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Views of Student Nurses on Caring and Technology in Nursing

Elizabeth Gail Brodell

VIEWS OF STUDENT NURSES ON CARING AND TECHNOLOGY IN NURSING

By

Elizabeth Becky Brodell
Bachelor of Science, Minot State University, 1989
Master of Science, University of Mary, 1995

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This dissertation, submitted by Elizabeth Becky Brodell in partial fulfillment of the requirements for the Degree of Doctor of Philosophy from the University of North Dakota, has been read by the Faculty Advisory Committee under whom the work has been done and is hereby approved.

Richard D. Landry
Chairperson

Katy Smart

Myrna R. Olson

Jan E. Stube

This dissertation meets the standards for appearance, conforms to the style and format requirements of the Graduate School of the University of North Dakota, and is hereby approved.

Joseph M. Benoit
Dean of the Graduate School

December 10, 2009
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Signature Elizabeth Bodell

Date 12-02-09

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ABSTRACT

Nurses entering the workforce are faced with many challenges, but today the multiple demands of patient care are complicated by a nurse's need to keep abreast of fast-changing technology. This research is universally relevant to nursing practice in educational settings and practice areas because nursing education needs to develop strategies to teach students the skills to manage technology, while keeping the elements of caring in learning and clinical practices.

This quantitative study examined the perceptions of nursing students on caring, technology as caring, the technological influences on caring practice, and their confidence level of PDA use. Participants were students accepted into Minot State University's Nursing Program during the fall of 2008 and spring 2009 semesters.

The survey instruments included the Caring Attributes, Professional Self-Concept Technological Influences Scale and the Technology Confidence Survey. The following caring attributes were rated the highest: listening to the patients, creating a sense of trust, and a relationship between a nurse and a patient is one based on trust, truth, and respect.

With new advancements in health care delivery and technology, it is important for nurses to be technologically competent and have the ability to maintain a caring environment. This study achieved the purpose; student nurses provided their perceptions for caring attributes, technology as caring, the impact of technology on caring, and PDA confidence levels. The results of the statistical tests for the Influence of Technology on

Caring Practice indicated one significant difference between the pre and posttest groupings. Due to the application of technology, nurses often become frustrated when the inevitable death of a patient occurs. In the area of Caring Communication the statistical test results indicated two items out of 28 with significant differences. Although, for all of the other research questions, there were no significant differences identified between the pre and posttest groupings.

Advances in technology are inevitable. The findings of this study are applicable to nursing education and nursing practice because students educated today will care for the patients of tomorrow. Integrating technology and caring into the nursing curriculum prepares students for the technologically advancing world in which they will work.

CHAPTER I

INTRODUCTION

Higher education in nursing has a responsibility to develop nurses who are competent in all aspects of health care, including caring qualities and technological competency. Caring is at the core of nursing practice. With new advancements in health care delivery and technology, it is vital for nurses to maintain a balance between technological competency and a caring environment. This, of course, requires nursing education to develop strategies that teach nursing students the skills to manage technology, while keeping the elements of caring in learning and clinical practice at the forefront. Technology is not a new concept for nursing. Locsin (2001) related: "Nurses have always used techniques and tools in meaningful ways to achieve valued ends" (p. 13). Although technology is not often viewed as caring, this research explored students' perceptions on technology competence as a form of caring.

One of the primary goals of nursing programs is to produce nurses who meet the needs of health care industries. Nurses, as related by Skiba (2006), constitute the majority of the health care workforce, 55%. Caring is not only an important attribute of nursing, it is a driving force for patient satisfaction. In today's health care market, satisfaction with nursing care is an important factor in rating the quality of the services received and whether patients will return as future customers. According to Duffy and Hoskins (2003),

Smith (2004), and Wolf et al. (1998) satisfaction with all aspects of health care is an important factor used by patients in evaluating the quality of the service received.

Caring is an essential concept within the nursing curriculum. It needs to be modeled by faculty and integrated throughout the nursing program. Caring should not only be taught; it needs to be fostered and mentored. To do this nurse educators must teach and model caring. This behavior is important because students are susceptible to the attitudes of their instructors and the nursing staff within the clinical agencies. Nursing students are the focus of our work as nurse educators and our goal is to educate nurses who are both caring and competent. Caring nurse theorists, Boykin and Schoenhofer (2001a), developed a theory of nursing called Nursing as Caring. Within this theory, they included strategies for teaching caring and state: "In teaching Nursing as Caring, faculty assist students to come to know, appreciate, and celebrate self and other as caring person" (p. 46).

Statement of the Problem

Technology education is imperative for nurses to acquire necessary skills to deal effectively with technology in the workforce. The National League for Nursing (NLN) Position Statement (2003, 2005, 2008) encourages nurse educators to integrate technology into their teaching. Nurses entering the workforce are faced with challenges, such as multitasking the care of their patients and keeping aware of fast-changing technology. Kaminiski (2005) advised: "The professional nurse is now expected to function well within a technologically advanced healthcare environment, carry out higher-level, complex activities, care for clients and their families" (p. 3). It is critical that

information technology be introduced into nursing curricula at the undergraduate level (George & Davidson, 2005; McCannon & O'Neal, 2003).

In 2007, to address the technology preparation of their nursing students, Minot State University (MSU) began implementing the use of personal digital assistant (PDA) technology with their first semester students. MSU's nursing program consists of five semesters of nursing courses. After students have completed the required general and supporting nursing courses, they complete an application process and are accepted into the program. Students are accepted into the program in the fall and spring semesters in cohorts of 18 students. Students need to successfully complete the course work for each semester to progress on to the next semester within the program.

PDA usage is infused throughout the nursing curriculum; students use them as nursing reference guides, calendars, appointment guides, and many other personal options. This study investigated the relationship of technology on caring attitudes and the confidence level of PDA technology of undergraduate nursing students at MSU.

Purpose

The purpose of this study was to examine the attributes of caring, the impact of technology on caring, and PDA technology confidence level of student nurses. The following research questions guided the study.

Research Questions

1. What were the perceptions of nursing students on caring?
2. What were the perceptions of nursing students regarding technology as caring?
3. What were the perceptions of nursing students of technological influences on their caring practice?

4. What was the technology confidence level of PDA use for student nurses?
5. What were the differences among students' perceptions of caring and their confidence in PDA technology from pretest to posttest as they progressed in the nursing program?

Hypotheses

The following hypotheses were tested in this study:

1. Students' perceptions of caring (as specified in research questions 1-3) will increase significantly from pretest to posttest measurement.
2. Students' confidence relative to PDA technology (as specified in research questions 4 and 5) will increase significantly from pretest to posttest measurement.

Significance of the Study

This study is universally relevant to nursing practice in educational settings and practice areas. This research utilized the quantitative approach to research; this is important because many qualitative publications on caring exist, but the quantitative research on caring and technology is sparse (Arthur, Pang, & Wong, 2001). Caring remains the most essential and most direct expression of nursing (Boykin & Schoenhofer, 1990, 2001a, 2001b; Brown, Holcomb, & Maloney, 2005; Finch, Schoenhofer, & Green, 2006; Gabbart, 2008; Swanson, 1991; Touhy & Boykin, 2008; Watson, J. & Smith, 2002; Watson, J. 1985, 2005). Schoenhofer's research related that: "Nurses now face the

challenge of creating an environment of personal care in the context of a highly sophisticated, although impersonal, health care technology" (Locsin, 2001, p. 3).

Advances in technology are inevitable; it is imperative that the caring aspects of nursing practice continue to be weaved into educational preparation and practice. Study of caring can enhance program quality and the nurses educated at MSU. These nurses will practice in this community, the surrounding communities, and nationwide hopefully as caring, technologically-competent, professional nurses.

By exploring PDA use among undergraduate nurses, nursing educators can better understand the implications for implementation. PDA technology is helpful in both the nurse's academic setting and practice arenas. Safety is a huge advantage of PDA use. With easy access to medication reference and dosage calculations, PDAs can assist nurses in reduction of medication errors. Many PDA programs are available for nurses (White et al., 2005). These programs consist of drug handbooks, drug dosage calculators, medical dictionaries, procedures, laboratory values, diagnostic tests, and the nursing process. More advantages include the ability to conduct a literature search for evidence-based practice and/or the elimination of heavy reference books, while providing quick and accurate access to information at the point of service (Scollin, Healey-Walsh, Kafel, Mehta, & Callahan, 2007).

This present research study investigated Minot State nursing students' perceptions of technology as it related to caring. This researcher believed that overall, MSU nursing students did not have a strong comprehension of technological competency as caring. Although this researcher did believe that there would be differences in the student's perceptions as they advanced through the nursing program. The study assisted in

identifying areas for curriculum development with a focus on technology competencies as a form of caring.

Limitations of the Study

This study was conducted with the following delimitations:

1. This study was limited to students accepted into the nursing program at MSU.
2. Data for the study were limited to the perceptions of the participants.
3. The study was limited to nursing students from fall semester 2008 and spring semester 2009.

Assumptions

1. The participants in the study were assumed to answer accurately, honestly, and openly to the Caring Attributes, Professional Self-concept Technological Influences Scale (Arthur et al., 1998, 1999 as cited in Watson, J. 2002).
2. The participants in the study were assumed to answer accurately, honestly, and openly to the Technology (PDA) Confidence Survey (Hess & Heuer, 2003).
3. The survey instruments accurately reflected the perceptions of the nursing students.

Definition of Terms

For the purpose of this study, the following terms were defined to clarify their meaning in relation to the topic:

Caring: The definition used for this study is by Boykin and Schoenhofer (2001a): "Caring is an essential feature and expression of being human" (p. 1). Mayeroff (1971) defined it: "Caring, as helping another grow and actualize himself, is a process, a way of relating to someone that involves development, in the same way that friendship can only

emerge in time through mutual trust and a deepening and qualitative transformation of the relationship" (p. 1-2). Roach (1997) described: "Caring is the human mode of being" (p. 7).

Nursing: American Nurses Association (ANA; 2003): "Nursing is the protection, promotion, and optimization of health and abilities, preventions of illness and injury, alleviation of suffering through the diagnosis and treatment of human response, and advocacy in the care of individual, families, communities, and populations" (p. 7). The ANA definition of nursing is used for this study. Craven and Hirnle (2007) described it this way: "Nursing is caring, commitment, and dedication to meeting the functional health needs of all people" (p. 37).

Nursing As Caring: This is a nursing theory that Boykin and Schoenhofer (2001a) described as: "Our understanding of person as caring centers on valuing and celebrating human wholeness, the human person as living and growing in caring, and active personal engagement with others" (p. 5). This theory is used as part of the theoretical framework for this study.

Person, patient, or client: Berman, Snyder, Kozier, and Erb (2008) defined person, patient or client as: "The recipient of nursing care (includes individuals, families, groups, and communities)" (p. 41).

Personal digital assistant (PDA): A small handheld computer device that contains a variety of nursing resources and databases.

Technology: The following definition of technology, as defined by Barnard and Locsin (2007) is used for this study, "Technology is artifacts, resources, and their complex interrelationship with knowledge, skill, science, people, organizations, systems,

culture, values and politics" (p. xiv). Technology is advanced for purposes of survival, transmission of cultural values, development of societies, economic gain, political leadership, military power, maintenance of health, the giving and receiving of information and exploration.

Organization of the Study

This dissertation is organized into five chapters. Chapter I introduces the topic and provides a description and justification of the research problem. Chapter II consists of a literature review on nursing, caring in nursing practice, the influence of technology on caring, nursing education, and the use of PDAs in nursing education. Chapter III describes the methodology used in this research. It includes a description of the subjects, description of the instruments, the survey methods, and data analysis. Chapter IV provides the research findings. Chapter V discusses research findings including recommendations for nursing education and practice.

Summary

In present day, nurses are challenged to create a caring environment amid complicated health care technology (Locsin, 2001). Often activities involving technology are viewed as uncaring. Locsin (2005) related: "To some nurses, activities that are technology-based often seem uncaring, but to technology-competent nurses, these are normal activities reflecting nursing in critical settings" (p. 91). In conclusion, this study is important because students need to develop both caring attributes and technological competence while in nursing school.

