinical information systems was expressed. The nurses with more practice than computer experience cited frustration when attempting to access information because they did not know what to enter in the search field. Whereas nurses with less practice experience but more computer experience just wanted to be able to search more proficiently. This would imply that ongoing education and information sharing as it pertains to searching for information from reputable and/or health authority sanctioned intranet/internet sites is required.

Curiously, with the exception of one of the participants who practiced in the role of the clinical nurse educator who strongly advocated for and championed the sharing of computer related information, the remaining participants never identified the role of the clinical nurse educator as a key contributor to their knowledge growth in this area. The role of the clinical nurse educator is critical to the success in advancing computerization initiatives and competencies among the nurses at the bedside. Often time’s, vital information is needed at or near the point of care and most often required at times when there are competing priorities and numerous distractions in the care environment, the availability of the clinical nurse educator can be a timely knowledge broker in this regard.

In addition, this finding illuminates the need to create opportunities for both groups of nurses to mentor one another in their quest for information accessed via the computer. From this perspective, the nurses with more practice and less computer experience could offer key
information about 'what' to search for, whereas the nurses with more computer than practice
experience could mentor their colleagues in 'how' to search for relevant information. These
fundamental mentoring opportunities could be realized in an organizational culture that
advocates and supports informal, just-in-time sharing opportunities or through formalized shift
mentorship structures pre-arranged by the unit leadership and based on ongoing competency
awareness programs that advance knowledge and experience amongst the nurses. Rather than
nurses "eating their young", they would support and mentor one another and enhance the
competencies in the both practice and knowledge arenas.

It's probably the same thing, it's fun when it works and it's really frustrating when it
doesn't, at home there is no pressure, if you're looking for a, you know, a critical lab
value or trying to get somebody's chest x-ray up because it's important, then there is
pressure, at home it's more of a nuisance, um, so there is not pressure at home, unless I'm
trying to do my banking...then there is pressure. So I think they're great tools when they
work properly.

This participant was asked to describe her experiences when working with a computer at work
versus at home. Based on the participant's response, does this statement reflect the participants'
hesitation or lack of confidence when trying to access information under pressure? What would
help relieve that sensation? This suggests that being able to take the time to log-on, know how to
search for and find the relevant information is "fun" - it also suggests that it is "not fun" when the
participant feels "pressured" to retrieve the information in a hurry.

With respect to the experience of learning as one of the value-based conditions required
for realizing the benefits, participants identified that time and timing of education and the
education modalities were significant in order to advance the computer adoption agenda.
Participants who had practiced equal to or greater than sixteen years typically expressed a need
to spend additional time beyond their less experienced nursing colleagues' computer education
requirements. This allowed for their unfamiliarity with informatics related competencies such as: computer literacy, computer-based language, use of the computer and understandings about how to navigate the clinical information systems and web-based applications. These participants also indicated that depending on the amount of learning required, they preferred to learn away from the clinical area so as to be able to take the time to learn without feeling inadequate in front of their more computer literate peers. This acknowledgement was particularly defining for these participants and for me as it reinforced the need for education strategies associated with computerization and informatics related competencies to acknowledge and include the different learning modalities and locations for learning (McNeil, Elfrink, Beyea, Pierce, and Bickford, 2006; Ornes and Gassert, 2007; Saranto and Leino-Kilpi, 1997; Smedley, 2005).

Additional findings in the area of learning revealed an interesting variance between two cohort groups of participants, those with 16 or more years of experience versus those with less than 16 years of experience. A question of 'how' the participant experienced learning about computer and bio-medical technologies was discussed. Participants with more than 16 years experience and graduated from a diploma-based program, described their learning about bio-medical technologies using memorization of step-by-step instructions; this was a process they continued to use when learning about computers. Whereas the participants who had less than 16 years experience described their learning about both the bio-medical and computer technologies using a conceptual approach to understanding the concepts associated with the different types of technologies and the related information systems. In this regard, unlike the participants with more than 16 years who described the difficulties transitioning from one device type to another, their counterparts were able to move with ease:
Maybe it’s just my generation, I’m pretty comfortable with whatever device type they throw at us, and it’s just a matter of playing with the buttons and figuring it out.

This realization is important as it reflected one of the barriers that participants described during the computerization initiatives. For some of the participants, not being able “figure it out” delayed uptake and subsequent adoption of the computer. With respect to their adoption of biomedical technologies, this transition was described as “easier” because the device type tended to be a single device type and they simply memorized the function and steps for use. Overall, establishing a conceptual learning approach to learning about computers or technologies in general provides opportunities for nurses to transition from one computer to another with ease (Smedley, 2005). With further qualitative study in this area, descriptions about these participants’ learning experiences may contribute to new understandings about the education methods used in basic and post-basic nursing education delivery when learning about technologies in general.

**Implications for Health Care Organizations**

In this section, I will describe the implications for health care organizations as they pertain to clinical change requirements resulting from computerization initiatives and diffusion of innovation (implementation) strategies. Access to information via the computer technology and the participants’ expression of access to ongoing support will also be described.

**Computerization Initiatives and Implementation design strategies**

Fulton, (1996) and Maxwell (1995) identified critical and facilitating factors to the successful implementation of pain innovations, specifically IV PCA technology. These core implementation strategies included: gradual introduction, enthusiastic and motivated facilitators, clear educational and reference materials, foundational education leaders such as clinical nurse
educators and resource nurses, front-line-nurse-involvement in patient selection, mandatory competency sign-off for all nurses, and support by nursing leaders/operational leaders and physicians. Inhibiting factors were also identified to include: negative attitudes of others, perceived job stress, absence of a clear understanding of the 'business' of the care area, perceived complexities associated with the technology and documentation systems. These strategies and inhibiting factors were consistent with those identified by the participants in this study with respect to their prior experiences with computerization in their practice.

Without clearly communicated technology and infrastructure visions, as well as concurrent attention to the organizations' supporting strategies as identified by Fulton (1996) and Maxwell (1995), organizational discourses will continue to impede the computer adoption imperatives for nurses and others. The present day literature identified in chapter two is also consistent with this direction as demands for computer skills and knowledge abound as an entry to nursing practice requirement (Alpay and Russell, 2002; Caldwell, Roby-Williams, Rush and Ricke-Kiely, 2009; Copnell and Bruni, 2006; Darbyshire, 2004; Kitson, 2008; McNeil, Elfrink, Beyea, Pierce, and Bickford, 2006; Pesut, 2006; Randall, Mitchell, Thompson, McCaughan and Dowding, 2009, and Shanley, 2007; Timmons, 2003).

