# Dissertation Proposal

RUNNING HEAD....The In/Visibility of Informatics in Nursing Education.....

June Kaminski

Student No. 68887801

University of British Columbia

Curriculum Studies,
Faculty of Education

Submitted to Supervisory Committee:

Dr. Stephen Petrina
Dr. Mary Bryson
Dr. Heather Clarke

March 14, 2007

# Table of Contents

# The In/Visibility of Informatics in Nursing Education: Sowing the Seeds of Culture

Information technology has infiltrated every aspect of developed contemporary society, including health care and subsequently, nursing. The field of nursing informatics has been recognized for over thirty years, evolving in pace with the growing use of computers and other information and communication technologies (ICT) within work and personal environments. This evolution has sparked a critical need for nursing education to integrate informatics theory and practice competencies in existing nursing curricula. "Academic and clinical staff members, as well as nursing students, require a holistic understanding of nursing informatics and use of information and communication technology in education and health care. While there is a general awareness of informatics in nursing, it is specifically related to the use of the Internet and other technologies such as databases for research and does not encompass a broad based understanding of the full scope of nursing informatics or its impact on nursing care" (Canadian Nursing Informatics Association, 2003, p. 22). One crucial barrier of nursing informatics integration is the virtual absence of a culture for nursing informatics within nursing education programs. This research proposal presents a plan for a participatory action research study intended to co-plan, design, and analyze the influence of support tools such as a) an Internet-based dashboard for nursing informatics learning resources and b) an Intranet-based faculty support infrastructure in facilitating the cultivation of nursing informatics culture in nursing education.

## Purpose

The purpose of this proposed research study is to analyze the process of cultivating a culture for informatics within the context of nursing education through participatory action research.
This study will further develop the existing body of knowledge focused on establishing a national comprehensive, accessible and pedagogically sound informatics curriculum for Canadian nursing

students. Two distinct research questions will guide this study. What do nursing faculty need to confidently and critically integrate nursing informatics theory and practice into nursing curricula? Does the NILORD (Nursing Informatics Learning Object Repository and Dashboard) interface facilitate the cultivation of a culture for nursing informatics in the context of education?

## Focus of Inquiry

Advances in technology in practice, research, and administration have catalyzed the development of nursing informatics theory and practical applications. This parallel thread has shaped the way nursing care is provided and has coloured the context of quality client care. Emerging national nursing informatics standards put the onus on nursing education programs and educators to include nursing informatics in the curriculum in a practical and meaningful way. “Nurse educators must prepare tomorrow's nurses to meet the challenges imposed by computer technology” (Saba & McCormack, 1994, p. 537).

The integration of computer technology into nursing education is no longer pure trajectory or a luxury. Students are expected to graduate, being able to interact with technology in order to function in health care systems. Most faculty need to gain a realistic view of the current use of computers in health care agencies as well as potential future uses of computers in all aspects of nursing in order to effectively prepare their students for the demands of the workplace (Mikan, 1992). Regardless of the extent to which a nursing school is presently using computers, newer computer applications that are faster, easier to use and more sophisticated emerge regularly. Faculty are continually challenged by these rapid advances when determining computer technology's usefulness to nursing and when planning for orderly, purposeful integration of computers into the curriculum.

Through a participatory action design, this study will provide the opportunity for a sample of nursing faculty to engage in the reflective act of brainstorming, shaping, and selecting the criteria for

the design of the NILORD (Nursing Informatics Learning Object Repository and Dashboard) interface which will include an Intranet-based faculty support infrastructure community. This process will lead to action through the design and implementation of the planned interface, as well as an analysis for evidence of nursing informatics culture development within the participatory group of faculty.

## Review of the Literature

Nurses comprise the largest body of health care professionals across the globe. This fact has led researchers, analysts, health care organizations, international licensing organizations, and consulting groups to all agree that it is imperative that nurses participate in the decision-making, design, implementation, and evaluation of computers and other interactive communication technologies (ICTs) in all contexts and sectors of the health care system. "Nursing has evolved dramatically in recent years. Many of the changes have been driven by advances in information and communications technology (ICT). ICT is no longer an add-on to traditional methods of health care, but rather an integrated, integral part of practice. As Canada seeks to maintain its leadership position in the health-care field, and to continuously improve the effectiveness of the health-care system, it will be important for nurses to improve their competencies and their use of ICT in their own practice" (Canadian Nurses Association, 2006, p. 14).

### *Role Adaptations in Nursing Culture*

The role of the nurse has intensified and diversified with the widespread integration of communication technology and information science into health care agencies. The nurse's role in the delivery of patient care is intensified by redefinition, refinement, and modification of the practice of nursing (Hannah, Ball & Edwards, 1994). The professional nurse is now expected to function well within a technologically advanced health-care environment, carry out higher-level, complex activities,

and are held responsible and accountable for the systematic planning of holistic and humanistic nursing care for clients and their families. This is expected to occur within a system plagued by a nursing shortage, heavy workloads and long shift work hours, tight budgets, modest wages for work rendered, and an increasingly acute hospital population. They are expected to keep abreast of technological implementation within their work environment with little time for professional development activities or in-service attendance. Technology does not function in a vacuum but within a social matrix, interacting with individuals in an organization: if nurses are to integrate technology into their culture, many factors and forces must be addressed (Richards, 2001). “ICT has tremendous potential to improve the practice of nursing, if applied in appropriate, useful ways. Nurses' insights into how this technology can enhance care are invaluable. As knowledge workers in this technological age, it is essential that nurses play an increased role in the development of ICT solutions. By communicating changes and needs in their practice settings, they can ensure the right ICT tools are selected and implemented for maximum patient benefit” (Canadian Nurses Association, 2006, p. 15).