CHAPTER II

REVIEW OF THE LITERATURE

A review of literature was conducted in the areas of caring theories, education, and technology as they related to nursing. This chapter is organized by sections that include each of these topics. Caring remains the most essential and most direct expression of nursing; it is referred to by many as being at the core of nursing, (Boykin & Schoenhofer, 1990, 2001a; Brown, Holcomb, & Maloney, 2005; Finch, Schoenhofer, & Green, 2006; Gabbart, 2008; Locsin, 1995, 2001; Swanson, 1991; Touhy & Boykin, 2008; Watson & Smith, 2001; Watson, 1985, 2005). This chapter begins with a general overview of nursing history, caring theorists, followed by the theoretical framework used for this study, nursing education, and technology.

Nursing

Every society has had people who have provided nursing care for others (Watson, 1985). Early concepts of health and illness care started with medicine men and with women caring for mothers in childbirth, for children, and for the elderly (Joel & Kelly, 2002). Records from many early civilizations indicate that nursing in the simplest form has existed for centuries. The Old Testament refers to nurses, Ancient Egyptian artifacts include descriptions of nursing procedures for dressing wounds, and pre-Christian India has records of the first hospitals that were staffed by men. Ancient China used drug therapy, acupuncture, massage, hydrotherapy, and physical exercises to maintain health.

Greece had health spas for the sick. Rome founded hospitals to care for their injured soldiers; both male and female nursing attendants staffed these hospitals (Joel & Kelly, 2002).

In the Middle Ages and Dark Ages, a sharp decline in medical and nursing care occurred due to wars, famine, and lack of educational opportunities. Disease was rampant partly related to the decreased value and application of hygienic practices. Later in the middle ages, the Crusades motivated monastic orders of monks and nuns to establish hospitals to care for the injured military. By the end of the Middle Ages hospitals were all over Europe. The majority of the hospital nurses were nuns. During this time, the status of nurses was very low. Those who were not in religious orders were lower class servants and those with criminal backgrounds.

The founder of modern nursing was Florence Nightingale who has had a great impact on the nursing care of patients (Catalano, 2006; Craven & Hirnle, 2007; Joel & Kelly, 2002; Leddy & Pepper, 1998). Nightingale improved sanitation standards of hospitals and work settings. Nightingale was a very highly educated woman; for the time this was quite rare. The majority of her education came from her father who taught her Greek, Latin, French, German, and Italian. Nightingale also studied history, philosophy, science, music, art, and classical literature. Nightingale's only formal nursing training was obtained from the Church Order of Deaconesses in Kaiserswerth, Germany.

One of Nightingale's most powerful accomplishments happened during the Crimean War (1854-1856). She was appointed to Lady Superintendent in Chief of female nursing in the English General Military Hospitals (Nightingale, 1969). At the time she took office the soldier's death rate was 60%. The soldier's convalescent quarters were

unsanitary and the wounded were only attended to during the day. Because of her leadership, the hospitals established sanitation guidelines, control for rats, and patients were cared for at all hours; the mortality rate decreased to 1%. Her patients thought fondly of her and referred to her as "the Lady with the lamp" because she would check on them during the night. This image holds true today as a symbol for nursing.

Florence Nightingale organized modern nursing educational programs to include theory and practice. The first nursing school that Nightingale organized was at St. Thomas's Hospital in London in 1860. The students went through a selection process similar to today's application practice. She was also instrumental in changing the status of nursing from that of the low class servant to a professional (Catalano, 2006).

Early nineteenth century Catholic and Protestant orders came to the United States, Canada, and Mexico to establish hospitals. The first American school of nursing was based on Nightingale's guidelines. This school was developed in 1872 at the New England Hospital for Women and Children. Nursing education started in the hospital settings as diploma programs, where the students worked part of the day in the hospitals providing patient care under supervision, and the rest of day was classroom lectures. These nursing students received the majority of their education from hands-on experience working under the direction of nursing faculty and alongside skilled nurses.

Caring

The first research question in this study asks the students their perceptions of caring. Foster (2006) asserted that: "The power of caring theory is in its ability to help nurses reconnect with themselves, their patients, and their peers" (p. 332). Caring as described by nurse theorists and educators varies; each has a specific angle from which

they approach the concept of caring. Common themes are evident throughout the research of caring theories. A central focus within the theories reveals themes of knowing and acceptance.

Sr. Simone Roach, a nurse, developed a theory of caring which focused on caring from the heart. Her theory is composed of the 5 "Cs" of caring: compassion, competence, confidence, conscience, and commitment. Roach (1997) explained that caring is the human mode of being, it is caring from the heart, and caring from the core of one's being. The nurse's specific technique of caring is developed by education and experiences throughout her/his professional role. Roach (1997) also believed that caring is an art form, as did Nightingale (1969).

The philosopher Mayeroff's (1971) theory on caring is referenced by many nurse scholars. Mayeroff asserted that caring is a process that involves knowing ways to help a person grow. He believed that specific ingredients are necessary for growth. Mayeroff's ingredients were: knowing, alternating rhythms, patience, honesty, trust, humility, hope, and courage.

Watson, a well-known nurse theorist, introduced caring as a nursing theory, when she developed the theory of human caring. Watson (1985) cited carative factors as the means used by a nurse to deliver health care to the patient/client. Watson identified ten primary carative factors:

1. The formation of a humanistic-altruistic system of values.
2. The instillation of faith-hope.
3. The cultivation of sensitivity to one's self and to others.
4. The development of a helping-trust relationship.

5. The promotion and acceptance of the expression of positive and negative feelings.
6. The systematic use of the scientific problem-solving method for decision-making.
7. The promotion of interpersonal teaching-learning.
8. The provision for a supportive, protective, and (or) corrective mental, physical, sociocultural, and spiritual environment.
9. Assistance with the gratification of human needs.
10. The allowance for existential-phenomenological forces (pp. 9-10).

Watson's theory has had a dynamic effect on nursing; it has generated many research articles on the topic of caring, including being instrumental in the development of the theoretical frameworks used for this study. In 1995, the American Nurses Association added caring in their definition and policy statement (Watson & Smith, 2002). Caring Science has evolved into a unique field of study affecting health and education professions. In years following, many other scholars have produced their own theories building upon Watson's concepts.

One of these scholars was Swanson, who formulated another nursing theory with a foundation in caring. It is a middle-range theory of caring. Swanson's theory evolved as a result of phenomenological investigations of three groups: women who had recently miscarried, care providers in newborn intensive care unit, and young mothers who had been recipients of a long-term public health nursing intervention (Swanson 1991). As a result of these studies, Swanson categorized caring into five processes. They are: knowing, being with, doing for, enabling, and maintaining belief. Swanson described the categories as:

1. Knowing is striving to understand an event as it has meaning in the life of the other.
2. Being with is being emotionally present to the other.
3. Doing for entails doing for the other what he or she would do for the self if it were at all possible.
4. Enabling means facilitating the other's passage through life transitions and unfamiliar events.
5. Maintaining belief is sustaining faith in the other's capacity to get through an event or transition and face a future with meaning (Swanson, 1991, p.163).

Boykin and Schoenhofer (1990, 2001a), nurse theorists, were similar to Roach (1997), Watson (1985), and Swanson (1991) as they also based their theory on caring. Boykin and Schoenhoffer developed the theory called Nursing As Caring and have authored several books and many articles on caring. Their unique theory is part of the theoretical framework used for this study. They believe that caring is a growth process. Boykin and Schoenhofer (2001a) stated that: "Each person, throughout his or her life, grows in the capacity to express caring" (p. 1).

Locsin (2001, 2005), a nurse scholar, expanded on Boykin and Schoenhofer's theory by adding the dimension of technology to caring. He asserted that technology allows the nurse to know more about the patient. To Locsin, the use of technology does not replace caring; it enhances it. Researchers Boykin and Schoenhofer (2001a) and Locsin (2001, 2005) believe that nurses are acting as caring when they are competent in technology. Locsin (2005) stated: "As a model, technological competency as caring illustrates a nursing framework guiding the practice of nursing in which technologies are

continuously used to know persons as whole and complete in the moment" (p. 8). According to Locsin (2005) caring in nursing is frequently depicted as the holding of a patient's hand, but it is much more than this; it is multidimensional, ranging from this example, to the presence of the nurse, and of the nurse competently managing the patient with technology.

Theoretical Frameworks

Two nursing theoretical frameworks were chosen for this study, Nursing As Caring, a general theory developed by Boykin and Schoenhofer (1990), and a middle range practice model, Technological Competence as Caring in Nursing by Locsin, (2005).

Nursing As Caring

The theory of Nursing As Caring is founded on the belief that all people are caring. Boykin and Schoenhofer (2001a, 2001b) take a unique approach to patient care; the model is centered in the fact that all people are caring. Many scholars, including the work of Mayeroff (1971), Roach (1997), and Watson (1985) influenced Boykin and Schoenhofer's theory. Nursing As Caring according to Boykin and Schoenhofer "is based on an understanding that the focus of nursing, both as a discipline and as a profession, involves the nurturing of persons living, caring, and growing in caring" (p. 12). People are developing caring throughout their lives, in the course of experiences that they encounter. Boykin and Schoenhofer (2001a) related: "As a process, personhood acknowledges the person as having continuous potential for further tapping the current of caring" (p. 4).

Boykin and Schoenhofer (2001a) developed six major assumptions that grounded their theory:

1. Persons are caring by virtue of their humanness.
2. Persons are caring, moment-to-moment.
3. Persons are whole or complete in the moment.
4. Personhood is a process of living grounded in caring.
5. Personhood is enhanced through participating in nurturing relationships with caring others.
6. Nursing is both a discipline and a profession (p.1).

Utilizing this theory, the nurse accepts the person cared for at face value in that moment. Nursing activities are not directed at changing the patient to meet the goals set by the nurse, but by understanding that the patient is unfolding. Boykin and Schoenhofer (2001a) stated: "There is not lack, failure, or inadequacy which is to be corrected through nursing... Persons are whole, complete and caring" (p. 12). The action of caring between the nurse and the one nursed improves personhood for both individuals.

An important key in the application of this theory is the fact that nurses need to know themselves as caring. Boykin and Schoenhofer (2001a) asserted: "Through knowing self as caring person, I am able to be authentic to self and with others. I am able to see from the inside what others see from the outside" (p. 4). Nurses applying the principles of Nursing As Caring are competent in identifying the concept of caring within themselves and in others.

Throughout their practice, nurses will encounter experiences with patients who display outward actions that are viewed as negative. Utilizing this theory, the nurse will

accept the patient at that moment in time, knowing that the caring value is indeed still present within the person. The nurse is there for the patient and cognizant of the fact of growing in caring. Having a grasp on this concept allows the nurse to be accepting of patients who act in this uncaring manner. Boykin and Schoenhofer (2001a) related: "The more I am open to knowing and appreciating self and trying to understand the world of others, the greater the awareness of our interconnectedness as caring persons" (p. 4).

Technological Competency as Caring in Nursing

Technological competency as caring in nursing was developed by Locsin in 1998. He based his model on Boykin and Schoenhofer's Nursing As Caring Theory (2001a), which he expanded to include the aspects of technology. Locsin (2001) related: "Nurse caring in high-technology settings is grounded in two fundamental principles: intentionality and knowing" (p. 6). Intentionality as defined by Locsin (2001):

> ...is the act of forming and intent, joining value, will, and action in a congruent, personal expression and communication. The value that underlies the intent of nursing is conceptualized in the nurse's understanding of the core meaning of nursing. From the perspective of Nursing As Caring, the underlying value is stated in the focus of nursing, 'Nurturing persons living caring and growing in caring'...Nurses whose practice incorporates the use of cognitive and/or mechanical technology understand that when technologies are used for nursing purposes, those uses must be intentional expressions of caring (p. 7).

