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Senior Students' Experiences, Perspectives, and Attitudes of Technological Competencies in Nursing Education

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Walden University
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Abstract

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Competencies in Nursing Education

by

Patricia C. Bennett

MBA, Adelphi University, 2001

MS, Adelphi University, 1993

BSN, Syracuse University, 1974

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Health Services

Walden University

August 2017

Abstract

Technological standards appear to be needed in undergraduate nursing education, as existing research has yet to establish technological standards for undergraduate nursing students. The purpose of this qualitative study was to examine the lived experiences of senior nursing students with respect to their perceptions regarding exposure to and abilities gained in the areas of information management, information literacy, and computer literacy. The framework of the study was based on Bandura's theory of self-efficacy and the Dreyfus model of skills acquisition. Using a phenomenological approach, in-depth face-to-face interviews were used with a purposive sample to collect data about the technological competencies taught to 12 participants during their nursing education. The key research questions pertained to senior-level nursing students' perceptions regarding their educational exposure to technological skills, the level of competencies achieved, and technology's impact on patient care. A thematic analysis was done. The findings from this research study are that students' technological exposure appears to vary and that there is a need for uniform exposure during their nursing education. The results of this research revealed that most students were confident about computer literacy but needed to strengthen their knowledge related to information management and information literacy. Implications for social change is a better understanding of technological competencies offered, or still needing to be included, in undergraduate nursing syllabi. Further positive social change implications of the study for health services include the promotion of clear technological graduation standards for nursing graduates entering the health care workforce.

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Dedication

I would like to dedicate this dissertation to my late mother and father. It was my pleasure to be your daughter. It is because of both of you that I am able to achieve a doctoral degree. Thank you. To my siblings Barbara Muniz, Valencia Gordon, Roy Gordon, Steven Killings, Donna Smith, and Tracy Killings who preceded me in death. I miss you all and please know that you are always in my heart.

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Chapter 1: Introduction to the Study

With the adoption of the electronic health record (EHR) in health institutions,

integration of informatics competencies into the undergraduate nursing curriculum is

essential to support nurse graduates' technological skill proficiencies in their career. The

Institute of Medicine (IOM, 2011) has asserted that, for continuous quality improvement

and safety in patient care, nurses in training need to acquire informatics competencies.

Given that nursing of the 20th century made a paradigm shift to increasingly complex

clinical information management systems for patient care, in the 21st century, nursing

students need also to expand their skills to include technology.

A definition exists for the specialty of informatics. The American Medical

Informatics Association (AMIA, 2015) Nursing Informatics Working Group stated that

nursing informatics is "the science and practice (that) integrates nursing, its information,

and knowledge with management of information and communication technologies to

promote the health of people, families, and communities worldwide" (para. 1). Currently,

nurses use a variety of technological tools to improve the quality of patient care.

Just as nurses need to expand their skill set, nursing schools' curricula also need

updating. My search of the literature revealed that competencies, not standards, are

available in undergraduate education; therefore, undergraduate nursing education needs

to obtain a national definition for informatics and initiate setting national standards for

required technological competencies of the undergraduate nursing student.

Students enter nursing education with various levels of technological skills; some

become overwhelmed with what is required of them to succeed in their nursing

education. In a study regarding the attrition rate of nursing students, there seemed to be a relationship between the attrition rate and the technological demands of nursing education (Edwards & O'Connor, 2011). The authors (Edwards & O'Connor, 2011) found that students with minimal technological skills appeared besieged by the technological competencies required by nursing schools. The demand for various technological skills may affect students who lack the necessary skill set to remain in the nursing program.

On the other hand, another common theme reported by Bartholomew and Heart's (2011) study was that integration of informatics into the undergraduate nursing curriculum has not been consistent. This inconsistency of integration into the curriculum for informatics standards may affect nursing students, leading to students graduating with various levels of technological skills.

A clear and indisputable definition of nursing informatics is needed for the undergraduate nursing school curriculum. In a study concerning core competencies and perceptions of students and faculty, the results revealed that both students and faculty needed a clearer definition of informatics (Morris & Hancock, 2013). Clarification of what nursing informatics is in undergraduate nursing is evidently needed to establish standards concerning technology exposure for students.

As students have grown up in the technology era, it is assumed that the nursing student population of today enters nursing school feeling comfortable with technology. In a study examining nursing students' use and perceptions of technology, it was found that students felt proficient in computer literacy, felt comfortable searching online, and

expressed a positive attitude toward information technology (Folami & Adeoye, 2012). The authors (Folami & Adeoye, 2012) reported that nursing students' strongest competency appeared to be computer literacy. In another study, a positive relationship between attitude and self-efficacy was also noted in nursing students (Gonen, Dganit, Offir, & Lev-Ari, 2014). Although nursing students feel comfortable with technology, exposure to technology should be uniform and adequate for all.

Also impacting students' lack of uniform skills is the level of faculty technological skill. Some studies have found faculty to be a barrier to the facilitation of informatics competencies during nursing students' education (Edwards & O'Connor, 2011; Mahon, Nickitas, & Nokes, 2010). In addition to the need for student technological skill standards, there is a need for faculty technological skills to be standardized.

The age of the faculty and the era during which faculty worked as nurses may also be a hindrance to the advancement of technological skills for nursing students. The average age of faculty with the rank of professor, associate, or assistant professor who are prepared to the doctoral level is 51.5-60.5 years; for faculty with a master's degree, the age range is 51.4-61.6 years (Rosseter, 2015). Because a large percentage of faculty worked as staff nurses during the paper-chart era, they may need assistance with the use of technology. In an examination of faculty's perception of teaching documentation in the clinical setting, faculty affirmed their proficiency with paper and reported a deeper learning curve with documentation in the EHR (Mahon, Nickitas, & Nokes, 2010). It appears that faculty also need technological standards.

Faculty need to have support in place to educate them on the informatics competencies used by undergraduate nursing students. In a study to identify informatics competencies and learning needs, students reported that faculty represented a barrier and lacked technological skills (Edwards & O'Connor, 2011). Technology support for faculty is necessary if students are to have adequate technology exposure during their nursing education.

More nursing studies are needed for students and faculty on a national level regarding technological standards. This study was limited to the exploration of the perceptions of undergraduate nursing students concerning their exposure to and use of technology by their senior level of nursing education in the United States. This study may contribute to an updated definition of informatics standards that should be applied to undergraduate students, as well as to the national standardization of nursing informatics competencies that senior students should have acquired by their last year of nursing education.

In this study, I addressed the lack of clear standards for computer and information literacy skills as well and information management for senior nursing students. This chapter includes the background, purpose, research questions, theoretical framework, and nature of the study. I also provide definitions of terms, as well as discussion of the assumptions, scope, delimitations, limitations, and significance of the study. I conclude with a summary of the main points presented in this chapter and provide a transition to the literature review in Chapter 2.

Background

Although informatics is being integrated to the health care system, nursing education has not kept up with the technological changes that need to be taught to nursing students. The literature has touched on a few reasons for the delay of informatics in nursing education, such as lack of national technology competency standards, lack of consistent integration of informatics into the curriculum, the age of faculty as an obstacle to providing current technology instruction to students, and the varied backgrounds of students with respect to informatics competencies (Edwards & O'Connor, 2011; Gagne, Bisanar, Makowski, & Neuman, 2012; Goncalves, Wolff, Staggers, & Peres, 2012). Studies on competency standards appear to have focused on the professional nurse (Staggers, Gassert, & Curran, 2002). Technological standards appear absent in the literature for nursing students. Senior-level nursing instruction seems to be an appropriate starting point for an investigation of what kind of exposure nursing students have had to technological standards and informatics. Students at this level should have had maximum exposure to information management, computer literacy, and information literacy when compared to freshmen, sophomores, and juniors.

Paper charting as an instrument of communication is becoming obsolete. The EHR has become the medium for technological recording, storing, and communicating of patient charts (Gartee, 2007). As health institutions implement changes in the workplace, the challenge is for nurses to acquire the technological skill set that will provide them with the knowledge and ability to use minimal data sets within the EHR.

As health institutions become technologically engaged, undergraduate senior nursing students need to be prepared to make a smooth transition to the workplace. The American Association of Colleges of Nursing supports the preparation of undergraduate students and has reported that introductory nursing informatics should include the ability to use selected applications in a comfortable and knowledgeable manner (AACN, 2008). This change is expanding the skill set needed by undergraduate nursing students.

The emergence of the EHR has influenced the technological skill set needed for documentation. Gartee (2007, p. 63) reported that nurses use essential elements of minimal data sets, which include nursing care, patient demographics, and service elements. The emergence of the EHR has resulted in the evolution of new skills needed for use with nursing documentation and communication.

Currently, informatics is part of the infrastructure of evidence-based practice (EBP). Once known only as a specialty in graduate education, informatics has shifted to being incorporated into the accreditation process in higher education (AACN, 2008). This change has necessitated specification of technology standards for a broader group, which includes undergraduate nursing students.

As changes are made in nursing practice, undergraduate nursing students need new core competency requirement standards. Both EBP and informatics are acknowledged to be core requirements for health professionals (AACN, 2008). Because technology is becoming commonplace in health institutions, as well as EBP in nursing practice, there is a need for undergraduate students to have technological nursing competency standards.

Recent research on nursing informatics has focused on the skills required by nurses within the workplace. Staggers, Gassert, and Curran (2002) developed a tool that measures information management competencies of nurses at each level, from beginner to innovator nurse. Additionally, the Dreyfus model of skills acquisition in nursing has been developed to measure nurses' attainment of technological skills from novice to expert levels (Benner, 2001, p. 13; Goncalves et al., 2012). Still, consensus is lacking on standards for technological skills that undergraduate nursing students should acquire upon completion of their schooling. This study is intended to fill this gap.

Nursing education requires technological standards for undergraduates. At present, there is no consensus on what competency categories should be included in nursing informatics for undergraduate students (Gagne et al., 2012; Goncalves et al., 2012). Gagne et al. (2012) also reported about disagreements over the placement of informatics competencies in the curriculum. These and other reasons have exacerbated the lack of consistent technological-skills competencies possessed by senior nurse graduates.

With the shift to EHR and the call for EBP, the lack of standards for technological competency for students has consistently been cited as a gap in recent research studies. The need is evident for establishing a level of standards of skills related to computer and information literacy and information management for undergraduate nursing students that will make them advance beginners in informatics upon graduation. The development of these skills standards will assist senior nursing students in bringing a uniform skill set of informatics competencies to the workplace.

Therefore, there exists a need for research to close the gap regarding technological-competency standards so that senior nursing students can make a smooth transition to the workplace. In this study, I interviewed students regarding their perceptions of their lived experiences of exposure to technological competencies in nursing school. The interviews provided me a deeper understanding of the issues involved in standardizing the curriculum for nursing students.

<div align="center">**Problem Statement**</div>

Technological competencies, which include information management and information and computer literacy, have become a requirement for nursing care of patients in health institutions as society transitions into the technology age. Because of these changes, it is the responsibility of health institutions to update the skills of professional nurses. To assist in the change, Staggers, Gassert, and Curran (2002) have identified information management, as well as computer and information-literacy competencies. Additionally, they have identified various levels for each skill.

There is a need for a precise definition of technological standards that undergraduate nursing students should be taught nationwide. According to Cronenwett et al. (2007), the challenge is to prepare nursing students with the competencies needed to keep patients safe in the 21st century. Cronenwett et al. expressed concern that nursing schools were graduating students without the necessary competencies. Two of the skills that were appropriate for examination in this study are informatics and EBP, which are increasingly based on information management, information literacy, and computer literacy skills.

Currently, upon graduation from nursing school, students possess different skill competencies in the areas of information management and computer and information literacy. Jones and Donelle (2011) asserted that student education should include an orientation to the EHR. However, there is evidence that clinical nursing students have had different levels of exposure to the EHR (Bartholomew & Heart, 2011; Fetter, 2009). These discrepancies demonstrate the need for the establishment of standards.

Which technological competency standards should be integrated remains unclear. According to Gagne et al. (2012), there is a need to integrate informatics into the curriculum of nursing education, perhaps in addition to stand-alone courses. Further, Baille, Chadwick, Mann, and Brooke-Read (2012) suggested that the necessary preparation of students will translate into support of the implementation of EHR. As health institutions make the transition from paper to EHR, it is essential for nursing students to receive appropriate training and exposure to technology.

The technological changes in health care systems have resulted in added knowledge requirements for nursing students. In a study of the assessment of students' computer competencies, it was revealed that the EHR has led to added training needs for nurses and nursing students (Edwards & O'Connor, 2011). In another study, it was found that nursing students did not consider themselves proficient in applied computer skills (Choi & Martinis, 2013). Finally, Schutt and Hightower (2009) reported that information literacy strengthens students' ability to effect change with empirical evidence. A clear need exists for the establishment of national curriculum standards for nursing students in the areas of information management, information literacy, and computer literacy.

Based on the identified gap in empirical technological competencies, I sought to examine the lived experiences of senior nursing students regarding information management and their computer and information literacy. Moustakas (1994) asserted that the empirical phenomenological approach uses experiences to obtain comprehensive descriptions that provide analysis and the essence of the experiences (p. 13). Moreover, Moustakas pointed out that everyday activity consists of lived experiences (p. 38). My task in this study was to discover themes and patterns of students' technological competencies attained by the time they reach their senior level of nursing education.

Purpose of the Study

Although prior research presented significant findings regarding computerization in health care, a gap exists in that nursing students do not receive standardized training to ensure their technological competency by the senior year of their nursing education. Consequently, a problem exists for nursing students as they graduate with diverse skill levels in information management, information literacy, and computer literacy. The purpose of this qualitative phenomenological study was to explore the lived experiences of undergraduate senior nursing students pertaining to their abilities and exposure to information management information literacy and computer literacy while enrolled in nursing schools in the United States. With this study, I gained a deeper understanding of what kind of educational standards are required to ensure that graduating nursing students possess the technological knowledge and skills necessary to succeed in the workplace and serve the needs of their patients in modern health care institutions.

The phenomenological approach allowed the exploration of the lived experiences of nursing students in relation to their exposure to information management, information literacy, and computer literacy during their nursing education. According to Moustakas (1994), "Phenomenology is a method used to investigate human experiences and to derive knowledge from a state of pure consciousness" (p. 101). Face-to-face interviews allowed the participants in this study to provide rich, thick descriptions of their experiences with information management, information literacy, and computer literacy during their nursing education. The findings contributed to a better understanding of the technological standards students should have met in their senior year of nursing education.

The findings of this study add to the body of knowledge, represent progress toward closing a gap in the literature related to undergraduate nursing education, and further clarify the definition of standards needed for nursing students to graduate with the solid technological skills required by working nurses. With the results of this study, I aim to contribute needed recommendations for the specification of national standards to provide graduating nursing students with the technological skills required in modern health care.

Research Questions

The research questions for this phenomenological study were as follows:

Research Question 1: What are senior nursing students' lived experiences of information management, information literacy, and computer literacy during their nursing education?

Research Question 2: What skills regarding information management, information literacy, and computer literacy do senior nursing students have as a result of their lived experience in nursing education?