It is imperative that nurses become competent users of ICT in all aspects of health care, not just because it is the wave of the future or is demanded by the modern quality-focused organizations that they work within. Nurses have a very unique view of health and knowledge of clients and their needs – this view is critical for the success of primary health care and the empowerment of clients seeking ways to boost their self-care abilities. Once nurses become comfortable with various technologies, they can shape them, refine them, and apply them in new and different ways – just as they have always adapted earlier equipment and technologies. “The Canadian Nurses Association calls on nurses in all areas of practice to work with our health-care partners in ongoing partnerships that ensure nursing will make its best contribution to the future health-care of Canadians. We must all work toward a health-care system in Canada that uses ICT optimally and effectively to provide the highest quality of care possible” (Canadian Nurses Association, 2006, p. 16).

*Infiltrating Nursing Curricula*

Since the late 1970s, pioneer nursing educators have tried to cultivate awareness and the inclusion of computer technology in the education of nursing students to prepare them to utilize informatics in their future practice. Books such as *Using Computers in Nursing* by Ball and Hannah (1984) became available in the early 1980s, which further sparked an interest in the budding field of nursing informatics in most developed countries. At the same time, nursing informatics became a strong focus of national nursing organizations and nursing theorists. The onus was placed on faculty to begin the conversion from paper based nursing education to technologically enhanced activities. Since the majority of nurse educators were schooled in the instructionist (broadcast) mode of pedagogy, this was and still is not an easy task (Richards, 2001). Despite the fact that more and more nursing schools have added computer experience to their curriculum, the "quantity and quality of this education remains insufficient to meet the growing demands of the high technology challenges within nursing practice. Currently nursing appears to be passively accepting the inevitable saturation of computer technology into all aspects of health care. Perhaps nurses, traditionally a passive group, are accepting the encroachment of computer technology in patient care with their usual resignation" (p. 8).

The swift development of computer technology and nursing informatics has created a need for nurse educators to somehow integrate informatics into existing nursing curricula in meaningful ways. It has become important that nursing students develop the knowledge and skills to apply ICT and computers in all areas of nursing practice. The challenge is not only how to integrate these technologies into curricula, but how to do so in a way that prepares student nurses to regard the social and hegemonic factors that accompany this integration. Approaches to nursing education have shifted over the past few decades from a behaviouristic, positivist, medical model paradigm to a more

phenomenological, humanistic, feminist, critical theory, health promotion model perspective. This shift has been coupled with the structural move from diploma level to degree level entry to practice requirements and the increasing numbers of graduate level (Masters, Doctorate) prepared nurses. "Canada is recognized as a world leader both in providing high quality nursing education programs and in developing and using ICTs." (Canadian Nurses Association, 2006, p. 43). Since most nursing faculty are experts in teaching nursing through a critical social theory, feminist, and phenomenological lens, they are already grounded in the mindset that is essential for teaching about nursing informatics in a discerning and critical way. The challenge is for nursing faculty to learn how to apply these perspectives to the integration of nursing informatics theory and competencies.

There is a critical need for effective development of nursing informatics competencies in nursing students and practicing nurses across the entire nation. National and provincial nursing governance organizations support this critical need and are taking steps to include informatics competencies within the expected Standards of Practice for nurses (CRNBC, 2006). There is also an urgent drive to set formal standards and to develop comprehensive curriculum (both on site and e-learning) for inclusion in basic nursing education across the nation.

"There has been rapid growth and expectations of health care information systems and technology in health care settings. With this growth has come the need to ensure that nurses have the necessary informatics competencies (knowledge, skills, attitudes, and decision making) to effectively meet their responsibilities and standards for nursing practice. The goal of nursing informatics is to improve the health of populations, communities, families, and individuals by optimizing information management and communication. This includes the use of information and technology in the direct provision of care, in establishing effective administrative systems, in managing and delivering educational experiences, in supporting lifelong learning, and in supporting nursing research" (Canadian Nursing Informatics Association, 2003, p. 1).

The relationship between computer literacy, technological competence and a nurse's ability to care is congruent for quality nursing practice. Computer literacy represents a proactive response to technology which enhances caring in nursing (Delaney, 1990). As well, the ability to apply critical thinking, expert clinical decision-making, and sound clinical judgment are mandatory in today's "high-tech" health arena. As computers and other technologies gain prominence both within health care institutions, and clients' homes as in tele-nursing, nurses need to find ways to convey their caring despite the gadgetry. “Nurses aspire for a practice that is based on the authentic nursing intention to know persons fully as human beings rather than as objects. When the nurse is able to simultaneously portray technological competency and caring in nursing, transformation is achieved” (Locsin, 2001, p. 3). Nurse educators need to find ways to incorporate theory and skills to help nursing students learn to work with technology and information in caring and client-focused ways, within the professional culture of nursing. “Professional culture is a form of professional life comprised of a cluster of material and symbolic practices organized around a body of specialized knowledge shared by a group of qualified professionals” (Hong, 2001, p. 5).