Nurses can demonstrate intentional caring in a highly technical setting as they touch the hand of the patients while making eye contact before they move on to assess the various tubes and other technology attached to the patient. Locsin (2001) believed that: "nurses who are expert at communicating caring effectively in high-technology go to the patient through the technology" (p. 8). The patient is the focus of the nursing care; technology enhances the care that is given. Locsin's theory plays an important role in this

study as the second question of this study focuses on the student's perceptions of technology as caring.

Teaching Caring

Khademian and Vizeshfar (2008) believe that nursing education has a responsibility to educate nurses with adequate caring abilities. Caring learning environments are essential for the development of caring nurses. This is important because the students educated today will become the next generation of nurses. Boykin and Schoenhofer (1990) recommend that teachers foster self-affirmation in students, have open nonjudgmental style, plus express caring qualities in the classroom. Mayeroff (1971) and Boykin and Schoenhoffer (1990) assert that respecting and allowing the student to make choices in their learning experiences facilitates learning. Mayeroff (1971) explained the importance of patience when he stated that: "I enable the other to grow in its own time and in its own way" (p.23).

Skepticism has arisen among nursing faculty concerning the concept of teaching caring. Some believe that caring cannot be taught. Watson (1985) stated: "A caring attitude is not transmitted from generation to generation. It is transmitted by the culture of the profession as a unique way of coping with its environment" (p. 8). Within Boykin and Schoenhofer's theory (2001a, 2001b), examples of strategies for teaching nursing as caring are provided. They include small group activities where students discuss actual situations when they experienced knowing self and others as caring, and another is journaling where they reflect on caring clinical experiences. Caring can be taught in the sense of assisting the student to identify situations where they actually acted as caring. By reflecting back on their behaviors when providing patient care, they can, in retrospect,

identify certain behaviors that indeed are those as described by this model as knowing self as caring (Touhy & Boykin, 2008). Boykin and Schoenhofer (2001a) explained: "As students engage in this exercise, their emerging reflections begin to ground them as they grow in their understanding of person as they live and grow in caring" (p. 46). Faculty can also create essay evaluations that provide students with an opportunity to express their thoughts on nurturing persons living and growing in caring.

Teaching Technology as Caring

The third question of this study involves the student's perceptions of how technology influences their caring practice. Teaching technology as caring is similar to teaching caring; it starts with faculty. Nursing faculty need to value these attitudes, plus teach and model technological competency as caring in nursing, (Eggenberger & Keller 2008; Sitzman & Leners, 2006). A method to assist students in the development of this concept is by introducing technology into the nursing curriculum at the undergraduate level and paralleling it with Locsin's concepts of technological competency as a form of caring.

Another opportunity to teach caring and technology is through the use of simulation. Simulation in nursing education is similar to the training concepts used in aviation (Galloway, 2009). Simulation allows the students an opportunity to practice skills in an environment where errors do not risk patient safety (Galloway, 2009). The use of high fidelity simulators consists of mannequins that can be programmed prior to class to respond in a particular manner based on a planned patient scenario. The student nurses assess and interact with the simulated patient while the faculty is observing their interactions.

Eggenberger and Keller's (2008) study discussed the importance of simulation being grounded in caring as they incorporated Locsin's technological model into their simulation lab. Students were encouraged not only to respond to the technology and tasks, but to what matters the most, the one nursed. Students were taught strategies to identify situations where they were intentionally present.

Following the simulation exercise, a debriefing session is held. This phase gives the students an opportunity to reflect on the nursing situation. Questions developed by Eggenberger and Keller (2008) guide the students' dialogue; they include:

> How did the study of this nursing situation enhance your competencies in caring?
> What calls for nursing could be identified in this patient situation?
> What cues led you to question the need for further nursing responses?
> Which theoretical concepts were you able to link to this practice situation?
> How did you prioritize the calls heard?
> Are there gaps in your understanding?
> What ways of knowing did you use in responding to this patient's needs?
> How has your personal knowing been enhanced?
> What became clearer to you as a result of this situation?
> What might you do differently next time? (p. 45).

The above questions are useful guides to assist the student in the identification of specific caring actions that they used in their clinical experience. Grounding the students' actions with concepts of caring gives them the opportunity to know, understand, and live the value of caring in nursing.

In an article by Boykin and Schoenhofer (1990), caring was analyzed by using five categories of questions: ontological, anthropological, ontical, epistemological, and pedagogical. The authors answered questions in relation to each of these categories based on many of the major caring theorist's concepts. Ontological questions focused on the "being" of caring theorists Roach, Watson, Parse, and Mayeroff's concepts. The

anthropological section explored what it means to be a caring person. The ontical part investigated specific actions of the person when they are caring; examples are compassion, competence, and confidence. Epistemological section focused on how caring is made known, personal knowing, empirical knowing, ethical knowing, and esthetic knowing. Epistemological zoned in on teaching and learning. Components of esthetic knowing included patience and hope. Boykin and Schoenhofer (1990) stated: "Sound educational practice requires that methodology be appropriate to the subject matter. Therefore, teaching and learning activities must be congruent with the values of caring" (p. 154). This concept requires faculty to incorporate learning activities that teach students to focus on knowing themselves as caring. Touhy and Boykin (2008) stated: "In teaching nursing as caring, faculty assist students to come to know, appreciate and celebrate the other as caring" (p. 10).

Implications for Nursing Education

In their book, Nursing As Caring: A Model for Transforming Practice, Boykin and Schoenhofer (2001a) assert that nursing education also needs to be grounded in caring. They recommended that their assumptions and values be implemented into all aspects of the education program. They stated that: "The curriculum, the foundation of the education program, asserts the focus and domain of nursing as nurturing persons living caring and growing in caring" (p. 41). Their model described a different role for nursing faculty, one where faculty and students are learning together. Boykin and Schoenhofer (2001a) asserted: "Faculty are encouraged to take risks and let go of the familiar" (p.46). Nursing programs grounded in Nursing as Caring are discovering that the meaning of caring in nursing involves the personal focus of knowing. Faculty of these

programs support a positive nurturing environment that prizes the unique qualities of all as they grow in caring. "The uniqueness and artistry of the student is born when the teachers nurture its emergence through caring" (Boykin & Schoenhofer, 1990, p. 155).

Caring in Practice

Reviewing the literature on caring in practice is especially valuable; it provides a picture of what is occurring in the world where students will practice. An article by Boykin, Schoenhofer, Smith, St. Jean, and Aleman (2003) described the development of a care delivery model grounded in caring. The study took place in Atlantis, Florida at John Fitzgerald Kennedy Medical Center on an acute care unit. The medical center used the theory of Nursing as Caring, plus incorporated the Dance of Caring Persons. The Dance of Caring Persons is a model that includes an image of dancers that form a circle, the dancers are holding hands, and are moving while remaining connected (Boykin & Schoenhofer, 2001b). This image portrayed the concepts of teamwork and the importance of each member in the delivery of patient care. Boykin et al. stated: "The Dance of Caring Persons as an organizational model assumes that cultures comprising caring persons and each person within the culture brings to it special gifts to accomplish a common mission" (p. 224). The medical center implemented Nursing as Caring theory not only into patient/nurse relationships but also into relationships with colleagues within the workforce. Following the study, it was noted that the medical center's patient satisfactory surveys had improved. Nurses also realized that they were more focused on what matters the most, the patient, rather than tasks.

Another article by Pross, Boykin, and Hilton (in press) focused on a process of transforming an entire health care facility by intentionally grounding it in caring. The

hospital is St. Lucie Medical Center, located in southern Florida. This project started by involving pivotal positions in the beginning of the process, which included senior leadership and nursing. The first stage asked participants to write or share a story that exemplified caring. This exercise helped them grow in their personal knowledge of knowing themselves as caring persons. Mayeroff's (1971) ingredients of caring were used to aid in expressing themselves as a caring person.

The project even involved the community by including them in a "Dance of Caring Persons" (Boykin & Schoenhofer, 2001b). Employees, patients, families, and community members joined hands to form a circle around the hospital. The central theme of the event was to portray the commitment to nurture and support that which matters. The project has brought a dimension of personalization to the way employees within the organization relate to one another, to patients, and to their families (Pross, Boykin, & Hilton, in press). The project is ongoing and continues to mature.

A study conducted by Bent et al. (2005) at a Veterans Administration Hospital in Colorado used Watson's (1985) theory to implement an environment of caring. To encourage staff support for the project, nursing managers started the process with discussion-focused sessions on Watson's theory of human science and human care. The project was piloted in specific units, which were named Nightingale Units. The project coordinators used a similar technique as Pross, Boykin, and Hilton (in press) to assist the staff in verifying caring experiences. Staff on the Nightingale Units were offered support staff to help convey the theory of human caring into everyday clinical practice. Nurses from these special units were also able to attend small group classes with Jean Watson to

learn her theory personally and experientially. Managers were encouraged to walk the walk by being positive examples of the project.

The project had positive effects on the pilot units of the hospital; nurses changed their focus from doing/task-orientated care to healing modalities emphasizing caring qualities. Staff grounded themselves before entering a patient's room, nurses created an end of shift report that engaged patients and supported healing, and in the Nightingale Units soft music was played after lunch. A new computerized charting template was created based on Jean Watson's curative factors, and a caring volunteer and visitor program was created (Bent et al., 2005).

A qualitative and quantitative research study by Brown, Holcomb, and Maloney (2005) at a southern Florida hospital created a new role for nurses called the patient care facilitator (PCF). The PCF is an experienced nurse who leads a team of nurses assigned to 12-16 patients: the role was based on Jean Watson's theory of caring, The PCF's primary function is the patient's advocate, acting as a liaison for physician, nurse, and other members of the heath care team, thus providing seamless care and improving the patient's continuity of care. The PCF also provides support for the nursing staff and a mentor for newly hired nurses.

Wilkes and Wallis (1998) conducted a qualitative study of nursing students on caring; the study took place in Australia at two different diploma nursing schools. The student's perception of caring was the focus of their research. The results indicated that first-year students related their lived experience of caring to actual incidents that had occurred within the clinical setting. The second-year students perceived caring as

compassion intertwined with communication. Lastly the third-year students integrated communication and compassion with professionalism.

Assessing Caring

Caring is an illusive concept which is difficult to describe; you cannot see it but it can be felt in your heart. Researchers have equated certain actions with caring; by doing this they were then able to create assessment tools to evaluate and measure caring. Assessing caring is vital in the relationship of nursing interventions and patient outcomes.

The tool used in this study is Caring Attributes Professional Self-concept Technological Influence developed by Arthur et al. (1998, 1999 as cited in Watson, 2002). Prior to the selection of this tool, this researcher investigated various tools used to measure caring. The tool by Arthur et al. was chosen because it contains the components of caring plus assesses technology as caring.

Several tools measure caring. Watson's book, Assessing and Measuring Caring in Nursing and Health Science (2002), contains a collection of caring instruments that address a variety of caring components. Nurse researchers created the instruments; they measure caring aspects of nurses', students', midwives', physicians', and patients' perceptions. The book also includes reliability/validity of each instrument.

The Caring Assessment Report Evaluation Q-sort (CARE-Q) developed by Larson was the first quantitative caring tool cited in nursing literature (Watson, 2002). This tool is for patients to rank how they feel they are being cared for. The tool is comprised of 50 questions, where the actions are ranked from most to least important.

Measuring student's caring learning environments was the focus in the development of the Peer Group Caring Interaction Scale and Organizational Climate for

Caring Questionnaire (Hughes, 1993, 2001 cited in Watson, 2002). This unique scale is one of few measurement tools created for use in nursing education. The instrument has two parts, 16 items focus on students and 39 items focus on the teachers. The items are rated on a Likert scale that ranges from one to six. The instrument is useful in evaluating nursing programs' organizational relationships of caring between faculty and students.

The Caring Efficacy Scale (CES) is a caring assessment tool developed by Coates (1997), a research and measurement consultant. The tool is based on Watson's theory of transpersonal caring from nursing and on Bandura's concept of efficacy from social psychology (Watson, 2002). The CES is a self-report form that contains 30 items; each question is rated by a Likert Scale (-3, -2, -1, +1, +2, +3). The tool assesses the capabilities of nurses in the development of caring relationships with their patients. Many nursing schools use the tool to measure student outcomes at the end of their nursing program (Watson, 2002).