Research Question 3: What are senior nursing students' perceptions regarding their lived experiences as they relate to information management, information literacy, and computer literacy for workplace competency and safe patient care?

Conceptual Framework

Self-Efficacy

I based the conceptual framework of this research on Bandura's (1991) theory of self-efficacy, which guided the study. Bandura (1997, p. 3) stated that self-efficacy is the perceived capability of an individual to perform a particular task. The need to acquire knowledge and skills may depend on the individual student's perception of his or her ability to complete a task. Based on Bandura's framework, nursing students' ability to see themselves as successful in technological information management, information literacy, and computer literacy depend largely upon their perception of whether they have acquired adequate skills to complete the tasks.

A focus of this research was to examine senior nursing students' perception of their performance regarding technological skill sets in nursing education. Bandura (1991, p. 160) maintained that self-efficacy contributes to an individual's level of motivation and achievement. This notion could sustain nursing students during their education as they are motivated by their accomplishments. Moustakas (1994, p. 52) looked at perceptions as primary sources that should not be questioned. In using a

phenomenological approach to the lived experiences of these students, I found that students' perceptions of their abilities provided data as close to the authentic experience of these senior nursing students as it is possible to get for informatics competencies. How the theory of self-efficacy relates to the research questions is discussed in greater detail in Chapter 2.

The Dreyfus Model of Skills Acquisition

In this study, I used the Dreyfus (2004) model of skills acquisition to demonstrate two of the five stages of skills for nursing students: novice and advanced beginner. The Dreyfus model relies on exposure to experiences for the development of ability (Benner & Tanner, 2004, p. 21; Dreyfus, 2004). The stages of skill acquisition reflect changes in moving from external reliance on others to internal reliance on self.

As students progress through their nursing program, they may go back and forth between being novices and advanced beginners as they learn new skills in information management, information literacy, and computer literacy. In one study of undergraduate nursing students, it was reported that the students had limited knowledge regarding the EHR and that they considered their technological skills to be at the novice level (Jones & Donelle, 2011). As the EHR involves a new skill, this finding is expected.

Nursing students should have to undergo assessment of their technological skills, first upon entering the nursing program and then again at graduation time. Bandura (1991) indicated that, with each achievement, the individual regresses to a new beginner level. By senior year, minimally, nursing students should be advanced beginners in computer literacy, information literacy, and information management.

An assessment instrument is needed for evaluation of nursing students' skills at the beginning and the end of their education. Benner's (2004) adaptation of the Dreyfus model provides an assessment instrument for students' skills acquisition. At the novice level, the nursing student may still be able to rely on external help, particularly concerning the study of information management. More details on how the conceptual framework relates to the research questions are provided in Chapter 2.

Nature of the Study

In this study, I used a qualitative inquiry and the phenomenological approach. According to Creswell (2007), the qualitative method allowed for exploration of issues that concern the researcher. Additionally, the phenomenological approach provided a deeper understanding and support to the study (Creswell, 2007, p. 61). Moustakas (1994, p. 125) asserted that researchers use the phenomenological approach to examine how different individuals can provide a range of understandings and meanings in relation to similar life events that they have experienced. The selection of senior-year nursing students was appropriate for this study because, at the senior level of nursing education, a student should have had the maximum exposure to information literacy, computer literacy, and information management, thus making senior nursing students appropriate participants in this study. Through the phenomenological approach, the lived experiences of undergraduate nursing students at the senior level of their nursing education provided rich data on participants' perceptions and level of technological competency.

I used a purposive sampling for this study. Purposive sampling provides information-rich participants to inform research (Creswell, 2007). Purposive sampling

permitted me to gather a small, select group of senior nursing students who were

attending a college in the northeastern part of the United States. This method enabled me

to interview participants who were representative of the population of interest and had

rich background information.

I interviewed 12 senior-level nursing students. I recruited students by e-mailing

flyers to students in the classrooms of a college within the northeastern region of the

United States. The flyers presented an introduction to the study, its purpose, and how the

data would be used to improve the education of future nurses. I indicated specific dates

on which potential participants could volunteer to take part in this study.

I conducted the data collection effort. The types of data collection used in this

research were interviewing, observation, documentation analysis, and audio recording, as

described by Creswell (2007). The purpose of interviewing in research is to explore the

views, experiences, motivations, and beliefs of the participants on the issues under study

(e.g., their previous training on computer use).

I used an interview protocol as I recorded the interviews with the participants. A

predesigned form is suggested for use during interviews, along with recording (Creswell,

2007). In the study, I used an interview protocol for semistructured interviews, which

featured open-ended questions. I also made use of audio recordings for each interview

with the participants' written permission.

A schedule of times for interviewing was given to participants for their initial

interview. Dukes (1984, p. 200) suggested that researchers using a phenomenological

approach conduct extensive interviews with participants to capture phrases illustrative of

their experience. The initial face-to-face interviews lasted between 45 and 60 minutes each, during which I examined the perceptions of the senior nursing students.

The students were informed at the end of the initial interview that a 15-minute follow-up interview would be done to give them the opportunity to review and confirm the accuracy of the interview transcript (member checking) and possibly offer clarification. The goal of the interviews was to capture detailed descriptions of the students' experiences. As the researcher, I found interviews to be more beneficial than questionnaires because I could obtain clarification and expand on the information by using follow-up questions if needed.

In this qualitative study, I examined the data to discover themes and patterns. Additionally, I used NVivo version 11 software for analysis and data storage. According to Creswell (2007, p. 176), qualitative research is an interpretive inquiry in which both researcher and participants make interpretations of the data. After transcription of the audio recording, I emailed the transcript to the participants for clarification and confirmation of accuracy. As a result of these interpretations, various themes emerged regarding nursing students' perceptions of exposure to technological skills and electronic data management regarding patient care and the level of their competencies.

In this study, I conducted personal interviews. Data collection also included observation, audio recordings, and field notes taken after the interviews, which occurred in the setting of an undergraduate nursing program. Data analysis was done using NVivo version 11. NVivo is a qualitative data analysis software package used to manage data received from focus groups and individual interviews, as well as for audiovisuals (Bergin,

2011). A thematic analysis was conducted to look for patterns and themes in the completed individual interviews. The collected data will be stored in a locked file cabinet for 5 years.

Chapter 2 contains further discussion of the phenomenological approach. Chapter 3 provides details concerning data collection and data analysis. Chapter 4 presents the results of the study.

Definition of Terms

The following terms are defined for the purpose of the study:

Accreditation Commission for Education in Nursing (ACEN, formerly known as the National League for Nursing Accrediting Commission [NLNAC]): Supports the interests of nursing education, nursing practice, and the public by the functions of accreditation (ACEN, 2013).

Advanced beginner nurse stage: The individual has theoretical knowledge and looks for feedback from others regarding his or her performance (Benner, 2001).

American Association of Colleges of Nursing (AACN): Responsible for accreditation of nursing schools (AACN, 2008).

Commission on Collegiate Nursing Education (CCNE): A nongovernmental agency that conducts accreditation of postsecondary institutions and professional groups (CCNE, 2013).

Computer skills and computer literacy: The basic functions used by individuals with information technology (Staggers et al., 2002).

Electronic health record (EHR): The primary electronic source for recording patient information. It replaces the paper chart used to record patient information (Gartee, 2007).

Dual degree: According to the college catalog, transfers student have a baccalaureate degree from an accredited college

Epoche: The process of bracketing, in which the investigator sets aside his or her experiences and personal bias (Moustakas, 1994).

Evidence-based practice (EBP): The best research paired with clinical expertise and patient values for optimum care (AACN, 2008).

Freshman Studies (FST): According to the college catalog, FST addresses the fundamentals of college life. One of the topics included in the course is library use. The course is not required for transfer students with 30 or more credits upon admission

Generic nursing students: According to the college catalog, generic students have taken secondary school biology and chemistry in recent years.

Horizonalizing: The clustering of data into themes (Moustakas, 1994, p. 118).

Informatics: Helps in managing care through documentation by using computer-literacy skills to retrieve information that relates to patient care management (Sherwood & Barnsteiner, 2012).

Informatics competencies: Include computer and informatics skills and knowledge, which, when human information is added, are transformed into information management (Staggers et al., 2002).

Information literacy: The ability to recognize when information is needed. Involves locating, evaluating, and using the information effectively. Additionally, information literacy is interwoven with and supported by information technology (American Library Association, 2015).

Information management: Documenting patient care and nursing practice online, accessing information, using data and information, and coordinating information flow electronically (Stephens-Lee, Lu, & Wilson, 2013).

Information technology: Describes both hardware and software used to create, store, exchange, and use information in its various forms (Nkosi, Asah, & Pillay, 2011).

Lived experiences: Describes exposure to the issue of concern (Moustakas, 1994).

Novice nurse stage: The individual has not had any clinical experience. The novice nurse/student relies on rules, books, and faculty direction to safely navigate his or her clinical experience (Benner, 2001).

Nursing informatics: "The science and practice (that) integrates nursing, its information, and knowledge with the management of information and communication technologies to promote the health of people, families, and communities worldwide" (American Medical Informatics Association [AMIA] Nursing Informatics Working Group, 2015, p. 1).

Phenomenology: Involves making sense of a phenomenon by people who have lived through the experience. The logic of the human experience is an inherent structural property of the experience (Dukes, 1984).

Quality and Safety Education for Nurses (QSEN) project: Using the Institute of Medicine quality and safety competencies for nursing and proposed targets for prelicensure program, the QSEN objective is to prepare future nurses with knowledge, skills, and attitudes related to patient-centered care, teamwork and collaboration, evidence-based practice, quality improvement, and informatics (Sherwood & Barnsteiner, 2012).

Self-efficacy: "The belief in one's ability to organize and execute the course of action required to manage prospective situations" (Bandura, 1995, p. 2).

Senior nursing student: A student in the senior year of nursing education in an accredited 4-year school with a nursing program in the northeastern region of the United States.

Technology Informatics Guiding Education Reform (TIGER): The TIGER initiative brings those in the field of nursing together to develop a shared vision of health information technology. The initiative's focus is improving patient care, education, and nursing practice (TIGER, 2009).

Transfer nursing: According to the college catalog, are students admitted to the nursing program with acceptable academic standing from their previous college.

Assumptions

For this study, I assumed that the participants shared their actual experiences and had exposure to the phenomenon under study. Further, I assumed that the participants took part without reservation and noted that they appeared to answer interview questions honestly. Finally, participants agreed to audio recordings and publication of the data.

Scope and Delimitation

One of the challenges of studying this issue is that both novice-level and advanced-beginner-level students can be found among senior nursing students. At each stage, a student may possess various informatics competencies. The focus of this study was understanding how senior nursing students perceive their exposure to informatics. The nursing program sampled was from one school that granted a baccalaureate degree and gave Institutional Review Board (IRB) approval in a timely fashion.

The scope of this study included data collection at a baccalaureate college of nursing in the northeastern region of the United States. I chose this baccalaureate program and requested access to senior-level nursing students for face-to-face interviews with open-ended questions. I also sought the participants' permission to make audio recordings of the interviews. The results obtained with a purposive sample pertain only to individuals with similar characteristics and may not apply to freshmen, sophomores, or junior nursing students or professional nurses. Generalizations to other populations or other areas should be made with caution. The purpose of this study was to explore the perceptions of senior nursing students regarding their exposure to informatics during their undergraduate studies. To achieve this purpose, I used qualitative methods and a phenomenological approach. Participants needed to be students in their senior year of nursing education.

Limitations

The study was limited to a purposive sample of senior nursing students. In agreement with Moustakas (1994), the essential criteria for participants were that they

needed to have experienced the phenomenon of interest and needed to be willing to participate in an in-depth meeting as well as a follow-up meeting. Additionally, by using a phenomenological approach, I focused the research on achieving a deeper understanding of the issues, not on finding causal relationships (Moustakas, 1994, p. 105). Because of the characteristics of the participants as a homogenous group, one limitation was that the sample was not representative of a larger population. Purposive sampling could thus have been a weakness of this study.

A further limitation was subjectivity, in that the results relied on my interpretation as the researcher. This may have increased the potential for bias, in that researchers bring their values and insights to studies. Creswell (2007, p. 210) recommended as a reasonable measure for reliability to tape record sessions, use blind coding with staff, and use a computer program to assist with recording and analyzing data. In this study, I addressed reliability through the use of an audio device and a computer program to assist with analyzing the data. I also collaborated with participants and conducted member checking to increase reliability in interpreting and reporting the data. Reliability concerns may also arise during the data collection phase due to inconsistency in questions presented to the participants. Therefore, an interview protocol was used to maintain consistency. A further limitation is that, in a qualitative study, replication of the findings may be difficult to achieve. I attempted to minimize inconsistencies in questioning by using an interview protocol, and I facilitated replicability of the study by keeping detailed notes.

Significance of the Study

As the nursing profession has become increasingly technology oriented and inclined to use EBP, nursing education needs to include established standards of information management, information literacy, and computer literacy for graduation. The enactment of the American Recovery and Reinvestment Act, promoting the adoption of the EHR, has led to the need for changes in nursing education (Blumenthal, 2009). The EHR is steadily becoming routine in health care institutions, and students need adequate technological preparation with uniform skill development during their nursing education.

This study is significant because it allowed nursing students to participate in a discussion of the needed definition of informatics education in undergraduate nursing programs and to provide evidence of standards achieved in information management, information literacy, and computer literacy by graduation. The EHR is a tool to convert patient documentation into communication (Fields, 2015). Senior nursing students need to be skilled in using computers to gather health information from the EHR and in managing information.

The consideration of technological competencies as a requirement for nursing studies is urgently needed at this time of increased computer use in clinical work. Spector (2007) reported that graduates experienced improved job performance, increased patient safety, and increased job satisfaction when there was a focus on core competencies. If nursing education places greater emphasis on standardized instruction in the core competencies of informatics (i.e., information management, information literacy, and computer literacy) as requirements for graduation, students will be able to achieve

uniform competencies and contribute to positive social change through enhancement of the nursing profession. Positive social change resulting from the findings of this study may include improvements to nursing education through the establishment of defined standards for technological skills that senior nursing students should possess upon graduation.

Summary and Overview of the Study

A purpose of the educational setting is to instill in students a sense of the importance of the core competency of informatics. Evidence of national standards for informatics competencies appears to be needed to assist graduating nurses in making a smooth transition to the workplace. The changes occurring in health organizations pertaining to communication and documentation of patient information require a new definition and a standardization of informatics requirements that senior nursing students must possess upon graduation.

In this chapter, I have discussed the background of the problem, senior nursing students' need for standardized technological skills, and evidence that national standards of informatics education are guiding students' education. Informatics initially focused on nurses returning to graduate school for certification in this new specialty; however, the AACN (2008, p. 17) broadened the definition of nursing informatics to include undergraduate nursing students as well. The AACN stated that the definition of nursing informatics in nursing education should include information management, computer literacy, and information literacy. In describing the nature of the study, I explained that significant technological changes have been taking place in health institutions and

suggested that a phenomenological approach employing qualitative methods is needed to gain a better understanding of undergraduates' technological requirements. I presented the research questions guiding the study and discussed the conceptual framework based on Bandura's (1995, 1997) theory of self-efficacy and the Dreyfus (2004) model of skills acquisition. I also discussed assumptions, limitations, delimitations, and the scope of the study and its importance for positive social change.