*Cultivating Nursing Informatics Culture*

All Canadian nursing education now occurs within degree-granting configurations, where nursing students gain practical and theoretical experience in working with clients on various specialty units as well as in the community, including in-home care, clinic-based work, public schools and other community service areas. Students are enculturated to influence change, conduct both qualitative and quantitative research, to inquire in phenomenological ways, to advocate, to empower, and to develop empathy and respect for the unique lives, beings, and saliency of each unique client and their supportive families and circles. Nursing education is often based on a model of transformatory learning and emancipatory action. Transformatory education encourages experiential freedom and the right to

interpret the stimulus events in life as one chooses, adopting from the manifest culture what one will, and discerningly refraining from emulating the more base, less desirable aspects of manifest culture in the workplace (Freshwater, 2000). The socialization process includes enculturation (how the students learn about and identify with their own professional culture) and acculturation (how students assimilate selected aspects of other professional cultures) (Hong, 2001). “For nursing students, enculturation is a process through which neophytes acquire a collection of cultural 'lens' or ways of seeing the world. Acculturation occurs when individuals from one culture interact with members of a different cultural group within a particular context; changes occur at both a personal and collective level” (p. 5).

In order for a nursing informatics culture to become a permanent component of the emancipatory culture of nursing education, faculty need to experience and exhibit agency within a multidimensional perspective of technologies within the nursing context. Nurse-anthropologist, Margaret Leininger described nursing culture as “the learned and transmitted lifeways, values, symbols, patterns, and normative practices of members of the nursing profession of a particular society. A subculture of nursing refers to a subgroup of nurses who show distinctive values and lifeways that differ from the dominant or mainstream culture of nursing” (1994, p. 19). Geertz (1973) elaborated that culture is a pattern of meanings that is historically transmitted to its members, is embodied in symbols, and manifests as a system of inherited/transmitted conceptions. Nursing scholar Patricia Benner applied Geertz's cultural views to the context of nursing: to Benner, meanings are not individualized and private, but rather public and shared, and ultimately, grounded in culture (1994). These cultural meanings, including linguistic expressions create what is noticed, and are inscribed on the body: symbols act as vehicles of culture. Geertz's webs of significance has meaning to the act of nursing by drawing attention to the beliefs and practices, cultural customs, social interactions, attitudes, behaviours, myths, rituals, and material constructions embodied by its members within a practice context.

Leininger (1994) went further to distinguish both ideal and manifest attributes of culture, by defining an ideal culture as one that reflects the "...attributes that are most desired, preferred, or the wished for values and norms of the group" while manifest culture is "...what actually exists and is identifiable in the day-to-day world as patterns, values, lifestyle patterns, and expressions" (p. 19). Faculty need to witness, first-hand, how the application of nursing informatics could potentially fit with the ideal culture that they strive to cultivate within the consciousness and being of their students, but also understand and educate their students about how technology is often applied to support and perpetuate the manifest culture of the bureaucratic health system.

"The notion of 'fit' runs in both causal directions. While the degree to which an information system fit other aspects of organizational life is crucial, so, too, is the degree to which the system embodies appropriate assumptions, patient care philosophies, and users' conceptions of their needs" (Kaplan, 2001, p. 45). Nursing faculty who have well-developed knowledge, awareness, and competencies in applying technology to nursing education and practice recognize "...ways in which instruments and artifacts incorporate values, norms, representations of work, and assumptions about usability" (p.45) and incorporate this recognition into the nursing curricula in critical, reflective ways.

Jerome Bruner (1982) elaborated by describing culture as symbolic meanings that are interpersonally negotiated through linguistic discourse. Like Geertz, he studied semiotic symbols but from a psychological perspective; a semiotic negotiation of meanings is the way agency actively constructs culture. People became cultural agents by the negotiation of meaning as one expressed their opinions and notions of cultural things to others. "It is the forum aspect of a culture (in which meanings are negotiated and renegotiated) that gives the participants a role in constantly making and remaking the culture – their active role as participants rather than as performing spectators who play out canonical roles according to rule when the appropriate cues occur" (p. 839).

In order to promote the application of nursing informatics, nursing leaders and theorists have

attempted to promote a change in nursing culture. “Changing the culture is sometimes necessary for revitalization. This needs to take account of factors such as: the dominant ideology, the locus of power and decision making, the organizational structure, career opportunities and paths, communication, heroes and villains, stories and anecdotes, rites and rituals, and image” (Thompson, 2003, p. 144). In their work called Toward 2020 (2006a), the Canadian Nurses Association hosted a workshop with thirty nurses who had a strong interest and command of the use of ICT in health care to articulate their vision of an ideal Canadian health system by the year 2020. The vision disclosed showed a strong role for ICT and informatics within the health system and nurses working with discernment, capability, and access within this system. “They agreed that if RNs are to participate fully in an ICT-supported health care system, the single biggest challenge is the creation of a positive information technology culture in nursing” (Canadian Nursing Informatics Association, 2003).