Swanson (2000) developed an instrument called The Caring Professional Scale (CPS). This instrument is based on Swanson's middle range theory; it evaluates the nurse, physician, midwife, and the care that the patient received. The CPS was created as a strategy to evaluate caring as the intervention/process variable, as cited by Swanson (2000) in Watson (2002). The scale is composed of 14 items and is rated on a 5-point Likert scale.

An article by Coates (1997) stated: "The CES attempts to reflect the spirit of Watson's approach by emphasizing the caring relationship and the experience of caring as a whole, enriching process and not a sum of discrete behaviors" (p. 54). Their sample included novice and experienced nurses from baccalaureate, doctorate, and masters

nursing programs. Means and standard deviations revealed no difference for the graduating students and alumni students. Coates believed that it was important to continue to study caring and recommended future studies on the CES using larger samples and more diverse samples.

The study of caring among nursing students has important implications for nurse educators. Watson, Deary, and Lea's (1999) longitudinal study on student nurses' perceptions of caring used the Caring Dimensions Inventory (CDI) and the Nursing Dimensions Inventory (NDI). The NDI was also developed by Watson et al. by re-wording stem questions from the CDI. The NDI was used to investigate more accurately if nurses were answering the question based on caring or what they felt was important in nursing. Their findings suggested that students lost some of the idealism about nursing and caring after twelve months of nursing education. Watson et al. believed that this could be explained by the fact that many people who enter the nursing education have high ideals about the nurse that they wish to become.

Researchers Fagerstrom, Ericksson, and Engberg's (1999) goal was to gain a richer understanding on whether the patient's perceived caring needs were being met by nurses. Their study was conducted at a hospital in Finland; they discovered that when patients were able to express their desires as problems and needs, the nurse could meet them. Although the key for nurses was to have the ability to comprehend the patient's needs and desires from the patient's view.

Khademain and Vizeshfar's (2008) research focused on nursing student's perceptions of the importance of caring behaviors. The study was conducted in Iran with 90 nursing students. These students completed a 55-item questionnaire consisting of

caring behaviors that were modified from a Caring Assessment Questionnaire. In their research the students identified "giving patients' medications and treatments promptly" as the most caring behaviors.

Nursing Education

The overall goal of nursing education is to educate student nurses who can practice at the basic entry level of nursing upon completion of their program of study. In reality, nurse graduates are expected to competently care for their patients plus function in the midst of high technological equipment and computer systems. Faculty have a serious responsibility to prepare students and to keep them abreast of advancing technology (Kooken, 2005; McBride, 2005). The healthcare environment is saturated with technology (Scollin et al., 2007). Technology innovations are pivotal to our survival as a profession, a culture, and as a society (De Groot, 2009). Nursing needs to keep current with technological developments.

Technology

This section addresses technology in healthcare, technology in nursing education, personal digital devices (PDAs), and the teaching strategies for introducing technology into the curriculum. Technology has many positive attributes for healthcare and it can help nurses work more efficiently and improve safety in the delivery of care (Locsin, 2001, 2005; Puthawala, 2009). Balancing machine-technology and caring-technology in nursing practice creates an experience of caring (Locsin, 1995). Technology becomes the tool to know and understand the patient.

Nursing has utilized forms of technology for centuries in the application of nurses' skills. Nurses used knowledge of herbs and plants to treat their patients' aliments;

as technology was developed and expanded, nurses added it to their practice (Locsin, 1995, 2001). In present day, nurses provide care for complex patients and maintain competence with technology. Nurses are challenged to create a caring environment amid complicated health care technology (Locsin, 2001). While providing nursing care for their patients, nurses manage machines and other technological devices. Often these activities involving technology are viewed as uncaring (Locsin, Barnard, Tanioka, & Campling, 2006). Locsin (2005) related: "To some nurses, activities that are technology-based often seem uncaring, but to technology-competent nurses, these are normal activities reflecting nursing in critical settings" (p. 91).

A common perception of technology in healthcare is of life support, which is the ventilator used to maintain life in critical care settings. However, technology in nursing is certainly not limited to critical care situations. Nurses assess body temperature using electronic thermometers; sphygmomanometers and stethoscopes are used to collect blood pressure data. The field of health care has many automated devices that assist nurses in the delivery of patient care, which include automatic oxygen level devices that are clipped to the patient's finger, glucose monitors that provide a quick reading of the patient's blood sugar level, pumps that deliver intravenous medication, and fetal monitors used in obstetrics.

Medication delivery systems are also computerized by the use of various delivery systems. Many facilities use handheld devices that include barcode-scanning systems and medication robots that deliver meds directly to the departments (Weckman & Janzen, 2009). Fiscal services are directly linked to the patient care systems, creating charges for

products used in patient care. Medical records are created and tracked electronically where the information is directly documented into the computer when care is delivered.

Advances in technology enhance patient safety concerns (Carr, 2009; Puthawala, 2009). Recently new technology was developed to aid operating room nurses following surgical procedures when they count surgical sponges. ClearCount Medical Services created this system. It is called the SmartSponge System (Carr, 2009) and involves sponges embedded with technology chips. Radio frequency is used to locate the sponges. A hospital in New York was the first to implement this system during the spring of 2009.

Lillard's (2009) article related that as a result of new technologies nurses in the United States are seeing improvement in efficiency, productivity, workflow, and overall patient care. These technologies include delivery robots, electronic medication administration bar codes, phone headsets, computer standardized information templates used for charting, and electronic trackers used to locate elderly patients and prevent falls.

The National League for Nursing (NLN) Position Statements (2003, 2005, 2008) encourage nurse educators to integrate technology into their teaching. The NLN Position Statement (2008) encourages nursing education to prepare nurses who can utilize technology in providing quality care. To help improve patient care, a committee of various professionals was formed in 2006. It was called the Technology Informatics Guiding Education (TIGER) Summit and met with the goal to improve patient care by assisting the profession of nursing in preparing the nursing workforce in the use of technology and informatics (DuLong, 2008). The summit consisted of 70 organizations; their work resulted in nine important topics. These include:

1. Standards and interoperability;
2. Healthcare Information Technology National Agenda/Policy;
3. Informatics Competencies;
4. Education and Faculty Development;
5. Staff Development/Continuing Education;
6. Usability/Clinical Application Design;
7. Virtual Demonstration Center;
8. Leadership Development; and
9. Consumer Empowerment/Personal Health Record.

Integrating informatics and technology into the nursing curriculum prepares student for today's workforce (George & Davidson, 2005; McCannon & O'Neal, 2003). A tool for teaching technology is the PDA. PDAs are cordless handheld computer devices that contain nursing resource material. The devices weigh eight ounces or less, are small enough to fit in a pocket, plus have the option for the addition of a keyboard (Charters & Guberski, 2006). PDAs have e-mail capabilities, can operate as a stand-alone computer, can connect to wireless networks, and can connect to other computers via a cable.

The benefits of PDAs include easy access to reference material at the point of patient care (George & Davidson, 2005; Scollin, Healey-Walsh, Kafel, Mehta, & Callahan, 2007). PDAs are used to access information that the nurse would have located in a textbook or reference manual. The reference material includes but is not limited to the following: a drug handbook, medical dictionary, laboratory values, diagnostic tests, a calculator, the nursing process program, and nursing procedures. Another feature is for

use in documentation of patient care. Nurses can document patient data as they gather it, and then download it to the patient's record.

PDA devices are useful in general; they contain a calendar, address book with telephone and email information, a resource tool for managing time, and the nurse can create a to do list and/or program it to sound reminder alarms. With easy access to telephone and beeper numbers, the device can save time in locating physicians. A key to using technology effectively is for the nurse to be able to prioritize the patient over the technology and not allow the tool to become a distracter but be able to use the technology as a means to improve patient care (Locsin, 1998).

To support NLN's position statements, Minot State University (MSU) developed a task force and pilot study in 2005 on the use of PDAs. The task force consisted of nursing faculty and several nursing students. The task force developed an implementation and assessment plan. According to Weckman and Janzen (2009) when implementing new technologies, it is important to include faculty and students in all phases of the process. Their input is essential for the success of new and innovative ideas. According to Skiba, (2006) nursing faculty need to participate at all levels of university technology committees and be a part of information technology revolutions.

PDA devices were purchased with a grant and distributed to third semester students of MSU's nursing program. Students used the devices for the next three semesters, while the task force assessed their progress. When this group of students graduated, they were given the opportunity to purchase their device or to return it. After the pilot study, the PDA Task force recommended to faculty that the use of PDAs be implemented into the curriculum.

Starting in the fall of 2007, PDAs were required for all nursing students accepted into MSU's nursing program. Students were required to purchase their own PDA and also purchase the nursing resource programs. Adams (2004) recommended that technology be introduced to the students at the beginning of their programs. MSU students began using their PDAs the first semester of their program in Foundations of Nursing class. A general operational class was held on care and maintenance by MSU technology support staff during the first few weeks of class. Included in this class was instruction on using the address book and beaming information from one PDA to another PDA.

Throughout the semester, the students were given assignments where they used their PDAs to complete the work. Implementation of actual assignments that incorporated the technology provided the students with familiarity on their PDAs prior to going to the clinical site. An example of PDA use in the laboratory setting is in the unit on medical asepsis and infection control when introducing the three different types of isolation. Students were given the readings prior to class; the theory content is covered in the classroom, followed by a lab the resource-learning center. During the lab, three different learning stations were set up for the students. Students were asked to identify which type of transmission precautions (isolation) would be required for the patient, the type of personal protective equipment they would be required to wear and the components of patient teaching. To answer all these questions, students used their PDAs to locate the information.

The fourth research question in this study investigated the students' technology confidence level with PDA use. Ragneskog and Gerdnert's (2006) study identified that beginning students have a variety of information technology skills. Elder and Koehn

(2009) related that students in their study rated their skills as close to expert in some areas, but their actual assessment findings found that students lacked necessary computer skills. Therefore, to level out the learning curve, consideration of the varying competency levels needs to be investigated prior to the introduction of PDAs and other technology.

When introducing new devices like PDAs, it is valuable for the instructor to identify what knowledge the students are expected to learn. Once this is identified, the instructor develops the behavioral objectives using the action verbs from Bloom's Taxonomy. The use of Bloom's Taxonomy is helpful not only when creating objectives but is also used in the assessment of the content (Bloom, 1956). According to Angelo and Cross (1993), "Effective assessment begins with clear goals" (p. 8). Assessment techniques need to match the initial objectives for the learning activity and be written at the same behavioral level.

Building on the student's previous knowledge of technology will enhance their learning experience. Many students have grown up with computers and cell phones, and PDAs have many of the same types of options. Elder and Koehn's (2009) study identified that not all students have the same level of technology skills and that some of them rate their skills higher than they actually are. Adams (2004) suggests using a behaviorist approach by breaking the learning into small mastery steps followed by engagement exercises for the student, which is a constructivist strategy. This approach makes the knowledge meaningful and personally relevant to the student.

In their article, Colevins, Bond, and Clark (2006) describe a program that used PDAs for RNs who were in a refresher course. The nurses in the program had been out of nursing practice for five years or more. Their nurse preceptors had noticed that the

returning nurses lacked technological aspects of nursing along with a deficit in the skills to operate the technology. The study revealed that by using the PDAs the nurses were able to gain confidence in the medical library and in the clinical areas.

PDAs affect healthcare in various ways. An article by Puthawala (2009) related the positive effects of technology in healthcare. Rochester General Hospital used an electronic medication administration record (eMAR) software program. The program increased the safety of medication administration process. Nursing administrators use the eMAR programs positive effect in decreasing medication errors as a recruitment tool for graduate nurses.

Summary

Throughout this chapter, I have examined a number of concepts in nursing and nursing education, starting with caring, the core of nursing, followed by technological advancements in nursing, then concluding with nursing education and the introduction of technology into curricula, specifically the use of PDAs. This study contributes to the body of knowledge on this subject, as the literature contains minimal research on student's perceptions of technology as caring.