In Chapter 2, I review the professional and peer-reviewed literature on nursing informatics, nursing curricula, and undergraduate student and faculty perceptions. In Chapter 3, I present the research methods, including the research design and rationale; the role of the researcher; descriptions of setting, sample, and sample selection; and data collection and data analysis procedures. Chapter 4 contains the results, and in Chapter 5, I draw conclusions based on the findings and offer recommendations for practical application and further research on this topic.

Chapter 2: Literature Review

Introduction

Studies of technological competencies in undergraduate nursing education undertaken between 2000 and 2012 echoed themes similar to those heard today. Gagne et al. (2012) reported a lack of consensus regarding the definition of informatics and computer competency requirements in nursing education. The authors also reported on the disagreement among stakeholders as to when informatics should be taught in nursing programs. Likewise, Goncalves et al. (2012) emphasized the need for faculty to integrate informatics into the curriculum. These issues are still awaiting resolution.

A review of the literature clearly revealed the growing importance of informatics in the health field and a definite concern about the lack of adequate preparation of nursing students in its use. Hebda and Calderone (2010) posited that nursing students should have exposure to technological skills. In the current study, I sought to highlight the issue of student preparation and contribute to positive social change by promoting a clearer definition of standardized requirements for informatics competencies for graduating nursing students.

Although nursing students' technological skills should be uniform, and students should have standardized exposure during their nursing education in the United States, the issue of where to place informatics within the curriculum remains a concern. However, evidence has shown that the use of technology has improved patient care (Darvish, Bahramnezhad, Keyhanian, & Navidhamidi, 2014), thereby supporting further efforts to gain data on student exposure to technology. Thus, the aim of this study was to

contribute to the knowledge base and offer recommendations based on the lived experiences of senior nursing students with respect to their current technological educational experience and their perceived needs.

In the summary of the literature review, I focus on research concerning the technological shift that is occurring in health care, which needs to be reflected in a similar shift in the educational preparation of future nurses. A focus of the literature review is the identification of issues that concern the researcher (Randolph, 2009). In my review of the literature, I aimed at discerning what information gaps exist today with respect to standardization of informatics skills taught in nursing schools and to provide useful recommendations to remedy the situation.

Standardized technological competencies for nursing students appear to be needed as health institutions increasingly implement the use of technological devices for patient care. National nursing organizations are supportive of technology in education and are leading the initiative for the integration of technology into the curriculum (ACEN, formerly known as the National League for Nursing Accrediting Commission [NLNAC], 2013, p. 3; Commission on Collegiate Nursing Education [CCNE], 2013, p. 10; National League for Nursing [NLN], 2015, p. 4). The ACEN, the CCNE, and the NLN are supporting the integration of technology into the curriculum to assist and evaluate learning outcomes for students. The thrust is to keep nursing students' technological skills up to date and suitable for use in the workplace.

Supplementing the push for nursing education to revolutionize and to standardize students' technological skill sets within undergraduate programs are two principal

agencies: the Quality and Safety Education for Nurses (QSEN) project and the Technology Informatics Guiding Education Reform (TIGER) initiative. These organizations emerged as a result of transitions being made in health institutions concerning "science and technology, patient activism, market-driven financing of health care, and in settings where these forces come together and where nurses now practice" (Sherwood & Barnsteiner, 2012, p. xi). These organizations are also instrumental in assisting with the placement of informatics within the curricula of nursing education.

In the following sections, I explain the literature search strategies used to find studies that provided evidence of the need for this study. According to Randolph (2009), one reason for a review of the literature is that the results examine research outcomes of the phenomena under investigation. I also engage in a more detailed explanation of the conceptual and theoretical underpinnings of this study. Last, I provide a review of the literature and conclude with a summary and transition to Chapter 3.

Literature Search Strategy

The library databases and search engines used in the search for peer-reviewed journals were CINAHLPlus, Medline, PubMed MeSH, Ovid Google Scholar, Thoreau, PsychINFO, and Educational Resources Information Center (ERIC). To identify germane relationships in nursing education, I used Academic Search Premier ProQuest Health and ERIC databases. Key terms used were *nursing education, faculty,* and *curriculum.* For statistical data and trends in professional nursing, I searched the database of the Bureau of Labor Statistics (BLS.gov).

Key search terms and combinations thereof were *electronic health records, informatics, informatics competencies, technological competency, computer literacy, health information technology, information communication technology, informational literacy, nursing informatics, health informatics, nursing education, perception and attitudes of faculty and nursing students,* and *baccalaureate nursing curriculum, undergraduate nursing curriculum,* as well as *informatics competencie*s.

I used purposive sampling of articles for this study. The reason for using a purposive sampling strategy with articles was that they would be pivotal and central to the phenomenon under study (Randolph, 2009). In addition to articles found in the aforementioned databases with the specified search terms, I checked for articles listed in the references sections of studies. In the literature search, all materials retrieved were written in English, and the majority of studies had been published during the most recent 5-year period.

Theoretical Foundation

Social Cognitive Theory of Self-Efficacy

Bandura's (1995) social cognitive theory of self-efficacy served as the theoretical foundation for this study. Bandura stated that *self-efficacy* is "the belief in one's ability to organize and execute the course of action required to manage prospective situations" (p. 2). Under this theory, ability is measured by assessment of the person's positive or negative belief regarding his or her ability (Bandura, 1995). When a person has a positive expectancy of his or her ability, this expectation results in a successful performance. A person with high self-efficacy is more successful than a person with low self-efficacy.

As shown in Figure 1, the positive correlation between self-efficacy and performance prompts an increase in self-efficacy and vice versa. In relating self-efficacy to nursing students' technological competency and performance, a positive correlation is noted. As a student's belief in his or her ability increases, so does the student's performance year after year. Major constructs that enhance self-efficacy are mastering experience, vicarious experiences, social persuasion, and physiological responses.
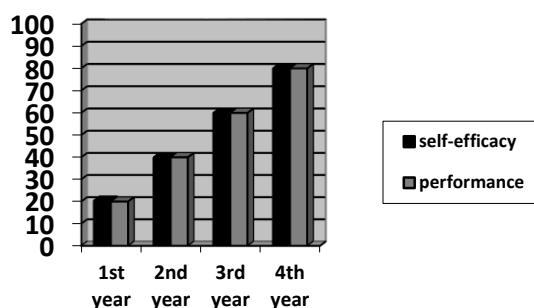
Figure 1. The relationship between self-efficacy and performance in nursing students.

Mastering experiences. This construct describes the development of tools for creating and executing an appropriate course of action. It requires direct experience in overcoming obstacles (Bandura, 1995, p. 3). In mastering experience, a person needs to be convinced that he or she can succeed. Individuals who have quick successes generally do not feel that they have mastered the experience.

Vicarious experiences. This construct describes how seeing people who are similar to oneself succeed has a positive influence on one's own performance (Bandura, 1995, p. 3). For this effect to occur, the person must believe that he or she is comparable to the person succeeding.

Social persuasion. This construct describes how an individual may be encouraged verbally to overcome any qualms. The focus here is on giving one's best effort (Bandura, 1995, p. 4). Verbal reinforcement provides an environment for positive personal efficacy.

Physiological and emotional responses. This construct describes how people improve their efficacy beliefs through a reduction of stress and negative emotions (Bandura, 1995, p. 5). When there is a reduction of negative physiological and emotional propensities, a state of positive self-efficacy can emerge.

The performance of individuals is raised by the "can do" lens of self-efficacy. Bandura (1995) reported that the mastery of experiences creates an active state of efficacy. He also saw in success a strong sense of personal efficacy and believed that vicarious experiences and social persuasion can provide effective tools to build and create efficacy. The can-do value is useful in enabling persons to meet the task at hand.

The self-efficacy framework provided insight into students' beliefs that they could successfully achieve performance with the proper preparation. In a study establishing a positive relationship between performance and self-efficacy, a positive experience with coaching during EHR simulations assisted nursing students in making a successful transition to the workplace (Bembridge, Levett-Jones, & Jeong, 2010). The positive relationship also provided the new nurse graduates with a strong sense of self-efficacy. The theory of self-efficacy relates to the research questions posed for this study in that undergraduate senior nursing students have been shown in the past to perceive that their

abilities and technological competencies will transfer readily and successfully to the workplace.

Conceptual Foundation

The Dreyfus Model of Skills Acquisition

In this study, I used Dreyfus's model of skills acquisition, which is a developmental model based on five stages of situations and performance (Benner, 2004; Dreyfus, 1992, 2004). The individual progresses through the first three stages of experience described by the model through reliance on others. In the final two stages, the individual takes ownership of his or her performance (Dreyfus, 2004). Individuals should progress through the five stages by increasing their skills and performance and relying progressively less on the help of others.

Benner (2004) adapted the conceptual framework of the Dreyfus model in her study of nurses' education because she found the five stages of skills acquisition to be a useful description of the learning stages of critical-care nurses. According to Dreyfus and Dreyfus (1986, p. 19), skills acquisition involves passing through five stages, each with a different focus on the task at hand and the decision-making process involved. In their progression through the stages, individuals acquire the necessary skills to perform the task. As individuals move through the five stages, they go from receiving external input from others to relying on internal input from self. The five stages are described in the following sections.

Novice. At the novice stage, individuals do not have the experience to base their approach or understanding of the situation on their own insights. Decision making is based on externally provided rules (Dreyfus, 2004).

Advanced beginner. An individual at the advanced beginner stage has experience and relies on rules (external) and experience (internal) for decision making (Dreyfus, 2004).

Competent. Individuals at the competent stage base their decision making on experience, which determines the rules they follow (Dreyfus, 2004). The most distinctive difference in skills acquisition is seen between the competent and the proficient individual (Benner, 2004). The proficient person makes decisions by relying much less on external input and much more on his or her own knowledge and experience.

Proficient. The proficient individual replaces rules with intuitive behavior in decision making (Dreyfus, 2004).

Expert. The expert individual is knowledgeable about the task requirements (Dreyfus, 2004).

Using the Dreyfus model, Benner (2004, p. 193) described professional nurses at different levels of skills acquisition. However, Benner's description of the advanced beginner is equivalent to the "nursing student in their final year" (p. 191). This individual (or advanced beginner) still sees only pieces of the puzzle, not the complete picture (Benner & Tanner, 2009). Following the Dreyfus model, this individual has had clinical experience but is reliant on external support from instructors or textbooks for decision making.

Competency in information management covers many new technological devices that are increasingly used in health institutions, such as clinical-decision support systems (CDSS). The CDSS tool can assist in decision making in patient care and is noted to have the highest rate of use by novice and advance beginner nurses (Courtney, Alexander, & Demiris, 2008). The CDSS can help new nurse graduates, who may be novices or advanced beginners and still reliant on external input for their decision making; thus, they would be receptive to the CDSS. Additionally, information management tools such as EHR and CDSS are helpful and essential for quality and safety as they deal with patient care and the communication of the care.

The characteristics of the advanced beginner can be based on experience and appear to have universal application for skills acquisition. According to Benner (2004), the advanced-beginner nurse has had exposure to clinical experience. Additionally, Gentile (2012) reported that the advanced-beginner critical-care nurse's focus is on the patient, on her- or himself, and on the preceptor for reassurance. Although this study was done on critical-care nurses, similar characteristics can be seen in advanced-beginner senior nursing students.

Literature Review Related to Key Concepts

The organization of the literature review follows a conceptual and historical format. Randolph (2009) stated that both conceptual and historical formats are commonly seen in the organization of a literature review. The historical overview and development present the progression of the problem (Randolph, 2009). To fulfill the historical review, the chronology of the literature denotes the progression of research. In addition, the

conceptual review examines themes in the literature (Randolph, 2009). Using both organizational formats, I provide coverage of the progression and of emerging themes seen in informatics for nursing education. The literature review contains prominent research themes such as technological competency requirements for undergraduate nursing students; the role of informatics in nursing education; student attitudes, perspectives, and experiences in nursing education; information management; and students' transition to the workplace.

Technological Competencies of Undergraduate Nursing Students

Although U.S. health institutions are becoming increasingly technologically dependent, nursing curricula still do not have technological competency standards in place for students. A competency assessment can ensure that individuals can perform essential skills for patient care (McConnell, 2001). Nursing students need uniform technological competency standards that will assist them in making a smooth transition from educational programs to health institutions to provide patient care.

The ultimate goal of nursing education is to provide nursing students with the skills needed to make a smooth transition to the workplace. Feng and Tsai (2012) recommended that further studies be undertaken on the topic of a smooth transition of graduate nurses from education to the workplace. In support of the smooth transition, this study contributes data regarding technological standards needed by senior nursing students.

In order to assist senior nursing students in making a smooth transition to the workplace, more evidence of informatics is needed. In a study regarding informatics and

anxiety, it was found that the extent of an individual's computer experience can influence his or her computer anxiety (Akhu-Zaheya, Khater, Nasar, & Khraisat, 2011). Their study found that 1st- and 2-year nursing students had higher levels of computer anxiety than 3rd- and 4th-year students. Students' anxiety level appeared to decrease with computer usage.

The initiation of studies to standardize informatics-competency requirements in the curriculum should logically begin with an assessment of current graduating seniors' level of technological competency and whether these competencies are consistent among all graduating nurses, followed by an assessment of how these competencies contribute to a smooth transition from school to the workplace. Such assessments should contribute to a higher quality of patient care.

The importance of safety and quality in patient care has resulted in the development of EBP and nursing informatics becoming increasingly useful and connected as the source of patient information resides online. According to Sherwood and Barnsteiner (2012, p. 14), one of the goals of the QSEN project is to develop and use evidence-based standards and interventions. Also, Melnyk, Mazurek, Fineout-Overholt, Gallagher-Ford, and Kaplan (2012) asserted that nurses see the expedience and are open to embracing EBP. Bringing EBP and informatics together is a study of students that compared the information-seeking behavior of student nurses and registered nurses and found that students were much more likely to utilize electronic sources in preference to print (Wahoush & Banfield, 2014). The study supported the students' needs for computer literacy to help them with doing literature searches and peruse electronic databases in

order to boost the use of EBP. The students needed to be able to retrieve data, which relates to technological competency, also called information literacy.

Nurse educators should integrate informatics skills into the curriculum, to assist students in recognizing the importance of managing quality improvement in data transfer by using an EBP. The AACN (2008, p. 27) recognized that baccalaureate education should provide an understanding of how evidence is developed because evidence is basic research incorporated into EBP for better patient care. As the health care system increasingly shifts toward the use of technology in patient care, nursing education must keep abreast of these changes by providing students with the requisite technological competencies so they can smoothly transition from school to the workplace.