This proposed attempt to cultivate a comfortable culture of nursing informatics in education requires the application of change within the faculty as a collective. A change model proposed by Quebec professors, Pierre Colerette, Robert Schneider and Paul Legris provides a suitable lens to view this cultural transformation. Colerette et al (2003) proposed alternative language for Kurt Lewin's essential change model of unfreezing, moving, and refreezing: the authors renamed these stages, calling them  awakening, transition, and ritualization. Collerette et al's model fits well with the process of cultivating nursing informatics culture since the language used suggests conscientious and deliberate cultural change within an organization, group or profession.

For instance, if faculty experience how technologies including ICT and the virtual environment or cyberspace can be used as a milieu for activism; a place to inform about crucial social issues, and to act as advocates to help people to use their minds and voices to shape their world, they may be more receptive to awakening to the notion of a nursing informatics cultural metamorphosis. As well, recent national health reform decisions encourage nurses to utilize technology to provide primary health care,

health promotion, disease prevention, client education and self-care support to the Canadian population. If faculty can conceive that they can judiciously apply technologies to widen their ability to teach these skills and awareness, they may open themselves to the notion of integrating informatics into the classroom. At the current time, a lack of nursing informatics culture, faculty preparedness, technology access, time and motivation are all inhibiting factors for this process (Canadian Nursing Informatics Association, 2003).

The Canadian Nurses Association launched an intensive web-based e-nursing portal initiative in 2006 to begin to facilitate nurse educators and practicing nurses to begin the process of developing nursing informatics competencies, knowledge and culture. Their direction for nursing education is to the point: “Educators need to develop and implement curricula that incorporate nursing informatics competencies in basic and graduate education, be active promoters of ICT in nursing, lead by example and link their institutions' websites to the portal. Partners should work closely with the Canadian Association of Schools of Nursing to ensure the integration of ICT competencies into core curricula” (Canadian Nurses Association, 2006, p. 81). This proposed research will hopefully provide insight and a potential model for the development of a culture for nursing informatics within nursing education by working collaboratively with nursing faculty to explore what is needed to shape this culture.

## Methodology

### *Research Design*

This proposed research study will include an interpretive participatory action design to work with faculty to explore cultural reconstruction, and develop a prototype of an Internet-based space intended to nurture and cultivate a context for nursing informatics culture in nursing education. In

human-computer interaction theory, a participatory design is one where eventual users are active collaborators in the design process. The design process is grounded in the context of the experiences, ideas, and learning needs of the participants (Dix, Finlay, Abowd & Beale, 1998). "Action research has a long history, one often associated with the work of Kurt Lewin, who viewed action research as a cyclical, dynamic, and collaborative process in which people addressed social issues affecting their lives. Through cycles of planning, acting, observing, and reflecting, participants sought changes in practices leading to social action for improvement" (Stringer & Genat, 2004, p.5).

In recent years, various health professionals have used action research to enhance the effectiveness of their work in many different contexts (Stringer & Genat, 2004). This systematic, participatory approach to inquiry enables participants to extend their understanding of problems or issues and to formulate actions directed towards their resolution. In a nutshell, action research is "the systematic collection of information that is designed to bring about social change" (p.7).

An action approach is the best research design for the purpose of this study since it involves collective, self-reflective inquiry by the participating faculty in order to improve the delivery of nursing educational practices, and to discern how technology and nursing informatics fits into these practices in a meaningful way for all involved. "A major purpose of participatory approaches to inquiry is to bring people together in a dialogic and productive relationship, enabling the development of a sense of community through the sharing of perspectives, the negotiation of meaning, and the development of collaboratively produced activities, programs and projects" (Stringer & Genat, 2004, p.9). Since action research is one form of qualitative or naturalistic inquiry, it seems an appropriate vehicle for constructing solutions to problems that are grounded in cultural meanings such as the development of nursing informatics culture in education. "In a world that has become increasingly alienating by the forces of economic rationalism and accountability, where every activity must be justified in terms of a pre-specified benchmarks and justified in dollar terms, the spiritual and artistic side of work life can

easily be lost in a maze of technical, mechanistic, and clinical procedures that too easily dulls and nullifies the creative, life-enhancing outcomes of a truly professional experience. The energy and excitement generated by collaborative accomplishment not only provides the means to accomplish the technical, professional goals of our work, but do so in ways that are truly meaningful and enriching not only for ourselves, but for the people with whom we work" (Stringer & Genat, 2004, p.29). This method of inquiry also honours the participants' deep and extended understanding of their own teaching practices, their world-views, and wisdom.

*Sample*

The sample population will be comprised of all Nursing faculty at Kwantlen University College in Surrey, British Columbia who teach in the Bachelor's of Science in Nursing program (N = 38, all female). From this population, a convenience sample of participants will be sought, with a target sample group of 12 to 20 active participants. All nursing faculty will be offered the chance to participate. A workshop to provide an overview of the study will be arranged: participation in the study will be formally requested at this event.