Furthermore, organizational decisions with respect to computerization must attend to the supporting policies that support safe and appropriate practice, project plans that reflect the implementation design of the next computerization initiative, and investments in an assortment of computer technologies such as, wall-mounted or mobile/hand-held devices that enhance or augment user access to information and data capture near or at the point of care. As evidenced by the participants' perceptions in this study, these implementation design strategies have been influential in either adversely impacting or positively influencing how nurses will realize the
benefits and manage the barriers in their practice. Essentially, if they had had numerous adverse experiences or experiences where the computer education was limited, then the rate of adoption was significantly and negatively impacted. Subsequently, the opposite held true for participants who had had positive prior experiences with technology implementation. Finally, so long as our nursing landscape remains as diverse as it is with nurses who entered the profession equal to or greater than 16 years ago, it is imperative that we continue to conduct qualitative and quantitative research in this area in order to capture the value and learning–based conditions that will support further adoption of the computer in their practice.

I think they can all probably see the meaning whether or not it’s their ability to take the time to learn and really understand and if we have a problem where do we go to solve the problem. I think everybody could eventually find the value in it but I think the biggest hold up is do we have the time to really learn what we need to know in order to do our work as quickly and as efficiently as we are doing it now...that is really hard, that learning thing.

Participants in this study describe the unfortunate and significantly adverse outcomes realized when organizations attempt to implement computer technology or clinical information systems without initially taking time to understand the practice environments that include the professional practice and organizational discourses. Typically in these situations, the desired clinical practice and workflow changes are not achieved, or worse, unsafe outcomes are realized. This is consistent with Kushniruk, A., Borycki, E., Kuwata, S., and Kannry, J. (2006) study described in chapter 2, pg. 21, which illuminated the risks associated with implementing an electronic medication administration documentation system that impeded the dynamic workflow relationships between the provider and the patient during medication ordering and administration scenarios. I am of the belief that timely and appropriately administered education, knowledge translation and end-user uptake can only be successfully realized if all of the above is considered
during the implementation and orientation of these clinical information systems and technologies.

**Defining Access to Clinical Information Systems**

Ease of access is an important segment described by all of the participants as one of the value-based conditions that pertains to the nurses’ ability to access the computer technology and supporting clinical applications as well as the ease in which they log-on to the computer. All of the participants described varied experiences in these areas and found them to represent barriers they either managed or felt unable to manage. The participants who were able to manage these barriers, described workflow processes that despite the computer type and location challenges, were still able to realize the benefits by seeing the efficiencies and patient safety outcomes gained when working with computer technology while administering medications for example.

One participant described a negative experience in this regard as both embarrassing; because of how she may have been perceived by the patient, while at the same time she felt somewhat comforted knowing that she had obtained the correct information to ensure safe patient care while administering medications:

> How does it appear to the patient while I am administering their meds and I need to relate to the previous laboratory results and then I have to run back to the nursing station to look them up...What kind of trust does this instill in patients?

This participant is acknowledging that although she values her ability to access this important and relevant patient information, the need for her to travel away from the patient to access the information via the computer at the nursing station would appear as though she is not organized. Unless this nurse explains to the patient that she needed to access the information elsewhere, the patient would not instinctively know that. This clinical scenario demonstrates the importance of
computer location as it pertains to the proximity of the patient and that nurses’ value the device placement strategy as much as they value the “pen in their pocket”.

Another vital aspect related to ‘access’ as expressed by the participants pertains to the ease in which they have the ability to log-on and off the computer. All of the participants, regardless of their practice location and their experiences with computers identified this as a barrier or impediment to their timely access to information. The nurses identified the organizational limitations associated with multiple and complex identification log-on processes including authentication with multiple passwords as challenging. This perceived barrier often resulted in nurses and others failing to log-off leaving the patient record and/or other clinical applications exposed for others to access using their user identification; in this HA this is constitutes a privacy breach. Although the participants are aware of this potential risk they expressed their frustration and the challenges in trying to adhere to organizational policy while being distracted and forgetful in their everyday work environment.

With respect to ease of logging-on or off the computer, the HA has begun to demonstrate significant opportunities for streamlining end-user log-on or off functionality by establishing a single-sign-on approach to all the clinical applications and decision support/resource tools that clinical users have access to. This sign-on/off approach using a single user identification and authentication requires one user name and password for logging-on as well as a single point and click for logging-off each access encounter. This enhanced functionality will be implemented in the near term and should mitigate some of the privacy breach risks and end-user dissatisfaction with the logging-on and off processes that have adversely affected their access to clinical information.
Diffusion of Innovation and Clinical Change

The concept pertaining to 'diffusion of innovation' has been researched and incorporated into organizational implementation design for years, with Rogers (1983; 1995) Diffusion of Innovation Theory, leading the way. This pioneer established a critical systems change framework that enabled organizations to better identify the internal and external factors that affect the change processes and lead to a targeted state of innovation adoption. The central tenet of this theory represents the notion that adoption of new initiatives or ideas by individuals within an organization for example, follows a predictable pattern. Within this model, stages or intervals of adoption status can depict the anticipatory trajectory of a group's adoption success. In this regard, the stages have been described by Rogers as 1) a slow and initial Lag Phase, followed by 2) the Take-off Phase, 3) Saturation Point and then 4) a natural deceleration phase where only a few last remaining slow-adopters finally join the rest of the group (Rogers, 1995). In this regard, the nature of the organizational change experience would be represented by these predictable patterns over time. This type of model is appropriately applied if the population is fixed and the organizational influences associated with the innovation are constant and therefore do not change during the course of the implementation.

Unfortunately, one of the shortcomings of systems change models like Rogers' (1983; 1995) have tended to be linear in nature, and do not incorporate the substantive and organic impacts that health care organizations and professional contexts of practice contribute throughout the entire diffusion of innovation process (Aarts and Berg, 2004; Caldwell et al, 2009; Greenlaugh, Robert, Bate, Macfarlane and Kyriakidou, 2005; Kitson, 2008). This 21st century discourse as it pertains to context is significant because conceptual frameworks have begun to emerge and incorporate these multifaceted requirements. As a result, conditions and causal
relationships can be teased out and explicated, which can better predict a successful outcome to the organizations’ overall diffusion of innovation ‘change’ experience.

Greenhalgh, Robert, Bate, Macfarlane and Kyriakidou (2005), have made a substantive contribution to diffusion of innovation conceptual models which incorporates the contextual underpinnings as components of spread and sustainability of the diffusion- innovation process. These categories of focus include: the innovation, the system antecedents for innovation, system readiness, the adopter – defining the adopter, assimilation, the implementation process, the identification of linkages, understanding and defining the outer context, communication and influence, resource systems, knowledge purveyors, change agency and user systems. Each of these components are researched and defined according to the organization and the innovation combined. Immediately following the organizational assessment, documentation and mapping of all of the categories, connecting and intersecting pathways are then delineated to assist in the recognition of the dynamic relationships between and among the components of the model.