Frequently used competencies by undergraduate nursing students are computer literacy and information literacy. The TIGER initiative asserted Information literacy and computer literacy are considered to be the foundation of informatics and that information literacy builds on computer literacy (Hebda & Calderone, 2010). On the other hand, the QSEN project does not include computer literacy as a competency (Sherwood & Barnsteiner, 2012, p 174). The project declared information literacy as essential to informatics and EBP. Staggers et al. (2002) mentioned computer literacy for the beginner level as a tool for nurses. The authors declared that computer skills are a component of information management (Staggers et al., 2002). As undergraduate programs commonly use these competencies, senior nursing students should have minimally exposure to computer and information literacy as standardized skills required for graduation.

With the introduction of EHR in the health care system, information management has emerged as an important core competency in nursing practice and for undergraduate nursing students. The TIGER (2009) initiative listed the EHR as a competency for information management. Although nursing education has not agreed on the technological standard, they appear to understand the importance of exposure for nursing students. In a demonstration of the usefulness of information management in undergraduate nursing education, a study of junior-year nursing students expounded the advantages of using case studies to gain a better understanding of the EHR. Also, Johnson and Bushey (2011) found that nursing students thought that they had increased their abilities of critical thinking and problem solving through their exposures to the academic EHR. As several studies have demonstrated the positive effect of EHR exposure during nursing education on the students' abilities, nurse educators should include information management such as the EHR uniformly into the curriculum. Integration of information management, computer literacy, and information literacy into the curriculum would ensure that senior nursing students gain exposure to skills in these areas upon graduation.

The current evolution of technology in the health care sector needs to be consistently reflected in undergraduate nursing programs. Nonetheless, the United States has been found lagging behind in technological standards for undergraduate nursing students (Edwards & O'Connor, 2011; Staggers et al., 2002). These studies support the need for revisions within the undergraduate nursing curriculum.

Staggers et al. (2002) declared that with the changes happening within health institutions, both the beginning and experienced nurses need their competencies updated and validated. Edwards and O'Connor (2011) reported that students entered nursing education with different levels of informatics competency and that nurse educators needed a valid and reliable tool to assess such technological competencies in their students.

A standardized tool for measuring technological competencies of undergraduate nursing students is needed. According to Sherwood and Barnsteiner (2012), quality improvement can happen only through technology-based tools and decision-support software. In the literature, there are a few tools available for use. The instruments I focused my literature review on were technology-based tools. I found that these instruments offered assessments of students' technology competencies.

One of the instruments in the literature was the Self-Assessment of Nursing Informatics Competencies Scale (SANICS) instrument, which was created to measure nursing technological competencies. The tool introduced nursing levels and competencies from the beginning, experienced, informatics-specialty, and innovator levels in their study. Choi and Bakken (2013), then, used the SANICS psychometric tool with undergraduate and graduate nursing students. The SANICS tool had high internal consistency and reliability. In the researchers' study (Choi & Bakken, 2013), graduates did score higher than undergraduate nursing students on the SANICS tool.

Another instrument piloted with 3rd- and 4th-year Korean undergraduate nursing students was the Information Technology Attitude Scales for Health (ITASH) tool (Lee

&Clarke, 2015). Verified as a valid and reliable instrument, the ITASH investigated attitudes toward information and communications technology (ICT) of nursing students who have clinical placement experience.

The Knowledge, Skills, and Attitude towards Nursing Informatics Scale have been developed and verified as a valid tool to measure constructs among entry-level nursing students (Bryant, Whitehead, and Kleier, 2016). This tool measured the perception of informatics, the perception of skills and the attitudes toward the use of informatics. The instrument appeared to be appropriate for both baccalaureate degree, as well as associate degree graduates of nursing.

In the standardization of undergraduate nursing education technology exposure, the requirement is a designated instrument to measure the technological skill acquisition of nursing students. The instrument or instruments should be equipped to satisfy the needs of nursing programs across the country. The instrument surveys nursing informatics exposure from the student to the professional.

Although tremendous changes have been happening in health care, decisions regarding technological standards are still absent in nursing education in the United States. Australia and Canada are currently the only two countries that have developed competency standards for undergraduate nursing students (Borycki & Foster, 2014). Both countries reported that they expected students to be computer literate when entering the nursing program (Borycki & Foster, 2014). The primary focus for computer competency in Canada was on information and communications technology. Australia's focus was on computer skills, information literacy, information management, attitude awareness, and

governance (Borycki & Foster, 2014). The requirement of computer literacy assures that students are entering nursing education with the essential skills in place. The focus in both countries was to establish standards for technological skills that would be needed globally by undergraduate nursing students.

Role of Informatics

Informatics in undergraduate nursing education is designed to provide students with a skill set that will improve the quality and safety of patient care. The role of informatics has been described as an instrument used to improve patient quality and safety (Darvish, Bahramnezhad, Keyhanian, & Navidhamidi, 2014). In another study, it was noted that informatics plays a major role in patient outcomes (Bembridge et al., 2011). Informatics in undergraduate education appears to have an active and positive role in patient care.

Although informatics has had a positive impact on patient care, students sometimes reported being unprepared. This unpreparedness can be demonstrated in the study of undergraduate nursing students who claimed that they did not perceive themselves as having the ability to access or extract information from clinical data sets, or take part in designing, developing, or evaluating technological, educational materials (Choi & Martinis, 2013). The establishment of uniform standards in informatics education seems to be urgently needed to provide undergraduate nursing students with the appropriate skill set that will provide the quality and safety of patient care by graduate nurses once they enter the workforce.

The role of the nursing faculty regarding informatics is to provide students with the competencies that will permit graduates to make a smooth transition to the workplace. According to Kramer (1974, p. 138), faculty should instill the values, norms, socialization skills, and role behaviors required in the workplace. Furthermore, the NLN (2015) recommended that faculty seek out learning opportunities that will support technological skills for students. This recommendation by the NLN would result in a smoother transition of nursing students to the workplace.

The EHR, CDSS, and other technologies have demonstrated the increasingly active role played by information management and the need to expose undergraduate nursing students to its use. As there are numerous technological devices emerging within health institutions, the TIGER initiative's recommendation for undergraduate nursing education is to expose students to information management competencies (TIGER, 2009).

Nursing students have frequently initiated their exposure to information management. In one study, students used their mobile phones to access the Internet to do research and to learn about the condition of a patient (Chang et al., 2012). In another study, it was reported on student use of information management in the clinical setting (Johansson, Peterson, & Saveman, 2012). Nursing students used mobile devices in their clinical primarily to look up information on multi-drug interactions and drug calculations. Although instances of the usage of technological devices have been reported, the exposure of nursing students to the use of such devices is by no means routine. The

inconsistent exposure to information management has resulted in varied experiences and varied skill sets among nursing students upon graduation.

Student Attitudes, Experiences, and Perceptions

In the examination of many studies regarding informatics and nursing students, it emerged that nursing students displayed a similar perception regarding self-efficacy. In one study, examining the student perceptions Jones and Donelle (2011) reported that students welcomed the EHR, but perceived that they were novice users of the technology. In another study, nursing students asserted that their strengths were in having basic computer skills but denied being able to extract information (Choi & Martinis, 2013). The students in both studies felt they had the ability to navigate the computer, but lacked in proficiency concerning information literacy and information management.

While the findings of Choi & Martinis, (2013) indicated that nursing students were in agreement regarding their strength were computer literacy, their exposure to information management was not uniform, and they felt at times there was no formal introduction. In one study, students' perceptions regarding technology revealed that the integration of knowledge about the usage of informatics was higher than their actual ability to use it (Morris & Hancock, 2013). The findings of Bartholomew and Heart (2011) indicated that nursing students were 100% in agreement regarding the inclusion of information literacy in their education; however, they saw little relevance to information-management devices such as telehealth medicine, remote monitoring devices, and clinical coding. The inconsistency in self-efficacy reported in studies of student proficiency on

information management and computer literacy has added to the conflicting views about students' technological competencies.

Studies about international nursing education also displayed a variety of technological experiences and perceptions. For example, Swedish nurses and final-term nursing students' perceptions and experiences were studied, and it was found that both nursing students and professional nurses used mobile devices for information retrieval, patient safety, and quality of care. Additionally, the researchers found that nursing students were more likely to use mobile devices than the nursing staff. However, in the study of a nursing program in Uganda, Chang et al. (2012) found that nursing students complained about their lack of Internet access. The inconsistencies found internationally in the exposure of nursing students to technological experiences appeared congruent with those besetting U.S. nursing programs and support the need for technological standards for undergraduates. The variability of student perceptions in Uganda and Sweden nursing programs toward informatics are another reason for inconsistent in competencies within undergraduate nursing education.

When informatics is used as a learning tool, simulated clinical experiences can assist with the implementation and standardization of technological competency requirements. Gardner and Jones (2012) posited that simulation of patient care served to standardize teaching and evaluation in the educational setting. In a pilot study, beginning nursing students described positive baseline attitudes toward computer use and also noted the positive impact of the personal digital assistant used in their nursing practice (Schairlet, 2012). On the other hand, Glinkowski, Pawloska, and Kozlowska (2013)

found that students did not promote the addition of informatics to their nursing education. Students also proclaimed in a study by Edwards and O'Connor (2011) that faculty were inaccessible and lacked technological skills. The various perceptions of and attitudes toward informatics are another reason for the challenges of inconsistent competencies within undergraduate nursing education.

Although the shift to informatics in health institutions is well under way, barriers still appear to exist in the standardization of informatics requirements in undergraduate nursing education. In the study by Glinkowski et al. (2013), the attitude of 60% of the student population indicated that they did not desire informatics added to their nursing education. Students saw the potential for telehealth medicine to be a part of their nursing practice (Glinkowski et al., 2013). Additionally, Vana and Silva (2014) found that 88% of undergraduate nursing students, in their first semester of junior year, denied that they had been exposed to EHR or online drug reference databases. Again, these challenges contributed to the inconsistencies that plagued the establishment of uniform standards of technology-related instruction in undergraduate nursing programs.

Faculty Perceptions

Faculty studies reflect the perception of nursing faculty regarding the challenges presented by nursing informatics. One perception noted by Mahon et al. (2010) asserted that computer availability for student use was limited at health institutions. The faculty in this study reported that they perceived that proficiency rested on paper documentation. Other studies revealed that faculty appeared to be stunting the development of informatics competencies in undergraduate nursing students (Edwards & O'Connor,

2011; Mahon et al., 2010). Faculty ranked the integration of informatics to be higher than its utilization (Morris & Hancock, 2013). It is important that members of the faculty continue to update their own technological skills in order to expose undergraduate nursing students to the necessary skill sets of their future workplaces.

The EHR is the most recent information management competency that emerged in health institutions, and nursing students need to add its use to their technological skills. In its early years, the EHR encountered resistance from faculty. In the study regarding the attitudes of nursing faculty, they argued that informatics should be part of nursing practice not education (Bartholomew, Parcel, Kok, Gottleib & Fernandez, 2011). The faculty thought that the students' clinical information systems training, which included EHR, should occur in the workplace (Bartholomew et al., 2011). Additionally, it was found that the faculty was a barrier to the adoption of EHR within the curriculum (Gardner & Jones, 2012). In conclusion, Gardner and Jones also proclaimed that the integration and incorporation into the curriculum should be a priority for nurse educators.

As the years passed, the progress of informatics has been steadily moving toward acceptance by faculty. Nursing faculty began to perceive the academic EHR (AEHR) to be useful in preparing students for electronic documentation (Kowitalawakul, Chan, Wang, & Wang, 2014). The faculty reported that the AEHR was a valuable, innovative tool but challenging to use (Kowitalawakul et al., 2014). Faculty also considered EHR simulations to be useful additions for the evaluation of documentation and nursing intervention (Schaar & Mustata, 2015). The various views of faculty described in these studies, however, added to the inconsistencies in the progression toward establishing a

uniform standard for informatics education in the nursing curriculum. Again, these

variations in informatics attitudes and experience call for standardization of technological

competencies for undergraduate nursing students.

Informatics and the Curriculum

The rise of nursing informatics from its beginnings as a specialty to its inclusion

in undergraduate nursing programs has forced the examination of nursing curricula for

their technological presence. According to the NLN (2015, p. 4), nursing curricula and

teaching strategies need to incorporate teaching instructions about technology. Several

studies appeared to reinforce the NLN position on the integration of information

management and computer literacy into the curriculum.

It would appear that the incorporation of informatics with the curriculum would

have an affect on the performance and ability of nursing students. In a study of predicting

computer anxiety in nursing students, it was noted that as there was a negative

relationship that existed with computer literacy. As anxiety decreased, computer literacy

increased. The implication for faculty was to encourage the integration of nursing

informatics into the curriculum because students appeared less anxious as their

experience with informatics increased.

The integration assessment exam upon entry to the nursing program, to check the

informatics level may assist in retention of nursing students. Increasing the exposure to

nursing informatics competencies in the curriculum would improve the attrition rate of

nursing students (Edwards & O'Connor, 2011). The addition of a standardized test upon

entry to a nursing program would provide a clearer snapshot of the needs the nursing student upon admission to the program.

Establishing standardized technological curricula frameworks could provide opportunities to introduce informatics into nursing courses and clinical. In a pilot project of how frameworks could incorporate computer literacy, information literacy, and information management, it was asserted that curriculum frameworks provided opportunities for incorporating nursing informatics (Stephens-Lee, Lu, & Wilson, 2013). The use framework could be useful to initiate and standardized all nursing informatics for undergraduate nursing programs.

In addressing how much how much informatics is in the curriculum in, Sanches, Jensen, Monteiro, and Lopes (2011) examined the percentage in undergraduate nursing programs in Brazil. The authors found that only 35% of nursing programs offered informatics-related subjects (Sanches, Jensen, Monteiro, & Lopes, 2011). It appears that nursing education internationally needed to increase the incorporation of informatics into the curriculum.

The position on nursing informatics for undergraduate education is far from being consistent. In studies regarding informatics it has been reported about the dissension related to placement of informatics within the curriculum and on the lack of consensus regarding categories of nursing informatics (Gagne et al., 2012; Goncalves et al., 2012). The authors recommended that future studies should provide examples of where to insert informatics competencies within the curriculum, grouping them by their complexity, to assist faculty guiding their students effectively.

Discrepancies of placement of competencies in the curriculum raise the question whether computer literacy is a prerequisite of competency in nursing education. It has been reported that computer literacy should be a prerequisite or placed within the curriculum (Gagne et al., 2012). The QSEN project reportedly does not consider computer literacy a competency that is needed as a prerequisite for nursing education (Sherwood & Barnsteiner, 2012). However, Staggers et al. (2002), who identified four levels of competencies for a master list of core technological competencies for professional nurses, identified the beginner nurse competencies to include the computer-skills category. This disagreement of placement of informatics within the curriculum has resulted in inconsistent placement and inconsistent skills acquisition among nursing students.

Nursing education should review and update the curriculum to ensure that there are uniform exposure and integration of informatics available to students. As has been evident in a study, technology is instrumental to patient care, and the insertion of informatics within the curriculum prepares students for clinical experience (Hebda and Calderone, 2010). Also reported was that exposure to the EHR during the students' nursing education would allow them to become proficient in nursing documentation upon graduation. Ultimately, the exposure will assist graduating nursing students to achieve a smoother transition to the workplace an increased quality and safety in patient care.