CHAPTER III

METHODOLOGY

This chapter describes the research methods and procedures used to collect and analyze the data for this study. Quantitative methodology was used to conduct this research. Permission to use the survey tools was obtained from the authors prior to beginning the study. The following survey questionnaires were utilized to gather data:

1. Caring Attributes, Professional Self-concept Technological Influences Scale (Arthur et al., 1998, 1999 as cited in Watson, 2002).
2. Technology Confidence Survey (Hess & Heuer, 2003).

The Institutional Review Board approval was obtained from the University of North Dakota and from Minot State University prior to conducting the study.

Participants

The participants of this study were from Minot State University's (MSU) bachelors of nursing program. In North Dakota, the basic level for registered nurses to enter the workforce is either an associate's degree or a bachelor's degree in nursing. A bachelors of science in nursing requires the general required college courses, basic nursing courses, plus the community health, research, and leadership. Students are accepted into MSU's nursing program after completing the required general education courses.

The nursing program consists of five semesters with approximately 18 students in each level for an approximate total of 80 to 90 students. The majority of students are female. Students originate from around the northwest region of North Dakota, and from a military base nearby. Therefore, the population varies to include a wide range of ethnic backgrounds.

Data were collected from cohorts of nursing students at mid-term of the fall 2008 semester and again at mid-term of spring semester 2009. Participation was voluntary. The same survey tools were used each time, although the semester five data was not included in the study because they graduated in the spring of 2008 and were no longer in the program for the post-test.

The department's philosophy and theoretical framework (Minot State University, 2008, p.2-4) is an eclectic model based on Nightingale's emphasis on environment to optimize health, Leinenger's theory advocating for cultural care, and Watson's premise that caring is the soul of nursing. MSU's Department of Nursing is an accredited nursing program through the National League of Nursing Accrediting Commission (NLNAC). Specific standards set by NLNAC need to be met for a nursing program to become accredited. The accreditation process takes place every seven years. A survey team completes a thorough onsite assessment every seven years; the last accreditation date was spring 2006. The North Dakota Board of Nursing also completes an onsite assessment every five years. They too have specific assessment criteria; their last site visit was also spring 2006. Both the NLNAC and the Board of Nursing provide a final report to the Department of Nursing. MSU's nursing program met all the standards and criteria for both regulatory agencies.

Survey Instruments

The instruments utilized for this study were the Caring Attributes, Professional Self-concept Technological Influences Scale (Arthur et al., 1998, 1999 as cited in Watson, 2002) and the Technology Confidence Survey (Hess & Heuer, 2003).

Caring Attributes, Professional Self-concept Technological Influences Scale.

The Caring Attributes, Professional Self-concept Technological Influences Scale (CAPSTI) was developed to measure multi-dimensional constructs of caring internationally. Watson (2002) related that: "It was tested on 1,957 registered nurses in 11 different countries. The purpose for development was to understand caring and compare responses of caring items with items related to professional self-concept and technological influences across diverse countries and cultures" (p. 188). The scale is comprised of three subscales, the Professional Self-Concept of Nurses Instrument (PSCNI; 30 items), technological influences (14 items) and caring (60 items). The original scale is divided into four parts. The first section of the CAPSTI contains a demographic questionnaire. The CAPSTI includes a section called PART III, which asked questions about the area in which the nurse currently works. The CAPSTI's directions ask the participant to describe their work as a nurse; for the purposes of this study, the word "student" was inserted before nurse.

Arthur (as cited by Watson, 2002) reports the validity/reliability of the tool:

> A total of 1,957 questionnaires from 11 different countries were analyzed. Within the four parts of the scale, Cronbach's alphas were reported as follows: PSCNI .89; TIQ .75; TISQ .94; and CAQ .88. Face and construct validity of the CAPSTI were established from the literature and the original pilot study. Significant correlations were found between and among the different parts of the CAPSTI. Pearson's r correlation coefficients were reported at $p < 0.0001$; between the

PSCNI and CAQ (r=0.51); between the PSCNI and TIQ = .13; between the CAQ and TIQ = .16 (p. 189).

The CAPSTI contains a total of 104 questions, 74 were used for this study. The demographic questionnaire of the CAPSTI was not used by this researcher, since the respondent semester information was placed on the Technology Confidence Survey form. The first 30 questions of the CAPSTI included the Professional Self-Concept section. These items were not the focus of this research, and therefore were not used in this study.

The CAPSTI section that asked questions about the area in which the nurse currently works was not included in this survey. This part of the survey was omitted for two reasons. First, the nursing students participating in this study do not specifically work in only one area. They rotate through various clinical and community settings throughout their nursing education. Secondly, the confidentiality of the healthcare facility would be at risk, as there is only one healthcare facility with clinical sites available to the students in this study.

Technology Confidence Survey

This tool was originally designed by Hess and Heuer (2003). The content validity of the instrument was established through a process of expert reviews of the items and subsequent revisions by the designers. That process involved submitting the alpha draft of the survey to a panel of three project leaders in the Migrant Health Program for which the instrument was being designed. Following incorporation of feedback from that panel, a beta draft was submitted for completion by 10 field nurses. Feedback from the nurses was incorporated, and the final survey resulted (C.W. Hess, personal communication, October 24, 2009).

The final Hess-Heuer instrument was subsequently adapted for this study by this researcher's substitution of demographic items appropriate to the present study seeking a respondent's academic semester level of study. The groups of items used in this study established respondent 1) confidence in general computer use, 2) PDA use, in general, 3) PDA use for data entry, 4) PDA medical dictionary use, 5) PDA use for calculations, and 6) PDA use for several nursing specific programs.

Data Analyses

The data obtained from the instruments were statistically analyzed using the Statistical Package for the Social Sciences (SPSS) Version 12. The frequency subprogram in SPSS was used to calculate frequency distributions and percentage tables. The statistics subprogram provided the mean scores and standard deviations on the variables. An analysis of variance was conducted to determine differences between the different semester groups within the nursing program. There were four dependent variables for this study. They were student perception of caring, student perception of technological influences on caring practice, student perception of technology as caring, and student PDA technology confidence level.

CHAPTER IV

RESULTS

The purpose of this study was to assess nursing student's perceptions of caring attributes, the impact of technology on caring, and PDA technology confidence levels. This chapter provides a discussion of the results and descriptive information for each of the research questions. Students were surveyed at mid-term in the fall 2008 (pre-test) and spring semester (post-test) of 2009; a comparison was conducted between the two assessment times.

Respondents

Respondents were students from four semesters at Minot State University's Nursing Program. Participation was voluntary. Students were surveyed by this researcher at the beginning of their class. The same survey tools were used each time. Semester 1 through 4 were included in the study, semester 5 graduated prior to the posttest (see Table 1).

Table 1. Respondents by Semester.

Semester	Pretest for CAPSTI	Posttest for CAPSTI	Pretest for Technology Confidence	Posttest for Technology Confidence
Semester 1	18	15	18	15
Semester 2	15	15	15	15
Semester 3	14	14	15	14
Semester 4	16	17	16	16
Total	63	61	64	60

Research Question Results

The data presented in this chapter correspond with the five research questions that guided this study. The Caring Attributes, Professional Self-concept Technological Influences Scale (CAPSTI; Arthur et al., 1998, 1999 as cited in Watson, 2002) and the Technology Confidence (Hess & Heuer, 2003) surveys were given to nursing students. A mean score was then calculated for each survey statement for all of the responses. The descriptive results of the study are based only on the posttest scores.

Research Question 1: What were the Perceptions of Nursing Students on Caring?

To answer this question, mean values were calculated on 56 specific items from the CAPSTI Scale. The responses were rated on a five-point Likert scale. Research question one was divided into four sub-categories; 1) caring attributes 2) caring communication 3) caring advocacy, and 4) learning to care. The sub-category items were prefaced by the following statements: 1) what caring means to you as a student nurse (items 1-12), 2) when I am working with my patient, as a student nurse I am being caring when I: (items 15-42), 3) how well does each item describe a caring nurse? (items 43-53), and 4) how is caring learned or taught? (items 54-60). The following sections of this chapter answer each of the four sub-categories separately.

Caring Attributes

Items 1-12 answered the first subcategory prefaced by, *What caring means to you as a student nurse.* Table 2 reports the results. Items 1, 10, and 11 are negative questions; therefore the scores reflected this. To accurately report the results the scales were reversed and recomputed for these items.

Table 2. Mean Likert Scores for the CAPSTI Scale: Caring Attributes (n = 61).

Item	Mean Score
What caring means to you as a student nurse.	
1. Caring is the central feature of nursing.	4.74
2. Caring is aimed at preserving the dignity of the patient.	4.64
3. Caring is a central virtue in nursing and focuses on the nurse as the moral agent.	4.62
4. Caring nurses are motivated by a feeling or emotion to provide care for patients.	4.56
5. Caring is unique in nursing.	4.13
6. Caring is acting; it is not just a feeling.	4.00
7. In plain language caring is a 'joint effort' between the nurse and the patient.	3.93
8. If a nurse ceases to care, he/she ceases to be a nurse.	3.92
9. A nurse cannot care too much.	3.82
10. Caring is a planned nurse activity designed to meet the patient's needs.	3.54
11. Caring is a natural human response and does not require any planning.	3.34
12. Caring makes no difference to the patient's condition.	1.61

One would be pleased to see the relatively high responses for caring. The responses are indicative of high regard for caring attitudes. This is expected for nursing students, as people with caring qualities often choose to enter professions like nursing.

Caring Communication

The section answering research question one consisted of 28 items that were rated on the same five-point scale. The respondents were asked, *When I am working with my patient, as a student nurse I am being caring when I am.* Mean scores for each of the items are displayed in Table 3. The mean participants' responses focused primarily on caring and communication (items 15-42). The items scoring the highest means were items relating to communication and trust. The highest responses and scores are: first, listening to the patients (4.80); second, creating a sense of trust (4.80); and third, speaking up for the patient when it is perceived that something harmful will be done to the patient (4.80).

Table 3. Mean Likert Scores for the CAPSTI Scale: Caring Communication (n = 61).

Item	Mean Score
When I am working with my patient, as a student nurse I am being caring when I am:	
1. Listening to the patients.	4.80
2. Creating a sense of trust.	4.80
3. Speaking up for the patient when it is perceived that something harmful will be done to the patient.	4.80
4. Allowing the patient to express feelings.	4.77
5. Providing the patient with encouragement.	4.77
6. Paying attention when a patient is talking.	4.77
7. Communicating with the patient.	4.75
8. Treating patient's information confidentially.	4.75
9. Talking to the patient.	4.74
10. Helping to make experiences more pleasant.	4.74
11. Giving the patient explanations concerning his/her needs.	4.74
12. Preventing any anticipated problems/dangers from occurring.	4.74
13. Knowing what to do in an emergency.	4.69
14. Helping the patient clarify thinking.	4.67
15. Keeping the relative informed about the patient as negotiated with the patient.	4.67
16. Working collaboratively with colleagues to ensure continuity of care.	4.67
17. Being empathetic.	4.66
18. Helping the patient with his/her activities of daily living.	4.62
19. Educating the patient about some aspects of self-care.	4.62
20 Demonstrating professional skills.	4.57
21. Speaking on behalf of the patient, in relation to their care.	4.56
22. Documenting care given to the patient.	4.44
23. Touching the patient when comfort is needed.	4.39
24. Expecting patients to do what I tell them.	1.89
25. Putting the needs of the hospital before the patient.	1.57
26. When I don't give the patient all the information he/she needs.	1.28
27. Not involving patients in planning their care.	1.21
28. Avoiding the patient.	1.18

The results indicate the student's high regard for communication. These scores are comforting to see as a nursing instructor. Students communicate directly with their patients, but they also need to communicate effectively with other members of the healthcare team. Communication skills are needed when dealing with people especially in highly stressful life or death situations. Communication with the patient's family

members is also often challenging. The low score for not involving patients in planning their care is a score a nursing instructor would like to see, as is the lowest score for avoiding the patient. Early in nursing education, students are taught communication skills and the importance of involving the patient in all aspects of their care.