Using this model, organizations can better understand and respond to the constantly evolving process map that is continually updated to understand the ongoing impacts associated with the diffusion of innovation. As it turns out, this model is significant in relation to this study because of the emergent fit with the grounded theory resulting from the participant data described in Chapter 4. In this regard, participants consistently described experiences about the HA’s decisions about time and timing of concurrent change activities, limitations pertaining to education and access to support and knowledge resources and computer technologies and challenges with integrating computers in their practice because of the complex log on/off requirements. I propose that by adopting Greenhalgh et al’s model of diffusion of innovation, a more comprehensive understanding and incorporation of: the nurses and others perspectives,
automation of practice and workflow requirements, organizational discourses, foundational understandings about current state of care delivery relationships and pre-implementation testing of the computerization initiative would impact the future implementation designs.

Copnell and Bruni (2006) posit that “the dominant discourses of change in nursing literature hold that change is an eminently desirable, rational process and synonymous with progress” (p.302). If this is true, then one might conclude that all innovation (change) represents progress so why then would nurses be resistant or question the proposed change? The most appropriate response in this regard was aptly defined by the participants in this study as they defined their value-based conditions that bring meaning to their practice when considering the computerization initiative; these conditions included the context in which the change is positioned and how effectively the change is communicated.

One participant referred to planned change as an expectation and comes with the territory of being a nurse. Another nurse reflected on the idea of divergent and convergent change and indicated that too much concurrent organizational change caused nurses to “pick and choose” their knowledge priorities and that they would end up selecting what they could learn in a timely manner, and what they could actually accommodate in their workload. This “picking and choosing” behavior outcome is consistent with Kitson’s (2008) article related to understanding the discourse on evidence-based practice, the relationship that ‘context’ has on the knowledge to practice journey, and the benefits of understanding how knowledge translation theories in combination with diffusion of innovation models can significantly influence the knowledge to practice outcomes during times of organizational systems change. With respect to this HA and the affects resulting from numerous concurrent change activities as described by the participants, the spread of new knowledge would be “slow and unpredictable” at best, adding to the adverse
impacts of poor and/or inconsistent computer adoption rates and amongst nurses. This same participant concluded that this was too much of a risk for the organization to assume since nurses would end up potentially learning only half of what they needed to know. Again, utilizing diffusion of innovation models that view healthcare systems as complex, interactive, organic entities, such as Greenhalgh et al.'s (2005) model will assist organizations like this HA to understand the implementation design impacts of their computerization initiatives and to mitigate the risks associated with concurrent learning and clinical change management demands.

Additionally, clinical change and innovation initiatives can be strategically 'bundled' to better address the amount of perceived convergent change while also attending to the much desired value-based conditions as described by the participants in chapter 4, pg. 107, as well as the new knowledge that the nurses are craving with respect to computerization. This bundled approach would also address the notion of divergent and often disconnected learning demands that according to the participants in this study become intrusive and overwhelming to learn and retain during a single instance. Access and delivery of this bundled education along with identified-on-site peer mentoring can be made available through peer identification, web-based portals and or computer-based training modules via an internet hosted solutions which would be augmented with computer kiosks located throughout their facility campus. Not only does this strategy significantly enhance access to self-paced learning but increases the likelihood that nurses would take the time to embark on their learning experiences knowing that they have peer support where and when they need it.

For many nurses during the initial or introductory stages of innovation design when implementing new technologies or clinical information systems, change brings about uncertainties and questionable meanings to benefits realization. If there is no immediate
perceived value, and nurses have had no opportunity to participate in the proposed, planned change, then they will no doubt question and resist the change.

When they work, they're great tools, but when they don't...our environment makes it difficult for some of us to provide care...there just aren't the resources to help us figure things out.

This participant is describing the frustration she experienced when she knew there were substantive benefits to incorporating the technology, but was unable to trust that there would always be someone there to provide support and ensure that the technology was working. This same participant, along with four other participants expressed specific concerns about the organization's ability to ensure that would be adequate supports during clinical system downtimes which essentially render the information applications inaccessible for a defined or undefined period of time. Availability of twenty-four hour by seven day supports, even by telephone is often a tremendous support at times when downtime uncertainty is rendering access to clinical data as inaccessible.

Additionally, availability of clinical colleagues, commonly known as super-users or peer mentors, who possess extensive comfort and knowledge related to the use of the computer and the clinical applications, is not only relevant for knowledge translation to occur but is also valued by the participants. Despite the differences expressed by the participants in table 2, pg. 92, participants emphasized that timely mentoring was necessary to provide the support needed to move forward while providing care. In this instance, mentoring about clinical practice as well as the computer technology was a valued and shared experience. Furthermore, all of the participants identified a lack of ongoing awareness about how to search for these supportive resources that include HA procedure manuals, approved clinical resources, and tips and tricks about how to navigate the electronic health record. When attended to, it is anticipated that these value-based
condition gaps in the HA will significantly enhance the overall computer adoption rate by nurses and others.

Finally, when defining organizational and practice values related to the computerization initiatives, ensuring that risks associated with clinical information and process redundancies are mitigated so as not to confuse or increase clinical risk. This HA's decision to maintain a parallel-sourced health record has proven to adversely impact not only the uptake by nurses to transition to integrating the computer in their practice and access the computer generated information in the electronic health record, but as described in chapter two and four, has also created clinical risk if the nurse has referenced outdated paper-based patient information. Organizations must advance clear clinical information visions with respect to source of truth and ensure that nurses and others know exactly where to find the most current and accurate patient information. This source of truth ideal is best captured in a fully integrated and completely automated electronic health record. However, in the current economic climate this may not be realistic and at the very least, should attend to all mitigation strategies related to data redundancy and multiple sources of 'like' information as it pertains to the patient's health record.

Nurses must also continue to be mindful that the true source of patient information resides with the patient; in this instance, computers and computerization initiatives can never 'take the place of the patient' as the source of truth, but will augment or enhance the nurses' ability to understand the patient's status from (for example) a physiological context. Nurses will continue to rely on the 'art' of nursing and their tacit knowledge to incorporate the physiological data abstracted from the EHR, into the broader perspective of the patient as a whole being.
Implications for Further Research

Implications for further research are required for advancing computerization in nursing practice and nurses’ adoption of this technology. As evidenced by the participants in this study, additional research is needed in three key areas of focus: education, clinical practice change management (diffusion of innovation, knowledge translation) and the nurse-patient-technology relationship.

With respect to education, specifically understanding how practicing nurses learn about technology versus how nursing students learn about technology may result in two different knowledge translation outcomes. Understanding how the implementation of education principles and learning modalities in diverse generational/graduation year nursing populations need to be more thoroughly examined.

Research in the area of clinical practice change management, which pertains to the concept of change in practice context and project methodologies for computerization initiatives that enhance computer adoption by nurses in health care – that build trust through education, peer mentoring and ongoing technology and support. Also understanding the relationship between education, conceptual learning and establishing a culture of nurses supporting and mentoring each other will assist in establishing a sustainable and knowledge journey for the nurses experiencing future computerization initiatives.