*Ethics and Confidentiality*

All participants who agree to be involved in this study will be assured of complete confidentiality, anonymity, and privacy regarding their identity and input to the data. Assurance will be given that any information shared or disclosed will be kept private and the researcher will not behave as an informant or disclose personal information to administration at the participants' place of employment. The decision to leave the study at any time will be at the discretion of each participant, without any ensuing repercussions or consequences. A written and signed Consent Form agreement will be signed by each participant. All paper documents that bear participant identifying information

will be stored in a locked filing cabinet throughout the study time period. Relevant computer files will be password protected. Ethical approval of this study will be obtained by the University of British Columbia's Research Ethics Board and Kwantlen University College's Research Ethics Board before any part of this study begins. Special attention will be given to the University of British Columbia's *Action/ Participatory/ Practitioner Research: Special Considerations in Ethical Reviews* guidelines and Policy 89, on *Research and Other Studies Involving Human Subjects.*

*Data Collection*

Data will be collected in a cyclic manner (as is common in action research) using an initial survey followed by audio-taped in-person and virtual active working group gatherings. Initially, a

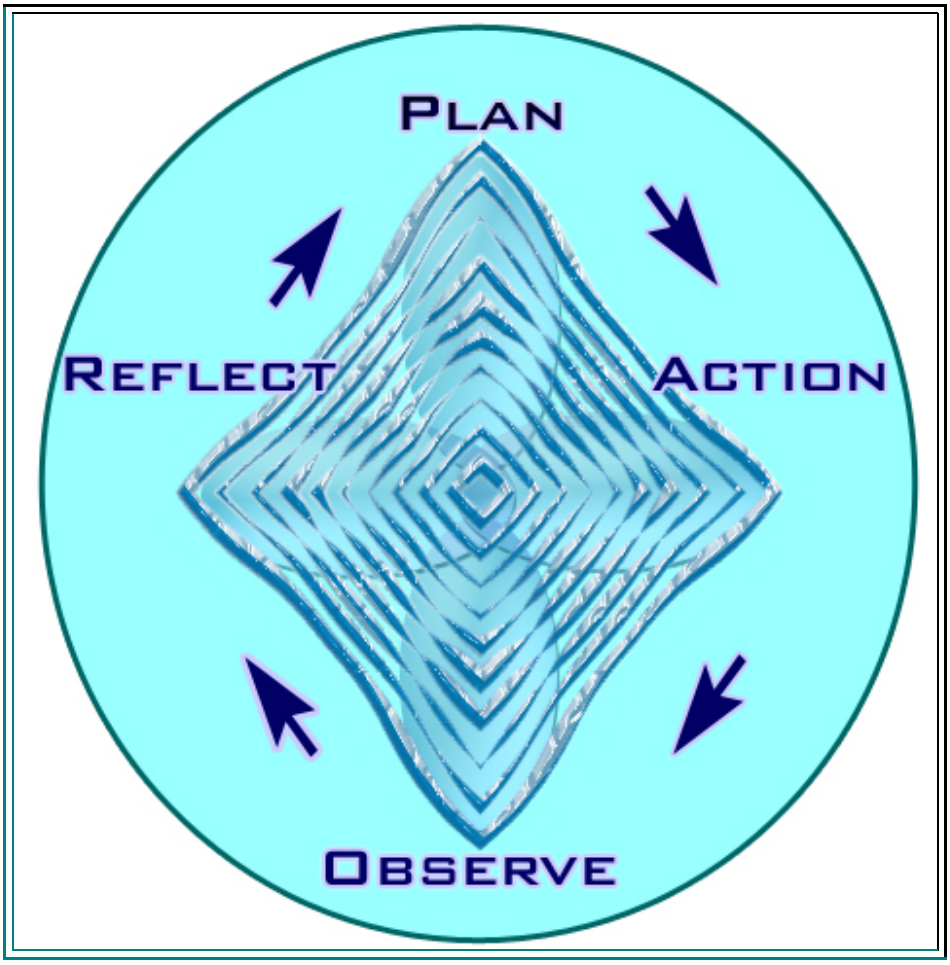


Figure 1: Participatory Action Design Phases

qualitative survey will be created to gather preliminary data related to faculty self-perceptions of their own nursing informatics competence and knowledge. The same survey will be given after the second cycle of participatory action research phases have been completed (see below for details).

| **Participatory Action Research Data Collection Phases** | |
|---|---|
| **ENTRY SURVEY:** Demographic and Qualitative Survey for all Faculty to share their self-perceptions of their own nursing informatics competence and knowledge. | |
| | |
| **CYCLE ONE** | |
| **PLANNING** | 1. Introductory Workshop with Overview of Study and Nursing Informatics<br>2. Active Recruitment for Core Group of Participants, Informed Consent<br>3. Three Working Group Meetings to Dialogue about Nursing Informatics and Plan NILORD interface design and artifacts |
| **ACTION** | 1. Design of NILORD interface and contents according to input from Participants |
| **OBSERVATION** | 1. Pilot testing of NILORD interface and artifacts by Participants<br>2. Virtual data collection of Participant's reactions to NILORD interface |
| **REFLECTION** | 1. Work group to share reflections about the NILORD interface. |
| | |
| **CYCLE TWO** | |
| **PLANNING** | 1. Work group to Plan how to integrate the NILORD interface and artifacts into the BSN program |
| **ACTION** | 1. Planned activities will be shared with entire Nursing faculty as directed by participants |
| **OBSERVATION** | 1. Observation of how the interface is used by faculty and applied to the program.<br>2. Virtual data collection of observations by participants. |
| **REFLECTION** | 1. Final work group to share reflections on the use of the NILORD interface, the cultivation of nursing informatics culture, and this research study's process.<br>2. Semi-structured interview with each participant to gather data about their insights and perspectives about the development of a culture for nursing informatics. |
| | |
| **EXIT SURVEY:** Demographic and Qualitative Survey for all Faculty to share their self-perceptions of their own nursing informatics competence and knowledge. | |