The top three were: first, listening to the patient (4.80); second, creating a sense of trust (4.80); and third, speaking up for the patient when it is perceived that something harmful will be done to the patient (4.80). One would be pleased with these scores, as safety, communication, and trust are pivotal skills of Nursing Foundations. These concepts are built upon throughout the rest of the student's nursing education.

Caring Advocacy

The following section consisted of 11 items describing caring qualities of nurses; they are items 43-53 (Table 4). The respondents were asked, *How well does each item describe a caring nurse?* The top three mean results were: first, a confident relationship between a nurse and a patient is one based on trust, truth, and respect (4.74); second, to be a caring nurse is to make someone comfortable in their surroundings (4.66); and third, a competent nurse is someone who has respect for themselves, the profession, and the patient (4.64).

These results report high responses by the students on caring advocacy. This could be expected for nurses, whose role focuses around caring qualities. It is rewarding to see the students' scores highest in the area of relationships based on trust, truth, and respect. These are attributes of strong character and necessary for competent nurses. The lowest response is to be expected and is good that it was rated this low.

Table 4. Mean Likert Scores for the CAPSTI Scale: Caring Advocacy (n = 61).

Item	Mean Score
How well does each item describe a caring nurse?	
1. A confident relationship between a nurse and a patient is one based on trust, truth, and respect.	4.74
2. To be a caring nurse is to make someone comfortable in their surroundings.	4.66
3. A competent nurse is someone who has respect for themselves, the profession, and the patient.	4.64
4. A caring nurse is displaying conscience when he/she is morally aware of their relationship and the status of his/her actions on others.	4.51
5. To be a caring nurse is to care for another person and help him/her.	4.49
6. To be a caring nurse is to help someone who is suffering from a disability and is unable to do things you can do.	4.46
7. A committed nurse is one who balances personal desires and professional obligations to provide care to patients.	4.44
8. The human expression of compassion is a necessary component of caring in an environment, which is technologically cold and impersonal.	4.23
9. A committed nurse is one who is prepared to work extra time with no pay.	3.16
10. To be a caring nurse is to just ask someone how they are, and to look after and provided for them.	2.74
11. Caring nurses do not feel concern for the well-being of others.	1.16

The top scores were: first, a confident relationship between a nurse and a patient is one based on trust, truth, and respect (4.74); second, to be a caring nurse is to make someone comfortable in their surroundings (4.66); and third, a competent nurse is someone who has respect for themselves, the profession, and the patient (4.64).

Learning to Care

The next section is comprised of the last subcategory for question one. The items in this section related to learning caring. It contained seven items, 54 - 60 that were also rated on the same five-point scale. The respondents were asked to rate their degree of agreement based on the following statement: *How caring is learned and taught*?

As shown in Table 5, the results of the means with the highest scores are: first, nurses learn about caring from personal experience (4.43); second, nurses learn about

caring by observing other nurses work (3.90); third, to care for a patient is an obligation according to patient's needs, regardless of the nurses' experience or ability (3.67); fourth, nurses learn about caring in nursing school (3.59); and fifth, caring is learned by modeling in the clinical setting (3.57).

Table 5. Mean Likert Scores for the CAPSTI Scale: Learning to Care (n = 61).

Item	Mean Score
How caring is learned and taught?	
1. Nurses learn about caring from personal experience.	4.43
2. Nurses learn about caring by observing other nurses work.	3.90
3. To care for a patient is an obligation according to patient's needs, regardless of the nurses' experience or ability.	3.67
4. Nurses learn about caring in nursing school.	3.59
5. Caring is learned by modeling in the clinical setting.	3.57
6. Caring cannot be learned or taught.	3.13
7. Caring is learned through instruction in counseling techniques.	2.69

The results of this section relate the importance of positive role models for nursing students in both the educational and clinical settings. Students rated their personal experience the highest, this could be interpreted to include not only situations involving health care. Instructors are held to a high standard; the attitudes that we display to our students can have an effect on their attitudes towards others.

The top items were: first, nurses learn about caring from personal experience (4.43); second, nurses learn about caring by observing other nurses work (3.90); and third, to care for a patient is an obligation according to patient's needs, regardless of the nurses' experience or ability (3.67).

Research Question 2: What were the Perceptions of Nursing Students Regarding Technology as Caring?

To answer this question the mean value was calculated on one item from the Caring Attributes, Professional Self-concept Technological Influences Scale (see Table 6). The same Likert scale was used. Respondents were asked to rate the item (13) based on, *What caring means to you as a student nurse.*

Table 6. Mean Likert Scores for the CAPSTI Scale: Technology as Caring (n = 61).

Item	Mean Score
What caring means to you as a student nurse.	
1. Caring is a tool for technology.	3.16

The mean score of 3.16 indicates uncertainty regarding caring being a tool for technology. Further education on this topic may provide the students with a greater understanding of the concept.

Research Question 3: What were the Perceptions of Nursing Students Regarding Technological Influences on their Caring Practice?

To answer this question respondents were asked to rate their degree of agreement on a five-point scale; *How well does each item describe you and your work as a student nurse*? Students rated the following three items the highest: first, I don't think there is any more spare time in nursing school even though we have an increase in technology (4.43); second, in general technology enhances patient care and well-being (3.75); and third, mastery of technology is a useful tool in developing the professional status of nurses (3.59).

The mean results for items 31-44 are listed in Table 7. The students in this study did relate that technology has enhanced patient care and has benefited the professional

status of nursing, however they do not appear to believe technology has freed their time involving their schoolwork.

Table 7. Mean Likert Scores for the CAPSTI Scale: Technological Influences on Caring Practice (n = 61).

Item	Mean Score
How well does each item describe you and your work as a student nurse?	
1. I don't think there is any more spare time in nursing school even though we have an increase in technology.	4.43
2. In general technology enhances patient care and well-being.	3.75
3. Mastery of technology is a useful tool in developing the professional status of nurses.	3.59
4. The influx of technology has raised the profession of nursing.	3.51
5. Mastery of technology has helped nurses control their work environment.	3.48
6. High technology requires high-tech skills.	3.33
7. Technology is an activity which adds meaning to the work of nurses.	2.98
8. The increase in technology in nursing has increased the workload of nurses.	2.90
9. Due to the application of technology nurses often become frustrated when the inevitable death of a patient occurs.	2.80
10. Nurses often neglect patients because of the influx of machines.	2.80
11. Technology and the use of machines often interfere with providing adequate nursing care.	2.70
12. Technology has resulted in nurses becoming increasingly professionally uncertain.	2.64
13. The increase of technical tasks has downgraded the nursing profession.	2.56
14. I'm not sure about the benefits of technology to my practice.	2.46

The top items were: first, I don't think there is any more spare time in nursing school even though we have an increase in technology (4.43); second, in general technology enhances patient care and well-being (3.75); and third, mastery of technology is a useful tool in developing the professional status of nurses (3.59).

Research Question 4: What is the Technology Confidence Level of PDA use for Student Nurses?

To answer this question the Technology Confidence Survey (Hess & Heuer, 2003) was utilized. Respondents indicated their level of confidence on a Likert scale.

For the statements, a nursing student was given 1 point for not at all confident, 2 points for somewhat confident, 3 points for moderately confident, or 4 points for very confident, and no points for I do not know what this means. Research question four was divided into two sub-categories by this researcher. The first category specifically answers research question 4. The other category provided information regarding computer use in general and the specific confidence levels using the programs on the PDA (Tables 8 & 9).

PDA Confidence

To answer the first category question the mean value was calculated on item 2 from the Technology Confidence Survey (Hess & Heuer, 2003). Respondents were asked to indicate their level of confidence on the above Likert scale.

Nursing students were asked to indicate how confident they felt about using a PDA, in general. The mean value for item 2 was 3.05, indicating a moderate confidence level with their PDAs (Table 8).

Table 8. Mean Likert Scores for the Technology Confidence Survey: PDA Confidence (n = 64).

Item	Mean Score
How confident do you feel about...?	
1. Using a personal digital assistant, in general.	3.05

This score for this item is in the uncertain range indicating a need for further instruction on the technology. It was projected that the confidence level would show a higher increase. However, some of the respondents had worked with their PDAs for several semesters and the newly admitted students only had a few months experience with them.

Technology Confidence

For each statement nursing students were asked to indicate *How confident do you feel about (item)*; not at all confident, somewhat confident, moderately confident, very confident, or I do not know what this means. Mean scores were then calculated for each survey statement response (see Table 9).

Table 9. Mean Likert Scores for the Technology Confidence Survey: Technology Confidence Levels (n = 64).

Item	Mean Score
How confident do you feel about...?	
1. Using a computer in general.	3.75
2. Keeping your PDA charged.	3.65
3. Using a medical dictionary in your PDA.	3.58
4. Doing calculations with your PDA.	3.37
5. Using the RN Disease Program on your PDA.	3.22
6. Using a personal digital assistant, in general.	3.05
7. Using the laboratory resource on your PDA.	3.03
8. Using the Nursing Procedure program on your PDA.	3.02
9. Using the RN Assessment program on your PDA.	2.93
10. Changing the control preference on your PDA.	2.70
11. Entering meeting notes into your PDA.	2.30
12. Using some other database in your PDA.	2.22
13. Infrared beaming of information between PDAs.	2.20
14. Producing backup for your PDA.	2.08
15. Word-processing documents in your PDA.	1.97
16. Creating voice recordings with your PDA.	1.57

Question 1 related to using a computer, in general; results revealed the highest mean score of 3.75. This is not surprising, students in this study are familiar with computer technology, they are sophomore college age and above. Questions 3-16 related to the use of specific nursing resources for PDAs and to PDA maintenance and applications. The respondents rated themselves rather high on both the pre and posttest; the next three highest means were: first, keeping your PDA charged; second, using a

medical dictionary in your PDA; and third, doing calculations with your PDA. Keeping the PDA charged is a vital issue for operation of the device.

One could expect to see the use of the medical dictionary in the top means as this is one of the first tasks taught to the students in Foundations of Nursing. It is also one of the primary resources for students especially in the clinical setting. Calculating medication doses is also a focus of Foundations and Pharmacology courses.

Item 1 results revealed a pretest mean score of 3.77, a standard deviation of .496 and posttest revealed a mean score of 3.75, a standard deviation of .474, for a *t*-value of .179 and *p* value of .858. In addition, no significant difference was noted between the pre and posttest groups.

Items 3-16 related to the use of specific nursing resources for PDAs and to PDA maintenance and applications. Overall students rated their skills relatively high in the pretest. This is similar to the study by Elder and Koehn (2009) where students rated their computer skills as close to expert in several areas and later were assessed to lack necessary computer skills. This could be based on the premise that students feel and want to be viewed as knowledgeable about computers but once they actually apply the technology, they realize they are not as skilled as they had expected.

Research Question 5a: Was There a Difference in the Pretest and Posttest on the Perceptions of Nursing Students on Caring?

To answer this question means, standard deviations, *t*-tests, and *p* values were calculated on 56 specific items from the CAPSTI Scale. Question 5a was divided into four sub-categories; 1) what caring means to you as a student nurse, 2) when I am

working with my patient, as a student nurse I am being caring when I am, 3) how well does each item describe a caring nurse, and 4) how caring is learned and taught.

The first subcategory was answered by items 1-12, *What caring means to you as a student nurse?* Table 10 reports the results; *t*-tests indicate no differences between the pretest and posttest groups.