Finally with respect to the nurse-patient-technology relationship, this is a key area of focus for research as it pertains to understanding how the nurse positions themselves in relation to patients, the relevant clinical information including the EHR, and the computer technology. Some of the participants in this study described how they distanced themselves from the computer technology. These participants attributed this action to the idea that they did not feel
confident in their proficiency with the device during times of increased workload or when they really needed to focus on the patient assessment. In this regard, they needed to take the time to log onto the device and figure out how to search for the relevant clinical information. Further understanding about the nurse-patient-technology relationship as it pertains to the patient’s perspectives about computer technologies in the care setting will also be critical to understand as we progress along technology evolution continuum. Building on the qualitative research conducted by Arbon (2004); Cadwell, Roby-Williams, Rush & Ricke-Kiely (2009); O’Keefe-McCarthy (2009); Perkus (1996); Sandelowski (2002) will provide a foundation of knowledge and direction in this regard.

Finally, qualitative research questions that examine, “How nurses use information obtained from electronic information systems?”, and “What is the meaning of the computer in the nurse-patient relationship in the context of providing care?” are examples of future research initiatives that will advance our understanding in the area of computerization and nursing practice. Additionally, the utilization of a mixed qualitative-quantitative research method will further our understanding about nurses’ learning experiences by comparing/contrasting/testing basic versus post-basic nursing education principles as they pertain to how nurses learn about technologies.

**Limitations of this Study**

Limitations of this study pertain to the areas I have also identified as implications for further research. These areas of limitation pertain specifically to further understanding how nurses learn about technology in the context of their automated clinical practice environments. In this study, the notion of learning was revealed as a second level category in the basic social
process. However, as the data revealed, only some of the participants expressed the need to move away from the clinical area to learn, while other participants did not share a similar perspective.

An additional area requiring more focused qualitative inquiry study pertains to idea of transitioning from one technology to another. Again, some of the participants, particularly those who possessed years of experience using computers, stated that they felt confident with all kinds of technology and that once they learned the basics of the device, they could comfortably figure out another device with similar functionality. This phenomenon of ‘transitioning between technologies’ was too limited to a small group of nurses to suggest a substantive understanding in this study. However, this does raise the question again about how nurses learn about technologies in general. Did nurses learn differently during the days of the diploma-based education versus the later part of the 20th century baccalaureate-based education?

Finally, the last significant limitation of this study had to do with nurses’ beliefs about moral agency in the context of the nurse-patient-technology relationship. During the interviews with participants who had not yet adopted the computer in their practice, revealed that while they acknowledged the importance and relevance of technology in general, they remained selective about the role of computers in their practice when providing care to patients. The fact that these perceptions were not consistent with all of the participants suggests that there are diverse perspectives that hold different degrees of value and a moral discourse that could not be realized in this study. A suggestion for another grounded theory study might include: How do nurses perceive computerization and automation of clinical practice processes?

Conclusions

This study has presented the perceptions of twelve very diverse and articulate Registered Nurse participants who have communicated their prior experiences when confronted with
computerization in their practice. These participants described the basic social process:

**DEVELOPING A RELATIONSHIP WITH THE COMPUTER IN NURSING PRACTICE**

when confronted with computerization in their practice. All of the participants expressed varying degrees of adoption of the computer and further define this rate of adoption as either having fully integrated the computer in all aspects of their practice - adopt or as having begun or have incorporated the computer and some of the related clinical information systems in their practice adapt. None of the participants completely ignored the computer altogether as they have slowly realized the clinical relevance and value that this technology brings to their practice relationships with patients, families and the enhancements of their professional knowledge.

Value-based conditions expressed by the participants and further evidenced in the literature have been integral to support the nurses ability to realize the benefits to their practice. These value statements were expressed to include statements such as: “not having to leave the patient”, “knowing how to find the information”, “having the time to learn” and knowing how to access available resources for support”. All of the participants emphasized the need to communicate the value of the technology and related applications at the time of introduction and ensure that nurses shared in the opportunity to communicate how the computerization impacts (positively or negatively) on their ability to provide safe and appropriate care. One of the participants, who had just begun to incorporate the computer in her practice, summed it up in this way, “There’s nothing this sucker won’t do... “.

Finally, preconceived assumptions about nurses who may have graduated prior the advent of computerization in nursing practice should not be generalized or based on quantitative instruments measuring attitudes that are devoid of the nurses’ perceptions that include context of practice, prior experiences and most importantly the values related to patient care and nursing
practice. Diffusion of Innovation frameworks that include the social context of nurses’ practice as it is constituted within an organization will most definitely create opportunities for successful implementation designs of future computerization initiatives. Organizations like this HA under study have substantive opportunities to further their computerization agendas and understandings about the present day nurses in practice in the automated clinical care environments. The key is for nurses to feel competent and supported throughout their journey towards overall computer adoption and be able to continue to move beyond adapt and/or ignore.
References


## Appendix A
Developing a Relationship with the Computer

### Table 5-CONFRONTING COMPUTERIZATION

<table>
<thead>
<tr>
<th>Second Level Categories</th>
<th>Third Level Categories</th>
<th>Conditions &amp; Consequences</th>
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</thead>
<tbody>
<tr>
<td>Reacting to the technology</td>
<td>Emotional</td>
<td>Conditions</td>
</tr>
<tr>
<td></td>
<td>♦ Intimidated</td>
<td>♦ PRIOR EXPERIENCES with computers:</td>
</tr>
<tr>
<td></td>
<td>♦ Frustrated</td>
<td>- At home</td>
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<tr>
<td></td>
<td>♦ No Choice</td>
<td>- From workplaces outside the HA</td>
</tr>
<tr>
<td></td>
<td>♦ Excited</td>
<td>♦ Clinical Applications:</td>
</tr>
<tr>
<td></td>
<td>♦ Overwhelmed/Fear</td>
<td>- EHRs</td>
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<tr>
<td></td>
<td>♦ Anxious to “get going”</td>
<td>- Clinical Resources</td>
</tr>
<tr>
<td></td>
<td>♦ Reflecting on PRIOR EXPERIENCES</td>
<td>♦ Log-On Processes:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Streamlined – Easy or multiple steps</td>
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<tr>
<td>Acting and “Getting on With It”</td>
<td>Exploring Options</td>
<td>♦ Computer Initiative</td>
</tr>
<tr>
<td></td>
<td>♦ Thinking about “New Ways”</td>
<td>Implementation Plan:</td>
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<tr>
<td></td>
<td>♦ Feeling stuck: desire to maintain “Old Ways”</td>
<td>- Phased – In versus Big-Bang Approach</td>
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<tr>
<td></td>
<td>♦ Eager to learn more</td>
<td>♦ Organizational Decisions versus Nurses’ needs</td>
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<td></td>
<td>♦ Participating in the computerization initiative</td>
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### Table 6-PRIOR EXPERIENCES: Computer Technology