Informatics and Information Management

The introduction of EHR in health institutions demanded increased attention to information management. In a long-term care facility study, the nursing experiences with

the EHR found that employees described many more positive than negative benefits

(Cherry, Ford, & Peterson, 2011). Among the benefits described by employees were easy

to access clinical information and ease of monitoring the residents' condition. However,

technology downtime was one the challenges reported. As nursing student gain exposure

to the EHR in clinical, we need to assess what they feel are the positive or negative

benefits of the EHR, in nursing education.

In preparing nursing students for a smooth transition to the workplace, standard

exposure to information management would be helpful. In a study in nursing education, it

was revealed that student exposure to the academic EHR made them better prepared to

use this technology in the workplace (Johnson & Bushey, 2011). Also, in another study to

examine telehealth as another information management competency, nursing students

reported on the potential benefit of telehealth and thought that it expanded patient care,

especially in rural areas of Poland (Glinkowski et al., 2013). As the U.S. health system

expands its use of technology, senior nursing students need to have uniform exposure to

the competencies of information management to help them have a smooth transition to

the workplace.

Simulated clinical experiences (SCEs) emerging in health institutions have

promoted information management as an essential competency that students feel they

need exposure to during their nursing education. In a study, first-semester nursing

students expressed 100% satisfaction toward using a personal digital assistant (PDA) in

their nursing practice (Schairlet, 2012). The students found that they were prepared to

answer questions and avoid errors in nursing practice. Additionally, PDA availability at

the bedside proved to be a useful tool (Schairlet, 2012). The usage of simulated clinical experiences (SCEs) such as the PDA is one way to provide information management exposure to students.

Another simulated clinical experience SCE using a PDA is the Nurse Central (NC) information tool. In a pilot study conducted with 3rd- and 4th-year nursing students using the NC information tool, students could gain reliable and quick information in their clinical (Secco, Doiron-Mailet, & Furlong, 2013). The NC information tool provided information from the Taber Med Dictionary, Davis Drug Guide and LAB Diagnostic Test, Davis Disease and Disorder and Handbook of Nursing Dx with a PDA hand-held device (Secco, et al., 2013). The students found the NC resources helpful, readily accessible, reliable, and current. These two studies share positive experiences for nursing students done on SCEs. A national consensus regarding the technological skills necessary for information management for all baccalaureate nursing programs is also needed.

Additional studies that utilized information management with EHR revealed more positive experiences. Schaar and Mustata (2015) asserted that SCEs with the use of EHR were beneficial when used for interdisciplinary learning. Besides its use for interdisciplinary learning, the EHR assisted with the assessment of student documentation skills (Schaar & Mustata, 2015). Also, using case studies of an EHR simulation, nursing students found that the experience increased their self-efficacy regarding pharmacology concepts and that they gained a better grasp of EHR through reality-based challenges (Vana & Silva, 2014). Johnson and Bushey (2011) also found a better prepared student body. Last, nursing students in Baille et al.'s (2012) study took

this challenge further as they were in a clinical setting. The students proclaimed that they had improved the availability of patient records through the use of EHR in their clinical experience. Experiences, whether through SCEs or in the clinical setting, appeared to prove positive for EHR exposure.

Student Transition to the Workplace

Competence is a requirement for nursing practice. McConnell (2001) defined the term *competence* as "the individual's ability to perform job responsibilities" (p. 14). Halfer and Graf (2006) reported that it took nurse graduates 18 months to achieve competence in the workplace. The graduate nurse appeared to need time to acclimate and master becoming organized or having the ability to complete the clinical tasks required in the workplace with competence. To make a smooth transition to the workplace again validates the students' need to have the exposure to the appropriate technology-related skills to perform competently in the modern workplace.

Another rationale for the need of standardized technological competencies is to make the students' transition to the workplace less stressful and prevent reality shock. Reality shock occurs when a new worker, who has prepared for the workplace, sees a gap in what she or he has learned and what the work experience demands (Kramer, 1974, p. vii). Feng and Tsai (2012) noted that a gap appeared to exist between the professional (nursing) education and organizational goals. Their study revealed a potential role ambiguity with respect to new nurses' experiences, the many new skills required, and new personnel on the job. This gap seems to indicate the urgent need to expose nursing students to technological competencies to reduce stress in their workplace.

It takes time for new nurses to adjust. According to Halfer and Graf (2006), most new nurses spend the first few months mastering skills and tasks; thus, it takes at least a year for the nurse graduates to begin to feel comfortable in the workplace. Bembridge et al. (2011) reported that exposure to information-communication-technology skills, knowledge, and self-efficacy enabled a successful transfer from education to the workplace. The new nurse graduates' exposure to technology-related skills during their nursing education can facilitate a smooth transition to the workplace.

Technological competencies are recent additions to the workplace, which has resulted in the need for standardization of technological skills requirements for nursing students. Nkosi, Asah, and Pillay (2011) noted that fewer than half of post basic nursing graduates in South Africa have access to computers at work. They also reported that hospital-based nurses were more likely to have used computers than clinic-based nurses. However, the attitudes of all nurses were positive toward computer use (Nkosi et al., 2011).

Studies in information management are needed to address the characteristics of new nurses. As reported by in a study, new nurses appeared more likely to use hand-held devices (Wahoush & Banfield, 2014). The increase in studies to information management would assist in providing the proper exposure to devices during the students' the nursing education.

Also, more studies may be needed in information literacy, the study also noted in the orientation of new nurses toward library resources; they found that new nurses did not have a high percentage use of library services (Wahoush & Banfield, 2014). Perhaps the

stress of the new job did not leave enough time for library use. However, the study did report that new nurses were more likely to turn to a work colleague, interpersonal sources, or their Smartphone for information (Wahoush & Banfield, 2014). It would appear that exposure to technological skills of information literacy during the nursing students' education is necessary for a smooth transition in the workplace.

Standard technological skills in nursing education can minimize reality shock and satisfy workplace requirements. Moreover, Benner's (as cited in Spector, 2007) application of the Dreyfus model would identify nurses as advanced beginners or new graduates on technological competency. The advanced beginner would have had exposure to technological skills during his or her nursing education. However, more research in technology is needed to see the trends in the workplace to strength the goal of a smooth the transition to the workplace for new nurse graduates.

Literature Review Summary and Conclusions

Information technology in health institutions requires the establishment of competency standards for undergraduate nursing programs. It would appear that information management, information literacy, and computer literacy may be subjects that should be part of the examination of senior nursing students' graduation requirements. As nursing informatics requirements in the workplace have changed, nurse educators need to become proactive in integrating nursing informatics within the undergraduate curriculum. With the rise of informatics, nursing students should have uniform exposure to these technological competencies by the time they reach their senior year. Because there is an emphasis on competencies for quality and safety in patient care,

information management, information literacy, and computer literacy should be required

subjects in the undergraduate nursing curriculum.

Whether using Benner's (2004) adaption of the Dreyfus model or Staggers et al.'s

(2002) SANICS scale, or any other valid and reliable assessment instrument, senior

nursing students need to have standardized exposure to informatics. The shift to

technology in health institutions requires the establishment of competency requirements

for undergraduate education. This chapter provided a conceptual and historical review of

the literature on the status of nursing informatics within the undergraduate curriculum.

The literature review indicated that informatics standards are not part of undergraduate

nursing programs. Yet, the need for such standards and the students' exposure to them as

part of their nursing education seems obvious. In this study, I aimed to narrow the gap by

shedding more light on what national standards might be considered adequate additions

to the undergraduate nursing curriculum.

In Chapter 3, I provide a description of the specifics related to the chosen research

methods, including research design and rationale; the role of the researcher; descriptions

of setting, sample, and sample selection; data collection and data analysis procedures; and

dissemination of the findings. I will discuss ethical issues in research and issues of

trustworthiness as well as measures taken to protect the participants' rights and

anonymity. Presented in Chapter 4 are the results of the study, and in Chapter 5, I identify

the implications, potential for social change, recommendations, and conclusion.

Chapter 3: Research Method

Introduction

The purpose of this phenomenological study was to explore lived experiences and perceptions regarding informatics competencies of senior-year nursing students in the northeastern region of the United States. Available data regarding standards for senior nursing students' exposure to informatics competencies were nearly nonexistent. I used the phenomenological approach because it supported an inductive inquiry into the experiences of those who had lived through the phenomenon under study (Creswell, 2007, p. 13; Moustakas, 1994, p. 13). As the investigator, I collected data on the lived experiences of senior nursing students using face-to-face interviews and observation. The scope of this study covered senior-year students in a baccalaureate college of nursing in the northeastern region of the United States.

In this chapter, I describe the qualitative research design and provide a rationale for choosing it for this study. Additionally, I provide a description of my role as the researcher in serving as the key instrument for data collection. In the methodology section, I describe the setting, sample, and sample selection and discuss the instruments used for data collection. Additionally, I describe data storage and data analysis. Last, I provide the data analysis plan and a discussion of trustworthiness, ethical procedures, and the protection of participants' rights and anonymity, concluding with a summary of the main points of this study.

Research Design and Rationale

Research Questions

In this qualitative inquiry, I aimed at gaining a deeper understanding of senior students' informatics competencies acquired during their nursing education. Qualitative research provides the foundation for quantitative theories and hypotheses (Trochim, Cabrera, Milstein, Gallagher, & Leischow, 2006, p. 15). As informatics is new to nursing education and the need for technological standards as a graduation requirement has become increasingly apparent, a qualitative research design seemed to be most appropriate for exploring this issue. The research design required broad research questions to promote clearer insights into the senior nursing students' exposure to informatics. In this qualitative study, I as the interviewer became part of the research design, as described by Moustakas (1994, p. 114). I interviewed the participants by posing exploratory interview questions to collect data on the state of these students' exposure to technological competency. The data collection included demographics and an interview protocol. The following research questions guided the study:

Research Question 1: What are senior nursing students' lived experiences of information management, information literacy, and computer literacy during their nursing education?

Research Question 2: What skills regarding information management, information literacy, and computer literacy do senior nursing students have as a result of their lived experiences in nursing education?

Research Question 3: What are senior nursing students' perceptions regarding their lived experiences as they relate to information management, information literacy, and computer literacy for workplace competency and safe patient care?

Central Concepts of the Study

Traditionally, nurses documented patient information in the patient's health care record using pen and paper. However, health institutions have implemented the electronic health record (EHR), which has resulted in improved nursing care, better care coordination, and greater safety for patients (Kutney-Lee & Kelly, 2011). This change, in turn, has resulted in the need for nursing students to become computer literate and skilled in the use of technological record keeping.

The literature review in Chapter 2 has also revealed the importance of evidence-based practice (EBP) in nursing. One of the goals proclaimed by the Quality and Safety Education for Nurses (QSEN) project was to develop and use evidence-based standards and interventions (Sherwood & Barnsteiner, 2012, p. 14). The emergence of this goal has warranted increased usage of computers to access electronic databases. This, in turn, has led to a need for the development of information literacy and computer literacy in professional nurses and nursing students.

Technological devices such as the clinical information system used for documentation in the EHR appear to have revolutionized health care. The Technology Informatics Guiding Education Reform (TIGER, 2009, p. 8) initiative insisted that nurses should be able to verbalize and appreciate the importance of health information systems as well as support confidentiality for patients. The emergence of technological devices

has resulted in the students' need to acquire knowledge regarding information management.

The shift in heath institutions toward technology has resulted in the emergence of new technological competencies such as information management, information literacy, and computer literacy. As revealed by the literature review, nursing education still lacks standardized requirements for informatics competency in the curriculum. As a result, nursing students have different levels of technological competencies when they graduate and enter the workforce. It therefore appears necessary to establish standards and indicate how to meet them by the time a student graduates. My intention was to explore the perceptions of senior nursing students to gain a deeper understanding of their exposure to technological competencies. The implication for social change is that data obtained in this study may contribute to the establishment of technological-competency requirements for graduation and may indicate the need for nursing faculty to expose students to a uniform experience of information competency and computer literacy in the United States. Positive social change may ultimately result in better prepared students who will make a smooth transition to the workplace and promote increased quality and safety in patient care.

Research Tradition: Qualitative Inquiry

Conducting qualitative research has several advantages compared to quantitative studies. First, according to Trochim et al. (2006), qualitative inquiry allows researchers to gain a deeper understanding of issues. Second, gaining a deeper understanding of issues also allows researchers to describe experiences (Trochim et al., 2006). For instance, I was

able to explain, clarify, and provide meaning for the use of technological devices and competencies reported by senior-level nursing students in the study. I chose qualitative inquiry for this study because there was limited research available, and understanding of the phenomenon of undergraduate nursing-informatics competencies appeared to be spotty. The strength of qualitative inquiry was that it provided a deeper understanding of the issues and permitted me, as the researcher, to shed light on the problems by clearly describing the phenomenon. A further advantage of qualitative inquiry is that the researcher is able to spend time in the environment in which the issue under study has developed and exists, which permits the reporting of findings "true to life."

The qualitative research approach provided details and a wealth of information. Additionally, there may be theory generation to advance new knowledge (Creswell, 2009, p. 52). Usually, in a qualitative inquiry, the researcher gains knowledge about an issue on which very little information is available. In this study, the use of qualitative inquiry provided insight into the status of student preparation regarding technological competency and computer literacy from the students' own perspective, based on their lived experience of exposure to these technological skills during their nursing education.

Research Tradition: Phenomenological Approach

I also chose a phenomenological angle in this study. Phenomenology provides descriptions of experiences, not explanations or analysis (Moustakas, 1994, p. 58). The advantage of this perspective in the present study was that, through the lived experiences of senior nursing students, a deeper and more realistic understanding could be gained of

what kind and how much exposure students have had to technological competencies in their nursing education.

Two previous studies based on the phenomenological approach used methods similar to the present study: Lauterbach's (1992, 2003) examination of the lived experience of mothers who were exposed to perinatal death in their families and Edwards's (2014) examination of the lived experience of distance family care givers. The data collection of Lauterbach (1992, 2003) was carried out through interviews with the mothers to document their reflections and experiences, as well as through the examination of memorabilia such as infant photographs and footprints. The descriptions through interviews and the examination of documents provided a comprehensive explanation of the mothers' lived experiences.

The phenomenological study by Edwards (2014) examined the lived experiences of distance family caregivers. The research method consisted of two interviews with each of the 10 participants to examine the phenomenon of distance caregiving to a family member with Alzheimer's disease and related dementia. The researcher initially conducted face-to-face interviews that used questions based on an extensive review of the literature. Edwards conducted the second interview by telephone. The telephone interview addressed issues and concerns and reviewed themes derived from the first face-to-face session with the participant. The researcher also kept a log of personal reactions. Additionally, he used a modified Van Kaam method called *psychophenomenological (PPM) analysis* of the data. The aim of PPM is to seek the essence of an experience with the assumption that the experience would be the same for different individuals (Anderson

& Eppard, 1998). The Van Kaam method of analysis appeared appropriate for the participants in Edwards's study, all of whom were distance caregivers of family members with Alzheimer's disease and related dementia.