Table 10. Means, Standard Deviations, *t*-tests, and *p*-values for the CAPSTI Scale: Caring Attributes

	Pretest (63)		Posttest (61)			
Item	M	SD	M	SD	*t*-test	*p*
What caring means to you as a student nurse?						
1. Caring is a natural human response and does not require any planning.	3.22	1.44	3.34	1.43	-.472	.638
2. Caring is the central feature of nursing.	4.76	.46	4.74	.44	.296	.768
3. Caring nurses are motivated by a feeling or emotion to provide care for patients.	4.40	.79	4.56	.62	-1.252	.231
4. In plain language caring is a 'joint effort' between the nurse and the patient	3.67	1.19	3.93	1.15	-1.271	.206
5. Caring is a planned nurse activity designed to meet the patient's needs.	3.37	1.37	3.54	1.31	-.730	.467
6. Caring is acting; it is not just a feeling.	4.14	1.26	4.00	1.34	.609	.543
7. Caring is a central virtue in nursing and focuses on the nurse as the moral agent.	4.48	.61	4.62	.55	-1.392	.167
8. Caring is aimed at preserving the dignity of the patient.	4.52	.61	4.64	.48	-1.156	.250
9. Caring is unique in nursing.	3.90	1.20	4.13	1.16	-1.066	.288
10. A nurse cannot care too much.	3.75	1.28	3.82	1.17	-.333	.740
11. Caring makes no difference to the patient's health condition.	1.48	.98	1.61	1.18	-.667	.506
12. If a nurse ceases to care, he/she ceases to be a nurse.	3.60	1.36	3.92	1.22	-1.350	.180

The next section, which also answered research question one, consisted of 28 items that were rated on the same five-point scale. The respondents were asked, *When I am working with my patient, as a student nurse I am being caring when I am.* Means, standard deviations, *t*-tests, and *p* values were calculated and are displayed in Table 11.

Table 11. Means, Standard Deviations, *t*-tests, and *p*-values for the CAPSTI Scale: Caring Communication.

Item	Pretest (63) M	SD	Posttest (61) M	SD	*t*-test	*p*
When I am working with my patient, as a student nurse I am being caring when I am:						
15. Being empathetic.	4.51	.89	4.66	.51	-1.123	.264
16. Avoiding the patient.	1.29	.63	1.18	.38	1.113	.268
17. Listening to the patients.	4.78	.52	4.80	.40	-.304	.761
18. Touching the patient when comfort is needed.	4.48	.73	4.39	.80	.599	.551
19. Allowing the patient to express feelings.	4.79	.40	4.77	.42	.310	.757
20. Talking to the patient.	4.73	.48	4.74	.44	-.091	.928
21. Helping to make experiences more pleasant.	4.78	.41	4.74	.51	.477	.634
22. Demonstrating professional skills.	4.37	1.06	4.57	.74	-1.261	.210
23. Putting the needs of the hospital before the patient.	1.75	1.12	1.57	1.00	.899	.370
24. Communicating with the patient.	4.83	.38	4.75	.43	.971	.334
25. Providing the patient with encouragement.	4.73	.48	4.77	.46	-.476	.635
26. Helping the patient clarify thinking.	4.30	1.08	4.67	.50	-2.419	.017
27. Expecting patients to do what I tell them.	2.29	1.23	1.89	1.05	1.940	.055
28. Treating patient's information confidentially.	4.83	.38	4.75	.62	.770	.443
29. Helping the patient with his/her activities of daily living.	4.73	.44	4.62	.61	1.118	.266
30. Giving the patient explanations concerning his/her care.	4.60	.95	4.74	.48	-.983	.328
31. When I don't give the patient all the information he/she needs.	1.62	1.09	1.28	.68	2.061	.041
32. Educating the patient about some aspects of self-care.	4.57	.66	4.62	.61	-.449	.654
33. Keeping the relatives informed about the patient as negotiated with the patient.	4.71	.55	4.67	.51	.497	.620
34. Preventing any anticipated problems/dangers from occurring.	4.73	.62	4.74	.48	-.075	.940
35. Knowing what to do in an emergency.	4.67	.50	4.69	.50	-.241	.810
36. Creating a sense of trust.	4.81	.39	4.80	.44	.083	.934
37. Speaking up for the patient when it is perceived that something harmful will be done to the patient.	4.81	.39	4.80	.44	.083	.934
38. Speaking on behalf of the patient, in relation to their care.	4.44	.13	4.56	.84	-.667	.506
39. Paying attention when a patient is talking.	4.87	.33	4.77	.46	1.418	.159
40. Documenting care given to the patient.	4.40	.10	4.44	.10	-.307	.759
41 Working collaboratively with colleagues to ensure continuity of care	4.71	.06	4.67	.07	.419	.676
42. Not involving patients in planning their care.	1.22	.09	1.21	.07	.075	.940

The statistical tests show a significant difference for items 25 and 31. The statement, *I am being caring when: I am providing the patient with encouragement* was rated higher on the posttest for a significant difference of ($p < .05$) The statement, *I am being caring when I don't give the patient all the information he/she needs,* was rated lower with a significant difference of ($p < .05$). The changes in scores could relate to the students better understanding the importance of communication. No other significant differences between the items for the pretest and posttest groups were identified.

Table 12. Means, Standard Deviations, *t*-tests, and *p*-values for the CAPSTI Scale: Caring Advocacy.

	Pretest (63)		Posttest (61)			
Item	M	SD	M	SD	*t*-test	*p*
How well does each item describe a caring nurse?						
43. To be a caring nurse is to just ask someone how they are, and to look after and provide for them.	2.78	1.32	2.74	1.36	.166	.869
44. To be a caring nurse is to care for another person and help him/her.	4.52	.59	4.49	.53	.315	.753
45. To be a caring nurse is to make someone comfortable in their surroundings.	4.67	.56	4.66	.51	.112	.911
46. Caring nurses do not feel concern for the well-being of others.	1.21	.60	1.16	.45	.443	.656
47. To be a caring nurse is to help someone who is suffering from a disability and is unable to do things you can do.	4.43	.71	4.46	.78	-.226	.822
48. A committed nurse is one who is prepared to work extra time with no pay.	3.17	1.36	3.16	1.46	.042	.967
49. The human expression of compassion is a necessary component of caring in an environment which is technologically cold and impersonal.	4.16	1.05	4.23	.86	-.409	.683
50. A competent nurse is someone who has respect for themselves, the profession, and the patient.	4.67	.50	4.64	.63	.265	.791
51. A confident relationship between a nurse and a patient is one based on trust, truth, and respect.	4.78	.41	4.74	.48	.496	.621
52. A caring nurse is displaying conscience when he/she is morally aware of their relationship and the status of his/her actions on others.	4.62	.49	4.51	.69	1.026	.307
53. A committed nurse is one who balances personal desires and professional obligations to provide care to patients.	4.46	.82	4.44	.74	.126	.900

The following section consisted of 11 items describing caring qualities of nurses (43-53). The respondents were asked; *How well does each item describe a caring nurse?* To answer this question means, standard deviations, t-tests, and p values were calculated on all of the items. The results of these statistical tests reveal no significant differences between the pretest and posttest groups (Table 12).

The next section is comprised of the last subcategory for question one. The items in this section related to learning caring. It contained seven items (54-60) that were rated on the same five-point scale. The respondents were asked to rate their degree of agreement based on the following statement: *How caring is learned and taught?*

Table 13. Means, Standard Deviations, *t*-tests, and *p*-values for the CAPSTI Scale: Learning To Care.

	Pretest (63)		Posttest (61)			
Item	M	SD	M	SD	*t*-test	*p*
How caring is learned and taught?						
54. Caring is learned through instruction in counseling techniques.	2.56	1.29	2.69	1.20	-.592	.555
55. Caring is learned by modeling in the clinical setting.	3.33	1.34	3.57	1.16	-1.064	.289
56. Caring cannot be learned or taught.	2.84	1.19	3.13	1.20	-1.346	.181
57. To care for a patient is an obligation according to patient's needs, regardless of the nurses' experience or ability.	3.51	1.33	3.67	1.02	-.767	.444
58. Nurses learn about caring in nursing school.	3.78	1.15	3.59	1.17	.896	.372
59. Nurses learn about caring by observing other nurses work.	3.75	1.15	3.90	1.12	-.763	.447
60. Nurses learn about caring from personal experience.	4.59	.63	4.43	.84	1.199	.233

To answer this question means, standard deviations, *t*-tests, and *p* values were calculated on all items. The results of these statistical tests revealed no significant differences between the pretest and posttest groups (Table 13). These respondent's

answers to these items reinforce the important role of positive role models for nursing students in both the educational and clinical settings.

Research Question 5b: Was There a Difference in the Pretest and Posttest on the Perceptions of Nursing Students Regarding Technology as Caring?

To answer this question a mean, standard deviation, *t*-test, and a *p* value were calculated on one item from the CAPSTI Scale. Respondents were asked to rate the item based on, *What caring means to you as a student nurse.* The difference between the pretest and posttest results was not statistically significant.

Table 14. Means, Standard Deviations, *t*-tests, and *p*-values for the CAPSTI Scale: Technology as Caring.

	Pretest (63)		Posttest (61)			
Item	M	SD	M	SD	*t*-test	*p*
What caring means to you as a student nurse.						
13. Caring is a tool for technology.	2.97	1.20	3.16	1.22	-.896	.372

Research Question 5c: Was There a Difference in the Pretest and Posttest on the Perceptions of Nursing Students Regarding Technological Influences on Their Caring Practice?

To answer this question means, standard deviations, *t*-tests, and *p* values were calculated on14 items (31-44). Respondents were asked to rate their degree of agreement on a five-point scale; *How well does each item describe you and your work as a student nurse*? The major focus of this section was on the influence of technology on caring practice.

There was a significant difference ($p < .05$) between the pre and posttest results on item 36 (see Table 15). This item addressed nurses' frustration with technology when a patient's death is inevitable. The increase in the posttest mean could be related to the fact that student's have had more time in the clinical setting. Students often enter nursing

with the goal of saving lives; however, after actual clinical experience they begin to see the reality of human life. Technology may not be able to prevent death.

Table 15. Means, Standard Deviations, *t*-tests, and *p*-values for the CAPSTI Scale: Technological Influences on Caring Practice.

Item	Pretest (63) M	SD	Posttest (61) M	SD	*t*-test	*p*
How well does each item describe you and your work as a student nurse?						
31 I don't think there is any more spare time in nursing school even though we have an increase in technology.	4.44	.73	4.43	.90	.123	.902
32. High technology requires high-tech skills.	3.41	1.05	3.33	1.06	.446	.656
33. The increase in technology in nursing has increased the workload of nurses.	2.83	1.04	2.90	1.04	-.407	.685
34. The increase of technical tasks has downgraded the nursing profession.	2.30	1.07	2.56	1.04	-1.347	.180
35. The influx of technology has raised the profession of nursing.	3.63	.76	3.51	.96	.813	.418
36. Due to the application of technology, nurses often become frustrated when the inevitable death of a patient occurs.	2.46	.87	2.80	.83	-2.23	.027
37. Technology and the use of machines often interfere with providing adequate nursing care.	2.62	1.21	2.70	1.14	-.406	.686
38. Nurses often neglect patients because of the influx of machines.	2.57	1.13	2.80	1.07	-1.168	.245
39. I'm not sure about the benefits of technology to my practice.	2.29	1.23	2.46	1.08	-.827	.410
40. In general technology enhances patient care and well-being.	3.83	.89	3.75	.85	.456	.649
41. Technology has resulted in nurses becoming increasingly professionally uncertain.	2.40	.89	2.64	.89	-1.513	.133
42. Mastery of technology has helped nurses control their work environment.	3.60	.95	3.48	1.01	.722	.471
43. Technology is an activity which adds meaning to the work of nurses.	2.95	1.09	2.98	.99	-.166	.868
44. Mastery of technology is a useful tool in developing the professional status of nurses.	3.49	1.12	3.59	.99	-.516	.607

Research Question 5d: Was There a Difference in the Pretest and Posttest on the Technology Confidence Level of PDA use for Student Nurses?

This research question was divided into two sub-categories by this researcher. The first category specifically answers research question 4. The other category provided information regarding computer use in general and the specific confidence levels using the programs on the PDA.

PDA Confidence

To answer this question a mean, standard deviation, *t*-tests, and *p* value were calculated on one item from the Technology Confidence Survey (Hess & Heuer, 2003). The focus of this item was on PDA use in general. Respondents were asked to indicate their level of confidence on a four point Likert scale.