<table>
<thead>
<tr>
<th>Second Level Categories</th>
<th>Third Level Categories</th>
<th>Conditions &amp; Consequences</th>
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</thead>
<tbody>
<tr>
<td>Using the Computer Technology</td>
<td>Experiencing Computers at home</td>
<td>Conditions &amp; Consequences</td>
</tr>
<tr>
<td></td>
<td>- home banking, travel, community programs, education</td>
<td>Feeling safe to use computers:</td>
</tr>
<tr>
<td></td>
<td>- Learning about computers and searching for information</td>
<td>♦ Minimal concern about crashing system</td>
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<tr>
<td></td>
<td></td>
<td>♦ Learning from trusted friend or family member</td>
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<td></td>
<td></td>
<td>♦ Feeling free to make mistakes</td>
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<tr>
<td></td>
<td></td>
<td>♦ Taking the time to learn the computer and search for information</td>
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<td></td>
<td></td>
<td>♦ Grew up with Computers</td>
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<td></td>
<td></td>
<td>Enhancing Lifestyle options using</td>
</tr>
<tr>
<td>Second Level Categories</td>
<td>Third Level Categories</td>
<td>Conditions &amp; Consequences</td>
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<tr>
<td>Ignoring the computer</td>
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<tr>
<td></td>
<td>Experiencing Computers at work</td>
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</tr>
<tr>
<td></td>
<td>- Finding relevance to practice and patient care</td>
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<tr>
<td></td>
<td>- Accessing patient/clinical information</td>
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<tr>
<td></td>
<td>- Grieving prior workplace experiences</td>
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<td></td>
<td>Embracing the option to Ignore the computer:</td>
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</tr>
<tr>
<td></td>
<td>- Deferring to others to look up information</td>
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<tr>
<td></td>
<td>- Preferring paper-based resources</td>
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<tr>
<td></td>
<td>- Waiting to find the time to learn about computers</td>
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<tr>
<td></td>
<td>computers:</td>
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<tr>
<td></td>
<td>- Realizing advantages with electronic booking of family activities, on-line banking</td>
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<tr>
<td></td>
<td>Accessing the computer where/when ever possible:</td>
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<tr>
<td></td>
<td>- Searching for new ways to access information</td>
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<tr>
<td></td>
<td>- Advocating for additional on-line resources and functionality</td>
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<tr>
<td></td>
<td>- Teaching and mentoring others to use the computer and electronic resources</td>
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<tr>
<td></td>
<td>- Feeling competent and confident</td>
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<tr>
<td></td>
<td>Didn’t grow up with computers</td>
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<tr>
<td></td>
<td>- Feeling incompetent and lacking confidence</td>
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<tr>
<td></td>
<td>- Harboring old practice patterns in care delivery</td>
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<tr>
<td>Beliefs about Bio-Medical Technology</td>
<td>Conditions &amp; Consequences</td>
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<tr>
<td>Using biomedical technologies</td>
<td>Conditions:</td>
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<tr>
<td></td>
<td>- Supports safe and appropriate patient care</td>
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<tr>
<td></td>
<td>- Gaining familiarity and proficiency</td>
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<tr>
<td></td>
<td>- Multiple ‘hands-on’ experiences</td>
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<tr>
<td></td>
<td>- Feeling confident with bio-medical support</td>
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<tr>
<td></td>
<td>- Technology resources defined and available</td>
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<tr>
<td></td>
<td>- Scarce Technology resources</td>
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<tr>
<td></td>
<td>- Feeling confident the materials/supplies are available</td>
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<tr>
<td></td>
<td>Consequences:</td>
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<tr>
<td></td>
<td>- Accepting the technology into practice</td>
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<tr>
<td></td>
<td>- Realizing the value to patient care - “Vital to patient care”</td>
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<tr>
<td></td>
<td>- Seeking new advances in bio-medical technology – participating in vendor trials</td>
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<tr>
<td></td>
<td>- Single-use technology makes it easier to learn and limits the need to understand multiple ways of accessing the information or function</td>
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<tr>
<td></td>
<td>- Frustrated with bio-medical when:</td>
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<tr>
<td></td>
<td>- it does not work</td>
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<tr>
<td></td>
<td>- Limited bio-medical support</td>
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<tr>
<td></td>
<td>- “The data can’t be trusted because ‘they’ don’t calibrate the machine regularly”</td>
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<table>
<thead>
<tr>
<th>Second Level Categories</th>
<th>Third Level Categories</th>
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<tbody>
<tr>
<td>Beliefs about Bio-Medical Technology</td>
<td>Feelings and perceptions about bio-medical technology:</td>
</tr>
<tr>
<td></td>
<td>- Feeling as though there was “No Choice”</td>
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<tr>
<td></td>
<td>- Valuing the relationship to patient care:</td>
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<tr>
<td></td>
<td>- monitoring, visual display of patient data, Life or Death</td>
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<tr>
<td></td>
<td>- Feeling supported and part of the selection process</td>
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<td></td>
<td>- Feeling the focused purpose of the technology</td>
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<td></td>
<td>- Feeling frustrated with bio-medical technology</td>
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<tr>
<td>Using biomedical technologies</td>
<td>Frequently using the technology</td>
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<tr>
<td></td>
<td>- Relying on the data</td>
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<td></td>
<td>- Trusting the data</td>
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<td></td>
<td>- Understanding the components</td>
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<td></td>
<td>- Connected to the patient</td>
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<td>Experiences with Learning</td>
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<tr>
<td></td>
<td>Learning about bio-medical technology</td>
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<td>- Realizing immediate value to patient care</td>
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<td></td>
<td>- Mandatory learning</td>
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<tr>
<td></td>
<td>- Appreciating practice/simulation time</td>
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<td></td>
<td>- Feelings about learning biomedical technology</td>
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<tr>
<td></td>
<td>Learning about computer technology</td>
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<tr>
<td></td>
<td>- Optional learning</td>
</tr>
<tr>
<td></td>
<td>- Afraid to learn - “too confusing, too many choices”</td>
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<tr>
<td></td>
<td>- “It’s only as good as the person using it”</td>
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<tr>
<td></td>
<td>- Feeling excited to learn search techniques (tips and tricks)</td>
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<tr>
<td></td>
<td>Learning about new methods or technologies</td>
</tr>
<tr>
<td></td>
<td>- Experiencing discomfort with changing methods</td>
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<td></td>
<td>- Fearing “I won’t be able to understand”</td>
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<td></td>
<td>- Feeling “embarrassed”</td>
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<td></td>
<td>Juggling with Time and Timing</td>
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<td>Realizing new ways to practice</td>
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<td></td>
<td>- Feeling afraid</td>
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<td>- Feeling excited</td>
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<td>- Motivated to experience new ways</td>
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<td>Conditions</td>
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<td></td>
<td>- Learning from others</td>
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<tr>
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<td>- mentoring</td>
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<tr>
<td></td>
<td>- Identifying individual learning needs</td>
</tr>
<tr>
<td></td>
<td>- “Forced to learn – but had to use the technology”</td>
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<tr>
<td></td>
<td>- Experiencing challenges with uptake of computer technology:</td>
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<tr>
<td></td>
<td>- Forgets education/training</td>
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<tr>
<td></td>
<td>- Does not use frequently enough</td>
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<tr>
<td></td>
<td>- New learning experiences about computers are shared with others (tips and tricks)</td>
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<tr>
<td></td>
<td>- Finding short-cuts to streamline information search using the computer</td>
</tr>
<tr>
<td></td>
<td>- Feeling overwhelmed with patient care – unable to incorporate time to learn</td>
</tr>
<tr>
<td></td>
<td>- Wanting to learn at home but unable to access education from home</td>
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<tr>
<td></td>
<td>- Feeling “left behind” – does not incorporate new learning into practice</td>
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<tr>
<td></td>
<td>“Fitting in” the learning – not absorbing the information</td>
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<tr>
<td></td>
<td>- Forgetting the information/new processes</td>
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<tr>
<td>Second Level Categories</td>
<td>Third Level Categories</td>
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<td>------------------------</td>
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<tr>
<td>Organizational Discourses:</td>
<td>Experience timing/impact of computerization initiatives:</td>
</tr>
<tr>
<td>Experiencing organization decisions about computers</td>
<td>• “Dealing with” multiple change initiatives</td>
</tr>
<tr>
<td></td>
<td>• Learning from demonstration units</td>
</tr>
<tr>
<td></td>
<td>• Feeling Frustrated</td>
</tr>
<tr>
<td></td>
<td>- Lack of staff backfill</td>
</tr>
<tr>
<td></td>
<td>- Experiencing too much change at one time</td>
</tr>
<tr>
<td></td>
<td>• Celebrating the multi-site implementation of computers and information systems</td>
</tr>
<tr>
<td></td>
<td>- Preferring “all or nothing” approach</td>
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<tr>
<td></td>
<td>Accessing computers:</td>
</tr>
<tr>
<td></td>
<td>• Experiencing a lack of computers technology:</td>
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<td></td>
<td>- Feeling Frustrated</td>
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<tr>
<td></td>
<td>• Experiencing cumbersome log-on processes</td>
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<td></td>
<td>Knowing where and how to find needed information:</td>
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<tr>
<td></td>
<td>• Defining resources</td>
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<td>• Experiencing Communication Gaps</td>
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<td></td>
<td>Experiencing Computer System Downtimes:</td>
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<td></td>
<td>• Dealing with the unknown:</td>
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<td>- Finding out unexpectedly</td>
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<td>- Searching for support</td>
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<td>- Feeling frustrated with system downtimes</td>
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<td>- Returning to paper</td>
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<td>Professional Discourses:</td>
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<td>Practicing Similarly and Differently</td>
<td>Relying on nursing practice experience:</td>
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<tr>
<td></td>
<td>• “Looking after the patient”</td>
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<td></td>
<td>• Feeling confident knowing</td>
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<tr>
<td></td>
<td>• Presumptions about each other</td>
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<tr>
<td>Supporting and Mentoring</td>
<td><strong>Experiencing Transitions</strong></td>
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<tr>
<td><strong>Second Level Categories</strong></td>
<td><strong>Third Level Categories</strong></td>
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<tr>
<td></td>
<td>* Perceptions about computers/biomedical technologies</td>
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<td></td>
<td>* Knowing how to use the computer</td>
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<td></td>
<td>* Incorporating the computer into practice</td>
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<tr>
<td></td>
<td><strong>Experiencing the patient-technology relationship:</strong></td>
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<tr>
<td></td>
<td>- Identifying the source of truth</td>
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<td></td>
<td>- Trusting the technology</td>
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<td>- Knowing when to question</td>
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<td></td>
<td>- Realizing accurate data</td>
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<tr>
<td></td>
<td>* Trusting the patient</td>
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<td>* Perceptions about computers</td>
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<td><strong>Valuing Each Other:</strong></td>
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<tr>
<td></td>
<td>- Trusting the colleague</td>
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<td>- Asking the colleague</td>
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<td>- Resenting the colleague</td>
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<td>- Helping each other</td>
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<td><strong>Fearing Change/Excited about Change</strong></td>
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<tr>
<td></td>
<td>- Feeling helpful/knowledgeable</td>
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<tr>
<td>Second Level Categories</td>
<td>Third Level Categories</td>
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<tr>
<td>Finding Relevance</td>
<td>Defining “Relevance”</td>
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<tr>
<td></td>
<td>• Contemplating the nurse-patient-technology relationship</td>
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<td></td>
<td>• Questions about technology impacts in relation to patient care</td>
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<td></td>
<td>• Context of practice</td>
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<td></td>
<td>• Over-arching vision</td>
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<tr>
<td>Finding Meaning</td>
<td>Defining “Meaning”</td>
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<tr>
<td></td>
<td>• “What does this mean to me and my practice?”</td>
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<td></td>
<td>• Exploring the context of practice requirements:</td>
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<td></td>
<td>• Knowledge needs</td>
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<td>• Decision Supports</td>
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<td>• Clinical Documentation</td>
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<td>• Being close to the patient</td>
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### Table 11—REALIZING THE BENEFITS