Rationale for the Chosen Tradition

In this study, I used a combination of the empirical and the transcendental phenomenological approaches to gain a deeper understanding of the lived experiences of students regarding their exposure to technological competencies during their nursing education. An approach combining empirical and transcendental elements allows a researcher to describe general characteristics and determine the meaning of a phenomenon (Moustakas, 1994). In this study using the combination of approaches, I gained a deeper understanding of the senior nursing students' exposure to technology.

Whereas as the focus of the empirical approach is on more than the experience, the focus of the transcendental approach is on the description of the experience by the one having that experience (Moustakas, 1994). Creswell (2007) pointed out that the decision to use a certain research approach in a qualitative research plan should be based on what the researcher is attempting to accomplish. The empirical and transcendental phenomenological approaches provide comprehensive descriptions that formulate the structural analysis (Moustakas, 1994, p. 13). With this study, I expected that the findings would provide comprehensive descriptions of senior nursing students' exposure to technological competencies and that this knowledge would start a lively discussion of what technological competency standards should be required for graduating nurses.

This study comes in response to the introduction of clinical information systems containing the EHR in health institutions. The changes noted in health institutions have caused concern about nursing education and the lack of empirically tested and standardized technology-related skill sets for undergraduate nursing students in the United States. Upon graduation, nursing students seem to have varied technological competencies as they are entering the workplace.

By using a qualitative approach, I sought to provide information about the phenomenon under study. The use of Moustakas's (1994) transcendental phenomenological reduction (TPR) approach afforded information on the lived experiences of students in nursing education regarding their exposure to technological competencies. The TPR was expected to get at the essence of the phenomenon (Moustakas, 1994, p. 34). It was my hope that this phenomenological approach would lead to a broader understanding of factors emerging from the exploration of the perceptions of nursing students regarding their educational experiences.

Using the phenomenological approach, I started gathering data in face-to-face interviews with students, exploring their perceptions and behaviors to gain thick, rich descriptions of the phenomenon under study. In phenomenological studies, the common process of data collection involves the use of in-depth interviews (Creswell, 2007, p. 131). In this study, I used face-to-face interviews to examine the perceptions of undergraduate nursing students regarding their exposure to technological competencies. According to Moustakas (1994, p. 52), perceptions are considered the primary source of

knowledge. In addition to the initial interview, I also conducted a second, shorter interview to allow each participant to clarify or add to the information provided.

Role of the Researcher

As the investigator in this study, I interviewed the participants and served to verify the information as needed. Additionally, through member checking and by maintaining a respectful environment, I was able to manage potential power issues in the relationship with the participants. Lastly, I assured confidentiality and the anonymity of the participants.

In the role of the researcher in a qualitative study, I was instrumental in informing the study. A qualitative researcher can generate in-depth reports while functioning as the key instrument in the research (Creswell, 2009). As the researcher in a qualitative study, I was able to obtain in-depth reports from research participants. I also used a phenomenological approach that afforded me the ability to explore the lived experiences of senior students regarding technological exposure during their nursing education. I carefully read and reread the data obtained, looking for key words, themes, and ideas that would help in outlining the analysis.

Additionally, in this study, my role as qualitative researcher was that of observer-participant. This role, as indicated by Carr (1994), provided me with the ability to verify the needed information, obtain clarification when necessary, and gain a better understanding of the participants and their experiences. Additionally, this role required me to become a great listener and an excellent interviewer. It heightened my awareness to what was present or absent from the environment.

Furthermore, as an observer-participant, I was able to put aside my personal beliefs. Moustakas (1994) called the first step in the phenomenological approach *epoche*. Epoche depicts the researcher setting aside personal bias and letting data enter anew (Moustakas, 1994, p. 85). Accordingly, the researcher should clarify biases at the outset (Creswell, 2007). I declared my biases regarding this topic by using a self-reflection journal. In acknowledging the influence of my biases, I kept a log of my personal reactions. Dukes (1984, p. 202) added that the role of the researcher must be flexible and include many self-checks. In addition, the role of the phenomenologist is to understand rather than explain the phenomena studied (Dukes, 1984). As the researcher in this phenomenological study, I pushed to provide an understanding of the technological standards required for senior nursing students.

In accordance with the Institute of Medicine, National Academy of Engineering, and National Academy of Sciences (2009), I as the researcher in this study also emphasized the *obligation to self,* which involves acting responsibly, maintaining personal integrity, and fulfilling the obligation to act in ways that will serve the public. In conducting this study, I endeavored to uphold the credibility and the validity of this research.

I used my workplace as an environment for recruiting participants. Moustakas (1994, p. 59) asserted that the phenomenological researcher usually has a personal interest in the research. My personal interest was based on my status as a faculty member in nursing education. I am concerned about the exposure to technological competencies, or the lack thereof, that senior nursing students are receiving. However, my role as

researcher and employee in the study environment was not used to influence the decisions of students to participate. Although some of the participants may have come from the college in which I have faculty status, I used neither professional nor financial inducements to recruit participants for the study.

This study was based on voluntary participation. I used member checking for confirmation of the accuracy of the interview data. Member checking means that the researcher verifies, together with the participants, that the data were correctly reported and interpreted as intended by the participant (Creswell, 2007). Additionally, I made sure that participants understood that their participation was entirely voluntary. According to Trochim et al. (2006), voluntary participation means that the participants volunteer to take part in the study. An example for boosting voluntary participation in this study would be to solicit student-participants from courses not taught by me. Additionally, the consent form provided to participants gave them the option to decline to participate in the study or to withdraw at any time without any adverse consequences.

As the interviewer and an instructor of nursing students, a power relationship with students was not an issue. Creswell (2009) suggested for impartial and respectful data collection that the following measures be taken: Interviews need to be respectful of the participant. Additionally, participants need to have their rights protected via utilization of informed consent, and a respectful collaboration should be established between the researcher and participant (Creswell, 2009). In undertaking this study, I was respectful of the participants' requests.

Research Methods

Participant Selection

The population targeted for this study consisted of undergraduate senior nursing students in the northeastern region of the United States. According to Marshal (1996), the most common type of sampling is purposive sampling. In qualitative inquiry, the most productive participants to answer the research questions are represented by a purposive sample (Creswell, 2007; Marshal, 1996; Patton; 1990). Purposive sample selection provides information that can enrich the research (Creswell, 2007; Patton, 2002). Purposive sampling enabled me to select participants that were representative of the population of interest. In this study, I chose baccalaureate senior nursing students because they had had the longest period of time for experiencing exposure to technological competency during their undergraduate nursing education. I selected students from the northeastern region of the United States because of proximity; this was expedient and permitted the effective use of time and resources available for this study.

As the researcher, I solicited a purposive sample of senior nursing students with the focus that these students would have had the optimum exposure to technology. My reason for engaging in sampling was the desire to learn about an issue (Creswell, 2009). Purposive sampling involves the selection of a small number of cases that may or may not be representative of the whole population. Guest, Bunce, and Johnson (2006) reported that they achieved saturation in their study with a sample size of 12 interviews. The sample size I determined for this study was from eight to 15 participants with the

expectation of reaching data saturation by maintaining the rigor necessary for a

qualitative study.

The relationship between saturation and sample size may lead to the use of a

larger or smaller sample. Although Mason (2010) noted in his observations on qualitative

studies that PhD researchers use many alternative principles in their decision on sample

size, he reported that saturation should be the guiding principle for data collection.

Marshall (1996) stated a similar point of view by explaining that the sampling

requirement is complete when new themes cease to emerge from additional data. The

definition of data saturation states that the collection of data has waned and that further

sampling would not produce new information (Marshall, 1996). Therefore, sampling in

this study was halted when additional interviews produced no new information. I

interviewed participants for data collection with the use of an interview protocol. Guest et

al. (2006) suggested the use of the same interview questions for each participant. I,

therefore, used an interview protocol in conducting face-to-face interviews and

presenting the same open-ended questions to each participant.

Predetermined inclusion criteria. Participants for this study had to meet the

following inclusion criteria:

1. The participant had to be actively attending a baccalaureate nursing program

    in the northeastern region of the United States.

2. The participant had to be in his or her senior year of nursing school.

These criteria were essential for inclusion. However, other criteria recommended

by Moustakas (1994) were also kept in mind during the selection process; for example,

participants had to agree to participate in an interview as well as a shorter follow-up

meeting. The potential participant should also have had some exposure to technology.

Further, the potential participant should be willing to grant the researcher the right to use

amenities such as an audio-tape recorder and later publish the data in aggregate form in a

doctoral dissertation. Additionally, the participant should grant the researcher the right to

present the findings orally to an audience or in a published article.

Identification of prospective participants was accomplished (a) through referrals

from teachers or other students in baccalaureate nursing programs, (b) through e-mails

sent to senior nursing students in nursing programs within the northeastern region of the

United States, and (c) by solicitation of students in nursing courses to volunteer for the

study. Participants were required to complete a demographics questionnaire to provide

information about their educational status, their relationship with the researcher, and their

willingness to take part in the study (see Appendix A). After ascertaining that the student

met the inclusion criteria, I presented the potential participant with an Informed Consent

Form to sign (see Appendix B).

Instrumentation

The qualitative instrument used in this study was an interview protocol with open-

ended questions (see Appendix C). Moustakas (1994, p. 115) described the interview

protocol as a guide that utilizes broad questions to provide thick descriptions of the issue.

Additionally, Doody and Noonan (2013) noted that the questions should be open-ended,

neutral, and sensitive. I set up semistructured face-to-face interviews with the

participants. Often, in research with unstructured or semistructured interviews, the

researcher may conduct multiple interviews. Additionally, the researcher may change the order of questions with each participant (Creswell, 2007, p. 131). In this research, the order of questions may have changed, but the interview protocol assured that all questions were addressed with each participant.

The interview protocol provided some structure to the interviews; in the words of Moustakas (1994, p. 109), the protocol assisted in providing consistency to interviews. Also, I used a tape recorder for data collection. Creswell (2007) noted that the use of a tape recorder can be helpful. The tape recorder assisted in capturing the oral communication of the interview. Documentation of the demographics was also used as a tool in the study. Appendix A shows the demographic information sought from each participant. The literature further suggested that the researcher engage in note taking and do so after the participant has departed, which may present less of a distraction than taking notes during the interview would (Walker, 2011). I followed Walker's (2011) suggestion, took notes, and reviewed the documentation after each interview. This practice ensured that the data collection instruments were adequate and sufficient to assure trustworthiness of the collected data regarding technological standards, or the lack thereof, in undergraduate nursing education.

Recruitment and Participation

The study involved individual interviews of senior students in undergraduate nursing programs, located in the northeastern region of the United States. As the investigator in this study, I recruited participants who met the inclusion criteria and who agreed to participate in the study. According to Moustakas (1994, p. 39), data in a

phenomenological study is commonly gathered through interviews. Participants had to be willing to participate in face-to-face interviews with a brief follow-up meeting for member checking. The initial interview of participants took approximately 30 - 45 minutes to complete. The period of data collection through interviews lasted 4 weeks. The participants needed to complete and sign an Informed Consent Form, which testified to their voluntary participation and stipulated that they agreed to complete a demographics questionnaire and an interview with a follow-up meeting for clarification purposes; it also gave permission to audiotape the interview and publish the findings in aggregate form in a doctoral dissertation and possibly a journal article.

Data Collection

Data collection is the gathering of data in research regarding an issue or concern. Creswell (2007) suggested four types of data collection: interviews, observation, documentation, and audiovisual analysis. In this study, I utilized two types: interviews and documentation. Initially, there was the collection of informed consent and demographic information on each participant. After the recruitment of participants, I interviewed the sample of senior-level students in a nursing program. The purpose of interviewing in research is to explore the views, experiences, motivations, and beliefs of the participants on an issue. As the researcher, I used individual face-to-face interviews for data collection. According to Opdenakker (2006), a face-to-face interview provides the interviewer with the ability to use observational and listening skills. The face-to-face interview informs the research with quality data as the interviewer can see and hear from the respondent in a synchronous time and place. I was able to make notations about the

congruence of the messages. Additionally, the participant has the undivided attention of the interviewer.

As the investigator, I used an interview protocol with open-ended questions (see Appendix C). Because interview protocols are considered verbal questionnaires, Patton (2002) posited that the researcher should interview each participant with the same list of standardized, open-ended questions. The data collection, thus, consisted of an interview in a semistructured format. The use of a semistructured format allowed for added questions when clarification was necessary, while the interview protocol supported consistency and assured that the same questions were addressed with each interviewee.

Additionally, in interviewing the participants, I used a contact summary sheet. The contact summary sheet included answers to questions from the participants (Miles, Huberman, & Saldana, 2014). This contact summary sheet kept memos on the interviews current and became part of the notes on each interviewee. Names on the contact sheets were alphanumerical to preserve confidentiality. Before each interview, participants completed a demographics questionnaire and an Informed Consent Form. After the interview, I thanked participants for the initial interview and informed them that a follow-up interview would take place to discuss my interpretation of the findings with them. For clarification and confirmation of the data and findings, I conducted a brief follow-up interview via e-mail with each participant.

Last, I utilized direct observation as a form of data collection after videotaping the interview. Direct observation does not depend on a person answering questions (Taylor-Powell & Steele, 1996). However, it does entail using field notes for data collection.

Observation of the characteristics of a purposive sample of participants for a specific

reason can be used and the researcher may observe their interactions, behaviors, and

reactions (Taylor-Powell & Steele, 1996). I also videotaped each interview. As the

researcher, I paid particular attention to the congruence of the participants' responses and

their body language for the truthfulness of the answers. For ease of retrieval, I coded the

notes from all data collections into NVivo version 11.

Data Analysis Plan

The data analysis plan called for techniques that are considered appropriate for

analyzing data collected through interviews with the use of audio-recordings, the

checking of documents and field notes, and by observation of nonverbal cues in the

recordings, all followed by open coding. With utilization of the NVivo software, I

performed descriptive statistics regarding the demographics information provided by the

participants. I also transcribed and reviewed the interviews. According to Corbin and

Strauss (2008), open coding requires a brainstorming approach. After data collection, I

carefully listed and reviewed the data and looked for any and all emerging patterns.

Moustakas (1994) noted that horizonalizing of data should occur after data collection; he

defined the term *horizonalizing* as the clustering of the data into themes (p. 118). I looked

for themes emerging from interviews of senior-level nursing students and related data, as

soon as the data collection was complete.

I interpreted and coded the data before the use of software. Coding means finding

the right word or phrase or interpreting the data in a way that conceptually describes a

piece the information (Corbin & Strauss, 2008). As the investigator, I needed to find the

right words to capture the essence of what was communicated in the interviews,

documents, and field-observation notes. The interpretations took place as I read and

reread the information provided to grasp the essence of what the participant tried to

communicate. During this phase of the research, I became the expert in the analysis of

my research. Glaser and Laudel (2013) scripted some of the steps I used in data analysis

and coding; they are follows:

1. Identify raw data and link to research questions;

2. Structure the data;

3. Search for patterns;

4. Integrate patterns;

5. Code.

Issues of Trustworthiness

To achieve trustworthiness of the study requires having confidence in the

reliability and validity of the results. Stiles (1993) explained that *reliability* refers to the

trustworthiness of observations of data and the ability to replicate the study responses,

whereas *validity* refers to the trustworthiness of interpretations and conclusions and to

internal consistency. I endeavored to assure that both reliability and validity were strong

features of this study.