*Table 1: Participatory Action Research Phases and Data Collection*

*Cycle 1 Planning Phase*

Next, an introductory workshop will be offered to all of the BSN faculty to provide an overview of the study and of nursing informatics in general. At this time, faculty will be invited to participant actively in the study. Faculty who agree to participant will be asked to sign an informed consent form.

A minimum of three in-person working group meetings (approximately 4 hours in length per meeting) will be organized to meet with the participant faculty to a) explore their beliefs, attitudes, and values related to nursing informatics through dialogue and reflection and b) to engage in the planning of the NILORD interface, artifacts and Intranet faculty community site. This planning will include the identification of essential learning object artifact resources that will be co-planned, then designed during the action phase for faculty access through the NILORD interface. During the dialogue, an emphasis on the networking, creative, and quality-enhancing qualities of technology will be applied, to both put participants at ease, and hopefully raise excitement and interest in developing nursing informatics knowledge and capabilities as a way to provide autonomous, client-focused, and effective nursing care. Nursing informatics will be presented through a number of relevant and contemporary lenses, including modernist, postmodern, critical social theory, humanistic and feminist perspectives. These will be applied to a number of important concepts in contemporary nursing education and practice including caring, context, empowerment, critical social theory, social justice, creativity, evidence based practice, primary health care, health promotion, social networks, communities of practice, life long learning, social change, social justice, community development, bioethics, power and hegemony, and interdisciplinary collaboration.

*Cycle 1 Action Phase*

The data gathered from the participants during the initial Planning phase will be incorporated and applied to guide the design of the NILORD interface and artifacts. During this active phase, careful consideration for human-computer interaction principles will be incorporated, including aesthetics,

ergonomics, usability, technological and social access, and intuitiveness. As well, principles of learning object design will be applied, including the promotion of inquiry based and constructivist learning. This is important to nursing since, "ICTs allow for learning to be more a part of work and support "just-enough, just-in-time-learning" delivery. In the workplace, nurses are often looking for 'bites' or 'chunks' of learning (called learning objects in the information technology world), often focused on skill development" (Canadian Nurses Association, 2006, p. 50).

*Cycle 1 Observation Phase*

Participants will be asked to pilot test the NILORD interface and artifacts and provide narrative input via virtual communication mediums to provide input on the preliminary interface design. This input will be used to guide further refinement of the interface and artifacts design.

*Cycle 1 Reflection Phase*

All participants will be invited to attend a Reflective work group gathering to dialogue and reflect on the NILORD interface and artifacts and to provide further input for improvement.

*Cycle 2 Planning Phase*

The participatory group will reconvene to co-plan the implementation of the NILORD interface and artifacts in the BSN Nursing program curriculum. If further changes to the interface or artifacts are needed, they will also be planned for further action.

*Cycle 2 Action Phase*

The planned activities selected by the participants will be presented to all faculty, and implemented as directed by the group.

*Cycle 2 Observation Phase*

The researcher and participants will observe how the interface and linked artifacts are used by the entire faculty and applied to the program. Web-based input will be collected to provide data for analysis and reflection.


*Figure 2: Components of the PAR design*

*Cycle 2 Reflection Phase*

Participants will be invited to a final working group meeting to dialogue and reflect on the utility of the NILORD interface and artifacts, the cultivation of nursing informatics culture, and their perception of this research study process. A final qualitative personal interview will be conducted with each faculty participant to explore their perspectives on any changes in beliefs, values, language, rituals, symbols,

lifeways, or worldview and the cultivation of nursing informatics culture as a result of engaging in the PAR process in this study.

### *Study Instruments*

#### *The NILORD (Nursing Informatics Learning Object Repository and Dashboard) Interface*

This proposed Dashboard interface and artifacts will be designed using open source software and HTML to provide a low-cost yet robust resource centre for nursing faculty who choose to include nursing informatics content and practice within the classroom. The BSN community infrastructure will be designed in Moodle, building on an initial community structure created by the researcher to provide a secure web-based work area for faculty workload selections and faculty meeting minutes, agendas, and resource documents. The community will be further developed according to the direction of the study participants.