<table>
<thead>
<tr>
<th>Second Level Categories</th>
<th>Third Level Categories</th>
<th>Conditions &amp; Consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiencing the value of computers in practice</td>
<td>Discovering Enhancements in Nursing Practice and Patient Care</td>
<td><strong>Conditions</strong>&lt;br&gt;• Ability to Synthesize Values related to nursing practice in the context of patient care&lt;br&gt;• Ability to connect with organizational processes that support practice and patient care:&lt;br&gt;  - Access to supporting policies and procedures&lt;br&gt;  - Clearly articulated computerization initiative vision&lt;br&gt;• Ability to receive education and training related to the computer and related clinical information systems&lt;br&gt;• Access to supporting processes and people:&lt;br&gt;  - Mentors&lt;br&gt;  - Clearly defined system Downtime procedures&lt;br&gt;  - Ongoing computer technology support resources&lt;br&gt;<strong>Consequences</strong>&lt;br&gt;• Timely access to electronic patient information, decision-support information, on-line policies and procedures&lt;br&gt;• Streamlined and safe workflow efficiencies&lt;br&gt;• Enhanced nurse-patient-technology relationships</td>
</tr>
<tr>
<td>Gaining Proficiency in using the computer</td>
<td>Learning from Prior Experiences&lt;br&gt;• Realizing the “New Way”: – the vision of the computerization initiative</td>
<td></td>
</tr>
</tbody>
</table>