In undertaking this phenomenological study, I had to set aside any preconceived

ideas. Moustakas (1994, p. 22) asserted that the epoche process should be used, in which

the researcher uses a transcendental approach to setting aside prejudgments regarding the

issue under investigation. Similarly, Pringle, Hendry, and McLafferty (2011) described

bracketing as the setting-aside of preconceptions regarding the phenomenon. Setting aside my preconceptions was necessary to avoid fitting the findings into my expectations. I planned for this necessity to assure that the research remained objective and had strong reliability (see Appendix C).

I also used an interview protocol in this study to increase and reinforce consistency throughout the interview process. Maintaining consistency provides reliability in research (Creswell, 2009, p. 190). By using an interview protocol, I could assure that each participant would address the same questions. The interview protocol supported credibility of the interview process and provided reliability for the study.

Another way to ensure credibility and validity is through triangulation. Triangulation provides for the presentation of multiple perspectives for validation (Stiles, 1993). Examples of different perspectives in this study would be the perspectives of readers, the participants, and the investigator. Triangulation eliminates potential systemic biases and it ensures evidence of credibility in the research (Patton, 2002). I, therefore, used triangulation in this study. Different types of validity are extant, which I considered for this research. Validity can involve the reader who finds coherence in the findings or the participant who provides testimonial validity (Stiles, 1993). Additionally, the investigator will check the findings for accuracy (Creswell, 2009). In this study, I could increase trustworthiness through the combination of the reader, participant, and investigator presence in the research.

A further strategy for upholding trustworthiness is validation. Validation means that the researcher checks for accuracy of the findings (Creswell, 2009). For example, I

used member checking to ensure that the findings I reported accurately reflected the meanings as intended by the participant. Stiles (1993) noted that in testimonial validity, the investigator correctly interprets the participants' experiences. The participants' reaction during member checking should indicate that they are recognizing the accuracy of interpretation of their experiences in the findings.

To increase trustworthiness, I endeavored to achieve external validity. External validity involves the transferability of the findings to other groups (Trochim et al., 2006). To reduce threats to external validity and facilitate replicability of the study, I kept detailed records during data collection and data analysis. I also paid close attention to member checking and honored the participants' corrections and expansions of their earlier responses, as desired by them.

I also considered the reactions of my readers with respect to the validity of the research. The reaction of readers should indicate that they do not find loose ends in the study. The research, according to Stiles (1993), should introduce growth in the perspective of the reader. The reader enters the world of the participants and gains exposure to the problem from their perspective.

Lastly, as the investigator, I had to assure the validity of the study. Validity of the study is boosted when the researcher checks for the accuracy of the findings (Creswell, 2009, p. 190). He recommended that researchers check the transcript for errors and make constant comparisons of codes with memos to maintain the meaning. I maintained vigilance in checking the transcripts and comparing codes with memos for consistency in meaning as a reliability strategy for this research.

Ethical Considerations

I obtained permission to conduct the study under the aegis of Walden University from the university's Institutional Review Board (IRB; approval # 05-09-16-0095009; see Appendix D). After this approval had been granted, I requested and received approval from the IRB of XXXXX College for its nursing program (see Appendix E). Participant selection adhered to the inclusion criteria previously specified. As the researcher, I encouraged potential participants to read and keep the Informed Consent Form in their personal files and to complete a demographics survey. No harm or risk to participants could result from participation in this study, and the recruitment procedures emphasized that participation was entirely voluntary. Also, the participants were informed that their personal information would not be shared with others and that their anonymity would be protected. I also informed potential participants about their right to discontinue participation in the study at any time without adverse consequences or penalties.

I explained to potential participants that the information they provide would be reported in aggregate form so that no participant can be identified through the data provided. Additionally, I assigned an alphanumeric code to each participant to uphold anonymity and confidentiality. The collected data are stored on a flash drive, which, together with other software, is password protected. To maintain the integrity of the study, one other condition for participation was observed, namely, that no participant could have either a professional nor financial relationship with the researcher. All data connected with this study will be kept for 5 years following completion of the study. The

data will be kept securely locked away in a confidential and fireproof filing cabinet; after 5 years, the data will be destroyed.

Summary

In this study, I used a phenomenological approach to exploring senior-level nursing students' lived experiences regarding their exposure to technological competencies during their nursing education. The expectation was that the outcome of the study would highlight similar technological competencies utilized by senior nursing students. The intent in conducting this study was to initiate positive social change by including into the nursing curriculum of undergraduate nursing students throughout the United States explicitly defined and uniform standards for the teaching of technological competencies. Teaching to such standards would not only ease the graduating nurses' transition into the workforce, but also increase the quality and safety of patient care.

Chapter 4: Results

Introduction

The purpose of this qualitative phenomenological study was to explore and analyze the perceptions, attitudes, behaviors, and experiences of undergraduate students regarding exposure to technological competencies while enrolled in nursing school in the northeastern region of the United States. Creswell (2007) reported that, in phenomenological studies, the process of collecting information primarily involves in-depth interviews. The approach taken during individual interviews is a transcendental phenomenological (TP) approach. Moustakas (1994) recognized the TP approach as focusing on the description of the experiences of participants. This approach involves describing the act and how it is experienced without speculating on the causal relationship (Jansen, 2005). Jansen (2005) asserted that although TP is unable to anticipate a specific scientific paradigm, it can disclose the particular accomplishment of imagination. Jansen appeared to disassociate TP with science for research investigation.

Using the TP approach, I assiduously set aside my biases to, as Moustakas (1994) put it, observe epoche and focus on gaining an understanding of phenomena from the interviewee's perspective. The in-depth interviews of the participants described the lived experience of senior-level nursing students' exposure to technology during their nursing education. The interviews extended to three areas: the students' awareness of their exposure to technology, perceptions regarding the students' technological skills, and students' perception of the influence of technology on patient care. With each interview, I

took time to bracket my biases and ask open-ended questions of the individual that focused on the phenomenon.

In this study, I explored the following three questions:

1. What are senior nursing students' lived experiences of information management, information literacy, and computer literacy during their nursing education?

2. What skills regarding information management, information literacy, and computer literacy do senior nursing students have as a result of their lived experience in nursing education?

3. What are senior nursing students' perceptions regarding their lived experiences as they relate to information management, information literacy, and computer literacy for workplace competency and safe patient care?

This chapter includes the restated purpose of the study, research questions, setting, and demographics of the participants. A discussion is also included of data collection and analysis. In addition, the chapter includes evidence of trustworthiness, study findings, and a summary.

Setting

I designed the study to recruit undergraduate senior-level nursing students as participants who should have had exposure to technology during their nursing school education. After obtaining the approval of the IRB of Walden University (approval # 05-09-16-0095009; see Appendix D) and the IRB of a baccalaureate college of nursing in the northeastern region of the United States (see Appendix E), I e-mailed the dean of the

nursing program, who, in turn, referred me to the undergraduate assistant dean for assistance with contacting the students. In addition to validating the interview protocol, I sent the list of interview questions to three experts. These experts were nurses who had a knowledge connection to nursing informatics. One expert was an instructor of nursing informatics courses, another was a student of nursing informatics, and the third worked as an informatics nurse. The experts requested only a few grammatical changes to the wording of the interview protocol. I made minor changes in the wording within the interview protocol, which appeared to satisfy the experts' requests.

The undergraduate assistant dean extended my initial invitational letter of recruitment (see Appendix F) to the senior class of nursing students at the college at the beginning of the semester. The letter of invitation invited those interested in sharing their experiences regarding technology exposure during their nursing education to contact me directly. The e-mailed invitational letter included information on how to get in touch with me.

During the initial contact, I sent a schedule of available appointments to the potential participants. After receiving a chosen appointment from a participant, I e-mailed confirmation and a follow-up reminder. In the reminder e-mail, I forwarded the location for our meeting. Additionally, I attached a demographic survey. During all interviews, I upheld the privacy of the participants. Validation of transcripts took place by e-mail as per participant agreement.

Demographics

Twelve participants ($N = 12$) completed a demographic questionnaire I had sent to them before our meeting; I reviewed it together with each participant at the start of the interview. The purpose of this questionnaire was to gain insight into any potential relationship of technological knowledge and nursing-student characteristics. The questionnaire provided data on gender, age, current educational status and educational history, race or ethnicity, work status, and the best way to communicate.

Twelve senior nursing students participated in the study; two (17%) were men, and 10 (83%) were women. Of the 12 participants, 10 (83%) were White/Caucasian, one (8%) was Hispanic/Latino, and one (8%) did not declare her background. All participants were college seniors; however, four (33%) of the 12 nursing students were seniors in their second semester of the nursing program. The participants ranged in age from 20 to 42 years. Additionally, as I interviewed participants, it became necessary to ask students about their educational history and whether they had taken Freshman Studies (FST) after their admission to the nursing program. As a result, I noted that only four (33%) of the participants had taken FST. In addition, the educational-history breakdown revealed that four (33%) were generic students; four (33%) were dual-degree students, and four (33%) were transfer students. Displayed in Table 1 is the breakdown of the participants' demographic data.

Table 1

Participants' Demographic Information

Pseudonym	Race/Ethnic background/ Gender	Age	Seniors' educational level	Educational history
Barbara	White/Female	22	Second semester	Generic
Carol	Hispanic/Female	27	Second semester	Transfer
Deborah	White/Female	39	Second semester	Transfer
Donna	White/Female	42	First semester	Dual degree
James	White/Male	20	First semester	Generic
Karen	White/Female	28	Second semester	Dual degree
Kathleen	White/Female	23	First semester	Transfer
Mary	White/Female	21	First semester	Generic
Nancy	Other (N/A)/Female	23	First semester	Transfer
Patricia	White/Female	30	First semester	Dual degree
Robert	White/Male	25	First semester	Dual degree
Sandra	White/Female	21	First semester	Generic

Note. Generic nursing students: students who have taken secondary-school biology and chemistry in recent years and who come to college directly from high school.

Table 1 indicates the pseudonyms chosen for the participants; these pseudonyms also appear in the results section to maintain confidentiality. Included in the questionnaire were questions about whether or not the participant had any previous computer training and whether the participant had worked in a health institution. Of the 12 participants, four (33%) had computer training before entering nursing school, but eight (66%) had not had any prior training. Six (50%) of the 12 participants confirmed that, currently, they worked at a health institution.

Data Collection

Via e-mail, I arranged the date, time, and location for each interview. I held 12 interviews over a 4-week period. This study took place in a 4-year baccalaureate college located in the metropolitan area in the northeastern region of the United States. Each interview took place at a private office location on the research partner's property. I conducted interviews based on the availability of the participants.

Before starting each interview, I explained to the participant the purpose of the study. During the initial contact with the participant, I reviewed the completed demographic questionnaire, which I sent to each participant in the reminder e-mail. In discussing the demographic questionnaire, I was able to ascertain the potential participant's eligibility from one of the questions related to the student's educational level. I also discussed the consent form with the participant; then we both signed the consent form. After each interview, I connected the demographic survey to the rest of the interview questionnaire.

The interviews used semistructured questions. During the interviews, I relied on an interview protocol (Appendix C) as well as on probing questions for further clarification. In all meetings, I asked the same questions; however, I changed the order of interview and probing questions as needed. The length of time for which I recorded each interview ranged from 23 to 52 minutes, with an average interview "face time" of 38 minutes.

During each of the interviews, I was attentive to the participant's responses. The original arrangement of the interview questions permitted me to provide students with my definition of *nursing informatics for undergraduate nursing students* before proceeding with the third interview question. During the first two interviews, I did not receive definitive responses to my first two questions, which were as follows:

1. What is your perception of undergraduate nursing students' use of nursing informatics during their nursing education?

2. Do you feel that undergraduate students have adequate nursing informatics competencies?

It therefore became clear that I would have to start each interview by providing the definition of *nursing informatics* that I had gleaned from my review of the literature.

Two other changes to the interviewing process occurred with respect to my questions about the use of search engines. The participants did not know the proper names of search engines, such as EBSCO, and their answers revealed vastly different levels of information literacy depending on their educational history. To make the participants' responses to the search-engine question more productive, I presented them

with a school library website that contained the names of databases housed in the library. In addition, after the third participant interview, I added probe questions to the interview protocol about the interviewee's educational history. The probe questions clarified data about the participants' educational history. I also asked probe questions to clarify participants' educational history during member checking of those early interviewees' transcripts.

At the end of the interview, I informed each participant that I would provide him or her with a transcription of the interview for confirmation that my rendering of the information he or she had provided was accurate. All interviews were audio recorded with a digital recorder. I saved and transferred the audio files to a secure drive for transcription. After each interview, I took the time to bracket my perceptions and to listen to the recording at least twice before transcribing the participant's responses. I then typed the transcripts by listening to the audio files several times and carefully comparing them to the transcription. Once transcribed, I forwarded a Word document to the participant for validation of the transcription. All participants agreed that the transcription was accurate.

The profile of each participant was initially numerical. After member checking and validation of the transcript by the participant, I started conducting the initial coding. Preliminary coding helped guide some questions and focus the probes while I continued to conduct the remaining interviews. Patterns began to emerge, and, after the ninth interview, I noticed repetition in the data provided. As I continued questioning and coding, I ascertained that no new patterns were emerging and that saturation had been reached. Because I had already committed to three more interviews, I proceeded to

conduct them. To keep the identities of the participants confidential, I stored the consent

forms, demographic questionnaires, and typed interview transcripts (i.e., hard copies) in a

locked cabinet at my home. I have also uploaded transcripts of the recorded interviews to

an NVivo version 11 program, which is stored on a secure flash drive.

Data Analysis

To immerse myself completely into the participants' experiences, I conducted

face-to-face interviews and then transcribed the interview responses while repeatedly

listening to the audiotapes. After validation of the transcripts through member checking, I

imported the transcripts into NVivo 11 and created a case classification node to store the

demographics. I autocoded each question, which made it easier to compare responses

from the participants. I used the word-frequency-query feature of the program to capture

the most frequently used words across the interviews.

First, I assigned pseudonyms as unique identifiers for the participants; then I

imported their transcripts into the NVivo program. I used NVivo 11 to organize and

manage the data. By storing all documents in the software program, I was able to link the

pseudonym-equipped transcripts to the demographic questionnaire and consent form of

each participant. I began the initial data analysis by using the word frequency feature of

the NVivo software, which allowed me to gain a feel for the manifestation of key

concepts from the data.

Second, I used the software's autocoding feature for the transcripts. Autocoding

regrouped data based on the interview questions. Autocoding allowed me to use

sentences to capture the meaning of codes and to identify the emergence of themes and

patterns for each question. Included in later sections, under Findings, are the results for both the word frequency quest and autocoding.