Nursing students were asked to indicate *How confident do you feel about using a personal digital assistant, in general*? The results of the statistical tests revealed no significant differences between the pretest and posttest groups (Table 16).

Table 16. Means, Standard Deviations, *t*-tests, and *p*-values for the Technology Confidence Survey: PDA Confidence.

	Pretest (64)		Posttest (60)			
Item	M	SD	M	SD	*t*-test	*p*
How confident do you feel about...?						
2. Using a personal digital assistant, in general.	2.89	.69	3.05	.83	-1.162	.248

Technology Confidence

The next category provided information regarding computer use in general and the specific confidence levels using the programs on the PDA (Table 17). Item 1 related to using a computer, in general. Items 3 – 16 provided information on general operations of PDAs and the specific resource programs on the PDA.

Table 17. Means, Standard Deviations, *t*-tests, and *p*-values for the Technology Confidence Survey: Technology Confidence Levels.

Item	Pretest (63) M	Pretest (63) SD	Posttest (61) M	Posttest (61) SD	*t*-test	*p*
How confident do you feel about...?						
1. Using a computer, in general.	3.77	.49	3.75	.47	.179	.858
3. Using the laboratory resource on your PDA.	2.83	.82	3.03	.86	-1.352	.179
4. Using the Nursing Procedure program on your PDA.	2.78	.93	3.02	.81	-1.492	.138
5. Using the RN Assessment program on your PDA.	2.73	.91	2.93	.91	-1.210	.229
6. Producing backup for your PDA.	1.97	1.11	2.08	1.16	-.559	.577
7. Keeping your PDA charged.	3.69	.61	3.65	.70	.315	.753
8. Changing the control preference on your PDA.	2.73	1.04	2.70	1.04	.183	.855
9. Infrared beaming of information between PDAs.	2.11	1.11	2.20	1.10	-.455	.650
10. Entering meeting notes into your PDA.	2.36	1.14	2.30	1.15	.287	.774
11. Word-processing documents in your PDA.	1.91	.93	1.97	1.05	-.337	.737
12. Using some other database in your PDA.	2.31	.95	2.22	1.12	.513	.609
13. Creating voice recordings with your PDA.	1.53	.85	1.57	.89	-.226	.821
14. Doing calculations with your PDA.	3.13	.93	3.37	.78	-1.558	.122
15. Using a medical dictionary in your PDA.	3.66	.57	3.58	.74	.616	.539
16 Using the RN Disease program on our PDA.	3.06	.90	3.22	.88	-.958	.340

Summary

Student's perceptions of caring were quite high in the pretest thus showing no increase to minimal increases on the posttest. However this could be expected considering nursing is a caring profession, which attracts people who already possess positive caring qualities. Although the student's perception of caring as a tool for technology had mean score in the middle range. This is an indication of a need for more education connecting technology and caring. It is important for nurses to identify the positive attributes of technology and caring.

Students perceived that technology has not given them more time, but they did relate that it has enhanced patient care and increased the status of nurses. Students

responded that they learn about caring by observing other nurses and from personal experience. This emphasizes the value of positive caring attributes in nursing instructors and preceptors.

Comparison results indicated that progression to the next semester in the nursing program had no significant effect on the student's perceptions on caring and their confidence level of PDA use. Although, comparison results did indicate a significant difference on one item related to the influences of technology. Chapter V discusses further implications of this study.

CHAPTER V

CONCLUSIONS, LIMITATIONS, IMPLICATIONS, AND RECOMMENDATIONS FOR FURTHER RESEARCH

The purpose of the study was to assess nursing student's perceptions of caring attributes, the impact of technology on caring, and PDA technology confidence levels. This study utilized a convenience sample of students in the nursing program at Minot State University (MSU). This chapter represents a discussion of conclusions, limitations of this study, implications for nursing, and recommendations for further research.

Conclusions

From the results for the first research question, what were the perceptions of nursing students on caring, one could conclude that the nursing students at MSU value caring as the central feature of nursing. This is congruent with the literature; caring remains the most essential and most direct expression of nursing (Boykin & Schoenhofer, 1990, 2001a; Brown, Holcomb, & Maloney, 2005; Finch, Schoenhofer, & Green, 2006; Gabbart, 2008; Swanson, 1991; Touhy & Boykin, 2008; Watson & Smith, 2002; Watson, 1985, 2005).

In the subcategory of caring communication, students rated "listening to patients," "creating a sense of trust," and "speaking up for the patient when it is perceived that something harmful will be done to the patient" with the highest mean scores. This is consistent with previous research findings. Kyle's (1995) literature review on caring

referred to findings by Larson where these studies found that "listens to the patient" rated as the most caring behavior. Consistent with this, a study by Watson, Deary, and Lea (1999) using the Caring Dimensions Inventory also rated "listening to a patient" as one of the highest items. In Khademian and Vizeshfar's (2008) study, students perceived a trusting relationship as one of the most caring behaviors.

In the present study the caring advocacy categories revealed that nursing students rated the components of trust, truth, and respect the highest. The second highest rating was for "making someone comfortable in their surroundings." A similar study by Wilkes and Wallis (1998) showed that student nurses in Australia rated the themes of compassion, communication, concern, and competence as the top themes of professional nurse caring.

Another issue studied was learning to care. The results from this category are of utmost importance to the profession of nursing. These findings support the importance of positive role models, as student nurses related that they learned about caring from personal experience, observing other nurses work, in nursing school, and by modeling in the clinical setting. Future nurses view the examples set by seasoned nurses. This places a high expectation on seasoned nurses to portray a kind and caring professional manner at all times not only for the provision of quality care but also for the preparation of student nurses.

For the second research question, what were the perceptions of nursing students regarding technology as caring, the present study showed that students were uncertain about their view of "caring as a tool for technology." The close to the middle value for this concept is an indication that students could benefit from more education on this

topic. The results for this question provide support for curricular changes, specifically for the application of Locsin's Model, Technological Competency as Caring in Nursing (2005). In an article on machine technology and caring, Locsin (1995) asserted that: "Through the harmonious coexistence of machine technology and caring technology the practice of nursing is transformed into an experience of caring" (p. 203). Locsin has several books on advancing technology and caring in nursing that could be utilized to strengthen the concept in a curriculum.

Another approach to help students incorporate caring technology into practice could be that when students are taught communication concepts, applications to technology need to be reinforced. For example, emphasizing the value of engaging with the client, utilizing eye contact when appropriate and not allowing the technology to interfere with interpersonal communication illustrate this point. These classroom approaches would lay the foundation for carryover into students' clinical practice.

For research question three, what were the perceptions of nursing students of technological influences on their caring practice, students did not think that technology had provided them with any more spare time, but they believed that it enhanced patient care. Overall the top mean scores ranged from 2.90 to 3.51, which indicated a degree of uncertainty. Again, by incorporating Locsin's Model, nursing education could possibly help the students to view technology in a more positive manner.

For research question four, what was the technology confidence level of PDA use for student nurses, students rated their confidence levels on PDA use in the pretest scores rather high, thus allowing little room for change on the posttest. This also was the case for computer use in general. The specific PDA features of changing the control

preference, entering meeting notes, using some other database, infrared beaming, producing backup, word-processing, and creating voice recordings on the PDA were rated low. The lower scores are an indication of the need for further instruction in these areas. However, technology is rapidly changing; PDAs are being replaced with other technology. As of the fall of 2009, MSU's Nursing Program no longer specifically requires PDAs since iPOD Touch devices are now recommended for the new nursing students as they enter the program. The iPOD Touch devices function basically the same as a PDA. The nursing resource programs are the same, although some of the specific functions vary slightly. They are similar to the iTouch phones and are relatively easy to use. Students embrace the technology quickly; however, the iPOD Touch device used by MSU is without the phone capabilities.

For research question five, what were the differences among student's perceptions of caring and their confidence in PDA technology from the pretest to posttest as they progressed in the nursing program? The results of the statistical tests could be affected by the ceiling effect phenomenon. That is the initial survey scores were relatively high leaving minimal room for significant increases.

Limitations of this Study

A convenience sample was used for this study; therefore, the results are not completely generalizable to other nursing schools or practice settings. Further, the sample size was relatively small.

A basic limitation of the present study was that the time between the pre and posttest was only four months. Had the time span been a year, there may have been an increase in the difference.

There are several other situations that may have impacted the results of this study. Students entering nursing education may have preconceived ideals of nursing and caring that could affect their views. In addition, the fact that the study measured students' self-reporting of behavior rather than their actual behavior may be a factor limiting the results. This may be so because some people view themselves somewhat differently from what their actual behavior reveals. Further, most people desire to be viewed favorable by others and may respond on surveys in accordance with what they believe the researcher wants to find. Thus, participants may portray themselves differently on paper than in reality and provide the socially desirable response.

Implications for Nursing

Technology has influenced healthcare, and there is a need for nursing to become committed to advancing along with the technology. These implications have an effect on the academic preparation of nurses and their clinical practice. Nursing programs have been encouraged by national nursing organizations to integrate technology into the nursing curriculum. The National League for Nursing specifically refers to this in their 2003, 2005 and 2008 Position Statements. Nursing educators need to become active participants in the development of student nurses who are competent with today's technology.

This study has provided MSU's Nursing Program with valuable information in regards to the use of PDAs. Nurses are most familiar with large reference textbooks. The use of handheld computers is a relatively new approach for nurses to retrieve medical information. When incorporating any new concept, there is a definite learning curve. There is room for improvement in the level of technology confidence at MSU, although

implementation of the devices is in the developmental stages; MSU's nursing program has only required them since 2007.

A primary goal of nursing programs is to produce nurses who are caring and competent in managing technology. Integrating technology into nursing curriculum prepares students for the technologically advancing world in which they will work (George & Davidson, 2005; McCannon & O'Neal, 2003). Information from this study supports the concept of incorporating technological skills juxtaposed with caring theory.

The mean scores for the item "caring as a tool for technology" were 2.97on the pretest and 3.16 on the posttest. There were no statistical differences between the pre and posttest scores; however, the scores fell in the mid range, indicating a need for more improvement and education on the concept. There is an opportunity for nursing faculty to work together to create an environment where technology and caring are blended. One method for enhancing this environment would be utilizing Locsin's concept of technological competency as a form of caring (Locsin 2001, 2005). In addition, curriculum changes could be made to incorporate the theory of Nursing as Caring (Boykin & Schoenhofer, 2001a) into MSU's theoretical constructs.

An opportunity exists for nursing faculty to create a course where the focus is on technology. The course should include caring theory and offer a variety of technology: Blackboard, iTouch, and the various resource programs. The course could be team-taught with nursing and information technology staff. Locsin's book would be an excellent choice as the text for the course.

Recommendations for Further Research

Implementation of PDAs or other hand held devices in undergraduate nursing programs is one approach to integrating technology in nursing. Continued research needs to be completed on these areas with the results applied directly to education and practice. Another study focusing on the iPOD Touch technology would also provide valuable information regarding the implementation of these devices.

This research study could be replicated with nursing students from the other nursing programs in the state. Other research studies could be performed on caring using one of the Caring Dimensions Inventory Scales developed by Watson, Deary, and Lea. Another area of interest is assessing student's caring learning environments using the Peer Group Caring Interaction and Organizational Climate for Caring Questionnaire (Hughes, 1993, 2001 cited in Watson, 2002).

In summary, this study achieved its purpose; student nurses provided their perceptions for caring attributes, the impact of technology on caring, and PDA confidence levels. One item in the category of Influences on Technology on Caring Practice identified significant differences between the pre and posttests groups. The item addressed nurse's frustration with technology when inevitable death of a patient occurs. For all of the other research questions, no significant differences between the pre and posttest groupings were identified.

In conclusion, although students scored high on caring it is an issue that continually needs to be addressed and improved upon. Throughout this study caring was referred to as the core of nursing. Our role as nursing faculty is extremely important for the development of nurses who model their behaviors based on our actions.

Therefore, it is our responsibility as faculty and as nurses to mentor and model professional caring values within the ever expanding and changing technological contexts.

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