### Table 12—MANAGING THE BARRIERS

<table>
<thead>
<tr>
<th>Second Level Categories</th>
<th>Third Level Categories</th>
<th>Conditions &amp; Consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confronting the Challenges</td>
<td>Mitigating the Barriers&lt;br&gt;• “Dealing With it”&lt;br&gt;• Minimizing the “fear”&lt;br&gt;• Motivated to confront the obstacles&lt;br&gt;• Exploring options to barriers&lt;br&gt;  - Finding new ways&lt;br&gt;  - Finding work-arounds&lt;br&gt;  - Practicing with the computer&lt;br&gt;• Loosing the Battle:&lt;br&gt;  - Feeling as though “No Choice”&lt;br&gt;  - Unable to find meaning&lt;br&gt;  - retaining “Old Ways”:&lt;br&gt;    - Relying on paper&lt;br&gt;    - Ignoring the computer&lt;br&gt;    - Relying on colleagues&lt;br&gt;  • Making practice decisions based on</td>
<td><strong>Conditions</strong>&lt;br&gt;• Able to feel confident to mitigate barriers&lt;br&gt;• Ability to realize over-arching technology vision&lt;br&gt;• Motivated to incorporate computer technology into practice routines&lt;br&gt;• Knows who to call – searching for reliable resources&lt;br&gt;<strong>Consequences</strong>&lt;br&gt;• Feeling victorious&lt;br&gt;• Feeling Frustrated&lt;br&gt;• Taking the Time&lt;br&gt;• Ignoring the Technology&lt;br&gt;• Returning on paper processes&lt;br&gt;• Basing clinical care on out-dated</td>
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</tbody>
</table>
### Table 13-OUTCOME: ADOPT

<table>
<thead>
<tr>
<th>OUTCOME: ADOPT</th>
<th>Third Level Categories</th>
<th>Conditions &amp; Consequences</th>
</tr>
</thead>
</table>
| Using the Computer Technology                       | * Incorporating the computer into practice and workflows  
  * Trouble-shooting the Problems                     | Conditions  
  * Feeling computer literate  
  * Possessing knowledge about clinical information systems  
  * Computers are available  
  Consequences  
  * Searching for Electronic Resources  
  * Accessing patient education  
  * Using mobile computer technology  
  * Incorporating the on-line resources  
  * Guiding others to use the computer  
  * Teaching/Mentoring Tips and Tricks |
| Advancing the Nurse-Patient-Technology Relationship | * Mentoring/Teaching Others  
  * Seeking new ways  
  - Integrating computers at the point of care  
  -                                           |                                                |

### Table 14-OUTCOME: ADAPT

<table>
<thead>
<tr>
<th>OUTCOME: ADAPT</th>
<th>Third Level Categories</th>
<th>Conditions &amp; Consequences</th>
</tr>
</thead>
</table>
| Gaining Familiarity                                 | Increasing computer exposure  
  * Seeking out computers to use  
  * Frequently using the computer  
  * Practicing  
  * Asking questions  
  Experiencing new learnings  
  * Tips and Tricks  
  * Mentoring  
  * Learning away from the patient area  
  Being selective  
  * Discerning when to use the computer  
  * Feeling stressed and overwhelmed  
  * Realizing new ways  
  * Hanging on to traditional methods | Conditions  
  * Taking the time  
  * Having the time  
  * Available support resources  
  * Open to learning  
  * Access to computers  
  Consequences  
  * Feeling tentative  
  * Excited to try  
  * Frustrated with the computer  
  * Sometimes relying on paper-based processes |
<p>| Balancing the Old and the New                       |                                                |                                                |</p>
<table>
<thead>
<tr>
<th>Second Level Categories</th>
<th>Third Level Categories</th>
<th>Conditions &amp; Consequences</th>
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</thead>
</table>
| Maintaining Old Ways    | Ignoring the computer technology/relying on paper  
|                         |  - Practicing with outdated information  
                              | Relying on others  
|                         |  - Asking colleagues to look up information  
                              |  - Relying on paper  
                              | Questioning the Value  
|                         |  - Unable to find a connection with relevance and meaning to the computer  
                         | Conditions  
|                         |  - Parallel-sourced health record  
                              |  - Automated printing of result/reports  
                              |  - Limited number of computers  
                              |  - Paper-based Manuals  
                              |  - EHR development limited to clinical viewer  
                         | Consequences  
|                         |  - Consistently relies on others to access information  
                              |  - Waits for results/reports to print  
                              |  - Telephones the lab for results  
                              |  - Relies on paper-based manuals  
                              |  - Does not seek new learning opportunities associated with the computer |
Appendix B

"Adopt, Adapt or Ignore", the Perceptions of Nurses with Computer Integration in Clinical Practice: A Grounded Theory Study

You are being invited to participate in a study entitled, "Adopt, Adapt or Ignore", the Perceptions of Nurses with Computer Integration in Clinical Practice: A Grounded Theory Study that is being conducted by Barb Cross.

Barb Cross is a graduate student with the University of Victoria's School of Nursing and Clinical Informatics Specialist with the Vancouver Island Health Authority. Barb can be reached by phone or e-mail:

Barb L Cross
Clinical Informatics, IMIT
Vancouver Island Health Authority
250 370-8529
Barb.cross@viha.ca

The purpose of this research project is to understand how nurses perceive the integration of computer technology in their clinical practice. This information will assist in:

- The development of implementation strategies for future deployment of computer technology throughout the Vancouver Island Health Authority's patient care areas,
- Understanding how nurses interact with patients/families, interprofessional colleagues and computer technology in the clinical care setting,
- The identification of barriers and opportunities for furthering the nurse's relationship with computer technology and access to information that supports clinical care.

This research is particularly important to the enhancement of automating clinical care processes that will facilitate more accurate and timely patient care decisions which can result in positive patient outcomes and create efficiencies in the provision of patient care. Your confidentially acquired information will provide the theoretical foundation for the establishment of these automated processes in clinical care.

If you volunteer to participate in this research study, you will be asked to sign a consent form which indicates your agreement to participate in a one hour, audio-recorded interview with Barb Cross. You may also be asked to participate in a follow-up 30-minute interview to clarify your interview data, if necessary.

Your participation in this research study must be completely voluntary. If you decide to participate, you may withdraw at any time without consequence or explanation. If you withdraw from the study your data will not be used in the analysis.

Your personal confidentiality and the confidentiality of your data are very important components of maintaining ethical standards in this research. All of the data will be coded and personal identifiers including participant names will be removed from the analysis and documentation of this data. Data from this study will be disposed of by the deletion of computer files, shredding of paper documents and the destruction of audiotapes.

It is anticipated that the results of this study will be shared with the University of Victoria Thesis committee, Grounded Theory Club members who are comprised of academic scholars in Grounded Theory and the Vancouver
Island Health Authority Clinical & IMIT Leadership community. If you desire a copy of the final documentation of this study, a copy will be available to you upon request.

There are no known or anticipated risks to you by participating in this study, other than the inconvenience of attending the one hour interview and potential 30 minute follow-up interview session. To demonstrate my appreciation for your participation, you will be given a $25.00 gift certificate to a local book store. The funding of these participant tokens are privately provided by myself as the principle investigator, Barb Cross. It is important for you to know that it is unethical to provide compensation to participants if they perceive any sense of coercion to participate as a result of the compensation. If the participant is only participating because of the compensation then they should not participate in this study.