Nursing informatics related learning object artifacts created for classroom use will be designed using an open source software such as eXe (elearning XHTML editor) and/or RELOAD. Learning objects are one of the most recent developments in educational software and are essentially web-based discrete lessons, images, or other learning activities that are specially created and packaged, meant to be usable in a number of distinct learning contexts. The main idea of learning objects is to break educational content down into small chunks that can be reused in various learning environments. Learning objects can be divided into three groups or types, namely, integrated, informational, and practice objects, are self-contained, can be utilized in one learning period, are reusable in other learning contexts, and are amenable to aggregation with other objects (Wiley, 2002; Smith, 2004).

The NILORD interface will assume a dashboard design, similar in concept to interfaces used in business, health education, and science. Computer or web-based dashboards were initially modeled after the operational layout of automobile or aircraft dashboards, where performance indicators could

keep managers up-to-date about critical operational information. Pertinent and popular examples are the various Nurse Executive Dashboards created for nursing administration. However, this dashboard will not be fashioned for the intent of control or monitoring performance, but rather as an unique, distinct resource for faculty to use for the application of nursing informatics to their teaching and other faculty roles, with the intent to foster a stronger informatics culture within education.

This dashboard will be organized and inhabited according to the data provided by the study participates using an interface ecology approach, which means it will be connected, dynamic, and characterized by relationships (Kerne, 2005). The actual components, links, and indicators on the NILORD dashboard will be envisioned and planned by the study participants, then implemented by the researcher. This particular dashboard will be designed to serve as a readily accessible interface to an array of nursing informatics resources (selected by the participants), including the faculty community infrastructure site, and the nursing informatics content learning objects.

*Entry and Exit Survey*

A demographic and open-ended qualitative survey will be created to gather initial and final data from faculty related to their own self-perceptions of their nursing informatics related knowledge, skills, and capabilities. The two surveys will be identical, and compared for differences and changes in response.

## Data Analysis

In this proposed study, qualitative data analysis will be conducted in two ways:

a) collaboratively and cyclically throughout the two complete cycles of the participatory action process (as outlined above), particularly during the Planning, Observation, and Reflection phases with the participants; and

b) at the end of the study, to analyze the Entry and Exit survey data, and the thematic narratives that

emerged from the dialogue and reflection done during the various work group, virtual input meetings and personal interviews with each participant. The former will inform the action research process, and guide the researcher through the Action phases of both planned cycles.

Data will be extracted from a variety of collection modes:

1. Entry survey data
2. Audio-taped work group dialogue and reflection data from both PAR cycles.
3. Virtually communicated data gathered during the Observation phases of the two PAR cycles
4. Exit Semi-structured Interviews with each participant.
5. Exit survey data
6. Researcher's Journal, Log, and Anecdotal Records of the Design process and the PAR process.

Data from these various sources will be reflected on, deductively organized into meaning units, then converged and categorized into themes by looking for patterns and recurring regularities in the data for further analysis for indications of informatics culture presence and cultivation. This analysis will aim to reveal how the participants make sense of the experience of participation in this study and in their experience with technology, including ICT. To achieve this, careful attention will be given to attempt to capture the participant's voices, attitudes, emotions, actions, and reflections to reach a clear understanding of their life experiences in utilizing and applying nursing informatics to education.

Categorizing and coding of the qualitative data will be supported through the use of software such as QSR's NVivo 7 program. This categorization will be done using componential analysis as described by Spradley (1979) and Stringer and Genat (2004).”Spradley's approach to analysis is based on the idea that people's everyday cultural knowledge is organized according to systems of meaning. These systems of meaning, he proposes, are organized taxonomically, using a hierarchical structure to distinguish the different types of phenomena that might be organized as categories. Categories divide and define our cultural worlds systematically, allowing us to impose a sense of order on the multiple

and complex phenomena that comprise our everyday life" (p. 105).

This componential analysis will include the following steps:

- Unitization of the data
- Data sorted into categories (meaning units) by analyzing for themes, patterns, connections, commonalities, and regularities in the data
- Categories divided into subcategories, if appropriate
- Categories coded using a overarching concept or cover term that clearly expresses the nature of the data within each category
- Identification of the Category attributes
- Identification of Category hierarchies
- Categories and subcategories organized into a system of concepts
- Non-participant data will be applied to enhance the analysis (review of the literature, nursing program document/artifact review)
- Analyzed categories crystallized as a conceptual framework to provide structure and meaning for the dissertation findings and report of outcomes
- Validation of the conceptual framework with the participants before beginning to write the final report of outcomes.

## Report of Outcomes

The findings of this study will be shared as a narrative that presents the data gathered throughout the two cycles of PAR using an interpretative lens that will reflect the process of nursing informatics culture genesis within the participating faculty.

Assumptions that will be readily identified include:

a) the research will be useful to practice, in this case, to nursing education.

b) this study has practical implications to nursing education.

c) the NILORD interface and artifacts will be perceived as a usable and useful dashboard that can be readily incorporated in nursing education.