If you have any questions or concerns about the ethical approval of this study, you may contact the Supervisor of the Thesis Committee, Dr. Marjorie MacDonald, 250 472 4265 or e-mail Marjorie@uvic.ca, or Ms. Marilyn Fuller, 250 370-8620 or e-mail marilyn.fuller@viha.ca, Research & Academic Development at the Vancouver Island Health Authority.

Thank you very much for considering your participation in this study.
"Adopt, Adapt or Ignore", the Perceptions of Nurses with Computer Integration in Clinical Practice: A Grounded Theory Study

You are being invited to participate in a study entitled, "Adopt, Adapt or Ignore", the Perceptions of Nurses with Computer Integration in Clinical Practice: A Grounded Theory Study that is being conducted by Barb Cross and supported by a Thesis Supervisor, Dr. Marjorie MacDonald. Dr. Marjorie MacDonald may be contacted by phone or e-mail:

Dr. Marjorie MacDonald
Thesis Supervisor, Graduate Studies,
School of Nursing, Faculty of Human & Social Development
University of Victoria
Victoria, BC
Marjorie@uvic.ca
250 472 4265

Barb Cross is a graduate student with the University of Victoria's School of Nursing and a Clinical Informatics Specialist with the Vancouver Island Health Authority. Barb can be reached by phone or e-mail:

Barb L Cross
Clinical Informatics, IMIT
Vancouver Island Health Authority
250 370-8529
Barb.cross@viha.ca

Barb's Supervisor for this research project, will be overseeing the ethical and research

The purpose of this research project is to understand how nurses perceive the integration of computer technology in their clinical practice. This information will assist in:

- The development of implementation strategies for future deployment of computer technology throughout the Vancouver Island Health Authority's patient care areas,
- Understanding how nurses interact with patients/families, interprofessional colleagues and computer technology in the clinical care setting,
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Your participation in this research study will be completely voluntary. If you decide to participate, you may withdraw at any time without any consequences or any explanation. If you do withdraw from the study your data will not be used in the analysis.
Your confidentiality and the confidentiality of your data are very important components of maintaining ethical standards in this research. All data will be coded and personal identifiers including participant names will be removed from the analysis and documentation of this data. Data from this study will be disposed of by the deletion of computer files, shredding of paper documents and the destruction of audiotapes.

It is anticipated that the results of this study will be shared with the University of Victoria Thesis committee, Grounded Theory Club members who are comprised of academic scholars in Grounded Theory and the Vancouver Island Health Authority Clinical & IMIT Leadership community. If you desire a copy of the final documentation of this study, a copy will be available to you upon request.

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Your signature below indicates that you understand the above conditions of participation of this study and that you have had the opportunity to have your questions answered by the researcher.

_________________________________________  ________________________________  __________
Name of Participant                        Signature                          Date

One copy will be given to you the participant and one copy will remain with the principle investigator, Barb Cross.
Appendix D

Participant Interview Questionnaire

Interview Questionnaire

Thank you for participating in this interview experience with me. This one-hour interview will be conducted using the following questions with the hopes that you will be able to respond freely, comfortably, and thoughtfully. Please remember, there are no ‘right’ or ‘wrong’ answers to these questions.

Throughout the interview, you will be free to ask any questions, make any comments, or leave the interview at any time. The entire interview will be audio taped so that I may generate a written transcript at a later time. If you would prefer to stop the audio recording of the interview at any time, feel free to let me know. Thank you once again for supporting my research journey.

Interview Questions/Discussion Points

1. Complete the following demographic indicators:
   a. State your age: ________
   b. Gender: ________
   c. How long have you been practicing as a Registered Nurse? ________
2. Tell me about your experience using computers in your clinical practice
3. Describe the ‘value’ computer technology adds to your practice.
4. Describe the challenges that exist when integrating computer technology in your clinical practice, e.g., how does device type, location & mobility of the device affect your ability to integrate computer technology in your practice?
5. Tell me about your experiences using other types of technology such as bio-medical devices, e.g., non-invasive blood pressure machines, pain pumps, volumetric pumps, and other monitoring devices.
6. Tell me about your experiences in learning about new technology; computer versus bio-medical devices.
7. Describe your beliefs about the relevance of technology, with respect to the patient, patient information and care outcomes.

The formal part of the interview experience is now complete...do you have any final thoughts?
Appendix E

Attention all Registered Nurses!

You are invited to participate in this very exciting UVIC/VIHA research study...

Research Aim
To listen and learn from you while you share your perceptions and experiences with computer integration in your clinical practice.
Our goal is to recruit 1-2 participants per selected clinical unit, on a first come – first serve basis. All volunteers will be contacted by Jan Walker, project assistant.

Participant Criteria:
- You are a Registered Nurse
- You have practiced on your current clinical unit for a minimum of 6 months

Your role in this study would require you to:
- Sign a consent form to participate in this study
- Participate in a one hour 1:1, confidential interview with Barb Cross – Principal Investigator, UVIC/VIHA Research Study
- Be available for one 30 minute follow-up interview if needed

All interviews and interview locations will be prearranged based on your availability and comfort with the location.

Participant Next Steps...
Please telephone or e-mail our project assistant, Jan Walker, Victoria Hospice Research and Development Coordinator by October 30th if you are interested in participating in this study...We look forward to hearing from you soon ☺
Janet.Walker@viha.ca or Tel: 250-519-1881
Appendix F

<table>
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<tr>
<th>Gift for participation</th>
<th>Funding Source</th>
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<tr>
<td>$25.00 per participant</td>
<td>Barb Cross – Principal Investigator</td>
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</table>
Appendix G

UVic/VIHA Joint Research Ethics Sub-Committee
Certificate of Approval

Principal Investigator
Barbara Cross
Master's Student

Co-Investigator(s):
Dr. Marjorie MacDonald, Supervisor, UVic
Dr. Elizabeth Borotek, Committee Member, UVic
Dr. Elizabeth Banister, Committee Member, UVic

Department/School
NURS

Supervisor
Dr. Marjorie MacDonald

Project Title:
"Adopt, Adapt or Ignore", The Perceptions of Nurses About Their Experiences With Computer Integration in Clinical Practice: A grounded Theory Study

Protocol No.
2008-69

Approval Date
26-Sep-08

Start Date
26-Sep-08

End Date
25-Sep-09

Certification

This certifies that the UVic/VIHA Joint Research Ethics Sub-Committee has examined this research protocol and concludes that, in all respects, the proposed research meets appropriate standards of ethics as outlined by the University of Victoria Research Regulations involving Human Subjects and the Vancouver Island Health Authority Research and Evaluation administration.

Dr. Richard Keeler
Associate Vice-President, Research, UVic

Dr. Peter Kirk
Director, Research and Academic DevT, VIHA

This Certificate of Approval is valid for the above term provided there is no change in the procedures. Extensions or minor amendments may be granted upon receipt of "Request for Continuing Review or Amendment of an Approved Project" form.