Limitations of this study will include:

a) small sample size reduces the ability to generalize the findings to the general population

b) the selection of PAR as a research method may interfere with the researcher's ability to study culture (ethnography might serve as a more appropriate research design)

c) the qualitative and participatory design may support the likelihood of bias in the researcher

Implications for Nursing and Education

a) the NILORD interface may provide a important resource that can help nursing educators to begin to develop a culture for nursing informatics within the curricula

b) the NILORD interface may prove to be a valuable resource for teaching and learning about nursing informatics

Final dissemination of the outcomes will be presented as a classic written dissertation with accompanying web site. The dissertation report will be written as an evocative rich narrative with the intent of sharing insights revealed through the participant's dialogue and reflection. “Writing evocative accounts entails more than the bland reporting of events. It requires report writers to find the textual means to evoke deeper forms of understanding” (Stringer & Genat, 2004, p. 119). The companion website will also be used to showcase the NILORD interface designed through the participatory action process.

The report will also reveal personal accounts of experience from the researcher's perspective, presented in a biographical format. This part of the report will present insight into the design process

that emerged as the NILORD interface and artifacts were created during the PAR cycles. The report will be written using an academic method of organization to meet standards for dissertation formatting and presentation. Illustrations, matrices, and other organizing visual displays will be applied to add clarity to the narrative analysis.

## References

Ball, M. & Hannah, K. (1984).*Using computers in nursing.* Reston, VA: Reston Publishing

Benner, P. (1994). The tradition and skill of interpretative phenomenology in studying health, illness and caring practices. In *Interpretive Phenomenology: Embodiment, caring and ethics in health and illness.* P. Benner, Ed. Thousand Oaks, CA: Sage, p. 99-128.

Bruner, J. (1982). The language of education. *Social Research, 49,* 835-853.

Canadian Nurses Association. (2006). *E-nursing strategy for Canada.* Ottawa: Author.

Canadian Nurses Association. (2006a). *Toward 2020: Visions for Nurses.* Ottawa: Author.

Canadian Nursing Informatics Association (2003). *Educating tomorrow's nurses: Where is Nursing Informatics?* Retrieved from the World Wide Web 07/18/05 from http://cnia.ca/OHIHfinaltoc.htm

College of Registered Nurses of British Columbia. (2006). *Entry-level Registered Nursing practice: Competencies and Context.* Vancouver: Author.

Collerette, P., Schneider, R. & Legris, P. (2003). Managing organizational change – Adapting to change, Pt. 4. *ISO Management Systems,* Jan – Feb. 59-67.

Delaney, C. (1990). Computer technology: Endangering the essence of nursing? In J. Comi-McClosky & Kennedy-Grace, H. *Current issues in nursing,* St. Louis: Mosby, 601 – 606.

Dix, A., Finlay, J., Abowd, G. & Beale, R. (1998). *Human-computer interaction*, 2nd ed. New York: Prentice-Hall.

Freshwater, D. (2000). Crosscurrents: against cultural narration in nursing. *Journal Of Advanced Nursing, 32*(2), 481 – 484.

Geertz, C. (1973) *The Interpretation of Cultures: Selected Essays.* New York: Basic Books.

Hannah, K.J., Ball, M.J., & Edwards, M.J. (1994). *Introduction to nursing informatics.* New York: Springer-Verlag.

Hong, G. (2001). Front-line care providers' professional worlds: The need for qualitative approaches to cultural interfaces. *Forum: Qualitative Social Research, 2*(3), September, 1-16.

Kaplan, B. (2001). Evaluating informatics applications – some alternative approaches: Theory, social interactionism, and call for methodological pluralism. *International Journal of Medical Informatics, 64,* 39-56.

Kerne, A. (2005). Doing interface ecology: the practice of metadisciplinary. International Conference on Computer Graphics and Interactive Technologies. *ACM SIGGRAPH 2005 Electronic Art and Animation Catalog,* Los Angeles, CA, 181-185. Retrieved March 13, 2007 from ACM Portal.

Leininger, M. (1994). The tribes of nursing in the USA culture of nursing. Journal of Transcultural Nursing, 6(1), 18-22.

Locsin, R. (2001). The culture of technology: Defining transformation in nursing, from "The Lady with a Lamp" to "Robonurse"? *Holistic Nursing Practice, 16* (1), 1 – 4.

Mikan, K. J. (1992). Implementation process for computer-supported education. In J. Arnold & G. Pearson (eds.) *Co mputer applications in nursing education and practice.* New York: National League for Nursing, p. 191 – 199.

Richards, J. A. (2001). Nursing in a digital age. *Nursing Economic$, 19* (1), Jan/Feb, 6 – 12.

Saba, V.K. & McCormack, K.A. (1996). *Essentials of computers for nurses.* 2nd ed. Toronto: McGraw-Hill.

Smith, R. (2004). *Guidelines for authors of learning objects.* NMC Learning object initiative. Retrieved March 10, 2007 from http://www.nmc.org/guidelines/NMC%20LO%20Guidelines.pdf

Spradley, J. (1979).*The ethnographic interview.* New York: Holt, Rinehart, and Winston.

Stringer, E. & Genat, W. J. (2004). *Action research in health.* New Jersey: Pearson Education.

Thompson, D. R. (2003). Fostering a research culture in nursing. Editorial. *Nursing Inquiry, 10* (3), 143 – 144.

Wiley, D. (2002). *Connecting learning objects to instructional design theory: A definition, a metaphor, and a taxonomy.* Retrieved March 10, 2007 from http://www.reusability.org/read/chapters/wiley.doc