Evidence of Trustworthiness

Member checking took place after transcription of each interview. According to Babour (2001), member checking should be done to improve the accuracy, credibility, and validity of what has been recorded and transcribed. I e-mailed to each participant his or her transcript for member checking. All participants were encouraged to provide feedback on my interpretation of the interviews to increase credibility.

Data saturation, as Miles et al. (2014) pointed out, is another measure of credibility. When patterns and themes began to repeat with each additional interview, I knew that data saturation had been reached. At this point, I ended further recruitment of participants.

In this study, I achieved transferability of the results to other schools of nursing through the inclusion of detailed descriptions of the participants as well as the addition of the steps used for data collection and analysis. *Dependability* refers to the replicability of the study (Lincoln & Guba, 1985). To facilitate dependability of the study and to ensure data reliability, I used an interview protocol and two digital audiorecorders; this helped to minimize inconsistencies in questioning.

Lastly, I addressed confirmability through the use of a reflective journal, which I kept throughout the data collection and analysis process. In addition, the research documents of this study will be available upon request to confirm the findings. I intend to maintain the documents on file for 5 years, as required by Walden's IRB.

Thematic Presentation of the Findings

The four coding groups were a result of the literature review and the emerging themes noted in the interviews. The four final themes were (a) exposure to technology; (b) skills related to technology; (c) attitudes toward technology and patient care; and (d) recommendations. Table 2 is a visual presentation of the four themes, the connected subthemes, and the number reference nodes. He table highlights thematic data used as nodes that contained the interview responses. References in Table 2 were the node frequencies. Exposure to technology appeared to have the largest number of reference nodes.

Table 2

Themes and Subthemes

Themes	Subthemes	Reference nodes
Exposure to technology	Courses and clinical exposure	58
	Clinical access	
	Roles and relationships	
	Timing	
Skills related to technology	Competencies acquired before entering nursing education	19
	Commonly used databases	
	Challenges and successes with technology	
	Routine for gathering data for patient assignments	
	Skills most helpful with the transition to the workplace	
Attitudes and views regarding technology and patient care	Attitudes, views, and beliefs regarding the effect of technology on patient care	28
Recommendations	Suggestions and comments	14

Based on Moustakas (1994), I used open-ended questions to arrive at emerging themes. I also used horizontalizing, as suggested by Moustakas, to reduce the number of nodes. I selected sentences related to a node and added them to an existing node in NVivo. The goal was to develop a clear vision in one's mind of the current extent of the students' exposure to technology during their nursing education. This section includes themes and subthemes that emerged from the coding of the data and from running a word frequency query. I supported the themes and subthemes with quotes from the participants' interviews.

Themes Associated With Research Question 1

Research Question 1: What are senior nursing students' lived experiences of information management, information literacy, and computer literacy during their nursing education? Using the theme of *exposure to technology*, I asked participants questions regarding their exposure to technology.

Theme 1: Exposure to technology. This theme covered the nursing student participants' exposure to computer literacy, information literacy, and information management. The following subthemes became evident: Clinical and course exposures, access to technology, roles and relationships, and timing. To assist the participants, I provided the definitions of information literacy, computer literacy, and information management. This theme told of the participants' exposure and access to technology, and the roles and relationships that have assisted with students' gaining the technology exposure they possessed. Finally, it showed what the students perceived as the timing of their formal exposure to technology during their nursing education.

Subtheme 1: Course and clinical exposure. This subtheme examined course and clinical exposure of the participants. Second-semester senior participant Deborah gave an example of her exposure, as she stated,

> I think that in certain aspects, we do use informatics adequately. For example, in some courses, we use it for PowerPoint presentations and for our papers that we are required to submit. About patient care documentation, I do not think there is much.

Also, second-semester senior transfer student Carol's response was "yes" to the question whether her technological exposure was adequate. However, she emphasized that challenges were associated with her introduction to information literacy. Although Carol claimed adequacy of her exposure to technology, she expressed her exposure to information literacy in this way, "The school's library sent someone to our course to state that, if you ever need help with the databases, you can go to the library to seek assistance, but they did not walk us through using the databases." When asked about the information provided, she stated, "They will show you the nursing databases, and that's all." Also, when asked if the information was helpful? She stated,

> No. I wish they would have walked us through the different search engines and told us what makes them different. For instance, when you are researching certain things, there has to be a reason why one would pick one search engine over another. But I do not know what I am looking for or know which search engine to use. Search engine usage also gets tricky when the professor would ask for the credentials of the articles to be all nursing. They may have a way to do this, but I

am not aware of the knowledge. I picked up stuff like skill in retrieving data as I

moved through the program, but it may have been after I have gotten the

assignment back and the professor stated that the assignment submitted was

wrong.

Barbara felt similarly adequate with regard to her exposure to technology, but she

appeared to have difficulty with information literacy. She found that the library

presentation helped, as she elaborated on her exposure. She expressed, "I think we use

technology a lot for evidence-based papers and assignments in our classes." Regarding

information management, Barbara stated,

Some of the hospitals give a course, and in other hospitals, you have to figure out

how to access the EHR on your own. I was not comfortable with the databases.

After they showed us the databases, the library still made it clear they were

available to assist with our assignments. I think that, after having the session in

retrieval of data (in Fundamentals or one of my earlier classes during my nursing

education), I was able to figure it out. Finally, regarding the EHR, I feel that once

I started to get exposure to one system, they were all pretty similar and I was able

to figure it out.

Throughout the interviews, participants reported many be similar challenges with

their exposure to information literacy and information management. Donna spoke of her

exposure with information literacy in this way:

It was touched upon in classes that we have this great tool called the library, and

you should go and learn it. In Research [one of her classes], we learned about

some of the databases, but they only tell you about it, and they tell you what is out

there, but they don't sit down and be like this is how you do it. So, navigation no,

but yes to giving us resources they have said they have told us about.

Additionally, James felt that his exposure to information management was limited. He

described his exposure as follows:

I feel that we have had exposure to computers, though limited, in the clinical

setting. I feel I have gotten a good grasp of it. I also feel that, because I am

working as a nursing assistant, I have an even better grasp of it. I probably would

not have as much exposure with documenting patient care without the

employment exposure to the EHR. So, I feel I have had exposure, but not a lot in

electronically documenting patient care.

Finally, Carol spoke about her exposure to documentation in the patient record. She

described her exposure in this way:

I have been to a clinical setting, where we did not have any access. In another

hospital, my professor was the only one to have a log-on to the computer for the

clinical group. Where I am presently having my Clinical, we can review and

document under our names on the EHR. So, access to technology has varied.

However, with the blood glucose, we do not access the material to document our

result on the patient record. We can obtain the blood for the test from the patient,

but we will have another person log on to record it. The blood glucose machines

in the hospital have not yet been set up for the students.

When I asked the participants again, a little later in the interview, about anything they might want to add regarding their exposure, they provided some examples. James described an additional exposure with the comment, "The simulation laboratory was helpful. It gave me exposure to almost real-life situations." Patricia also spoke about exposure via simulation and intravenous pumps (IV); she said, "In the laboratory, they would set up simulations on the laptops, and we were exposed to electronic IV pump training as well as." Carol referred to her additional exposures as "intravenous and kangaroo pumps." She explained that "the kangaroo pump prompts you with questions. It is simple. I have also had exposure to finger sticks on glucometers and to ventilators."

Figure 2 provides a composite of examples of the technological equipment, identified by the participants, to which they had some exposure during their time in the nursing program.
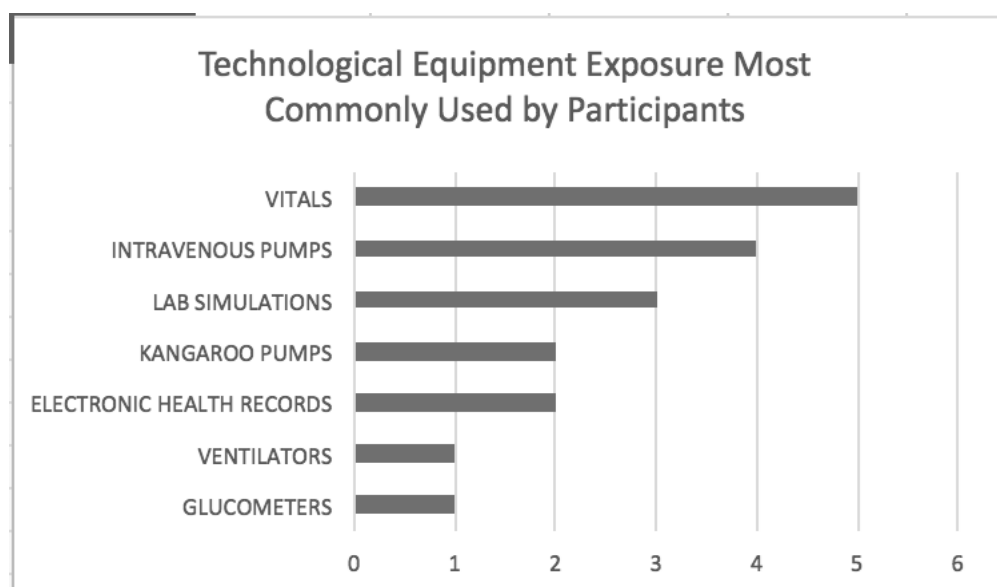
Figure 2. Number of times participants mentioned commonly used technological equipment during their nursing education.

Subtheme 2: Clinical access. This subtheme dealt with the participants' access to clinical information systems. The participants reflected on the benefits and the barriers of various experiences with access. James described his experience in these words, "Many of the hospitals do not allow students to document in the patient EHR. We are just allowed to look at documentation rather than doing our own documenting." When probed further regarding gathering information, James stated, "My instructor had us look at laboratory results and patient documentation, which helped me a lot. In the following semester, at another hospital, they were still doing most of their charting on paper."

The limited-access subtheme continued in the responses. Kathleen described her limitations, as well as some advantages when she was given access:

I had a few times when only the instructor had access. When only the faculty member had access, my student access time was limited to reviewing the EHR. Having been exposed to having my own access and also to having only faculty access, I found it much easier when you have your own access, and you were more independent in looking up patient information in the EHR.

Mary also talked about the limitation of access and timeliness of tasks when there was only faculty access for the group of clinical students. She also spoke of the benefits when students had their personal identification for access. Mary recounted her experience in these words:

It depends on the hospital. Some will give us [students] passwords, and then some would have only the clinical professor to have access. When only the faculty had access, it could be a little bit complicated if you have eight students who all want

to look up their patients at once. Or the trouble I saw was if the students wanted to

give medications and only the faculty clinical instructor had access. We would

have to wait because the information was only displayed one patient at a time

with faculty-only access. Sometimes the students administered patient

medications late. The limited access is only at some hospitals, and then some

hospitals give you [the student] your password identification, and that is

wonderful.

Finally, Barbara verbalized that, although her access varied, when she did have it,

she was able only to review data on the patient, but she was not able to document

anything. Barbara stated:

I have been to the clinical setting, where we did not have any access. In another

hospital, my professor was the only one to have a log-on to the computer for the

clinical group. Where I am presently having my Clinical, we can review and

document under our names on the EHR. So, access to technology has varied.

However, with the blood glucose, we are not able to gain access to document. We

can obtain the blood for the test from the patient, but we will have another person

log on to document. The blood glucose machines in the hospital have not yet been

set up for student documentation.

Subtheme 3: Roles and relationships that impacted the participants' exposure to

technology. This subtheme revolved around persons or things that may have assisted the

participant with acquiring exposure to technology. When asked how she knew about the

nursing databases, Kathleen responded, "I always got assistance from the librarians."

Additionally, she commented, "I would ask for help at the library or print a ton of articles and take them to my professors to ask which were good." Mary sought help from friends and colleagues who may have been working with her on some project. She stated, "If it's finding literature, and I played around with it and could not find anything, I would have to ask someone for assistance, for example, my fellow nursing students or friends." Barbara received the best support from her sibling; she recounted, "I have an older sister who would help me with navigating the databases. I have reached out to the library a few times, but it was mostly for interlibrary loans."

Figure 3 shows the number of people who, according to the interviewees, had provided them with some exposure to computer use and nursing informatics while they were enrolled in the nursing program.

Number of Persons Reported by Participants that Impacted their Technological Exposure to Databases

Category	Number of Persons
friend	1
sisters	2
students	3
professors	6
librarians	15
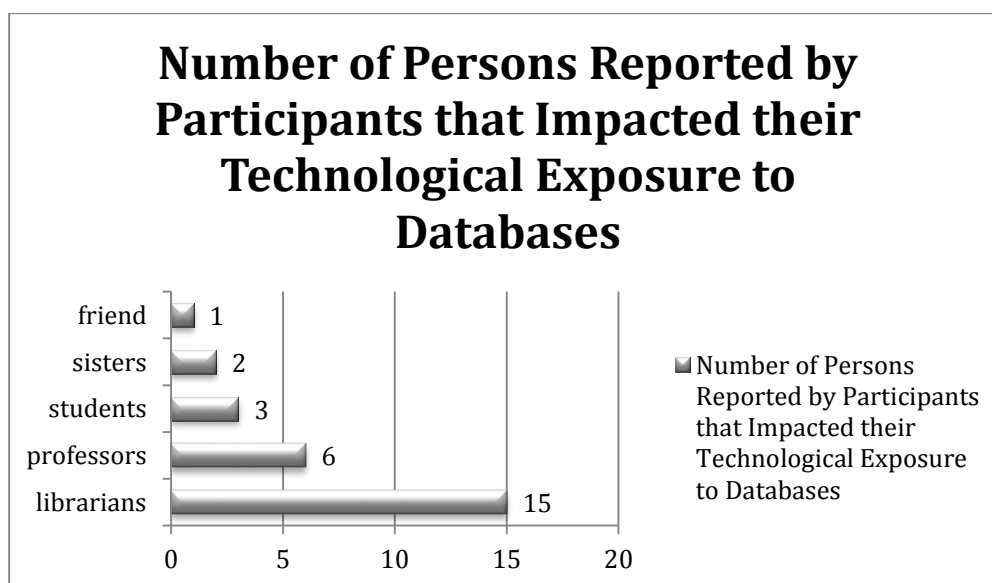
Figure 3. Librarians were the most commonly quoted group assisting nursing students with the use of information technology.

Subtheme 4: Timing. This subtheme dealt with the participants' perception of information literacy, computer literacy, and information management and how differences in timing may have impacted their exposure. It appeared that there were differences in timing of exposure between generic students, transfer students, and dual-degree students. Barbara, James, Mary, and Sandra were generic students. Barbara stated, "I believe we learned about the databases in my freshman year, when we had classes in the library. The librarian taught us how to use the databases." James recounted, "I had a 1-day class in FST in the library—a very quick class. It was fast and not all-encompassing." Mary also described the rapid run-through of the class day as she recalled, "We had a run-through in the library on how to get research articles. It was quickly done; 1, 2, 3; real fast. You forget about it the next day. There was no reinforcement. It wasn't helpful nor in-depth." When asked when she had this class, she thought, "It was, maybe, the sophomore year."

As a dual-degree student, Patricia described the integration of information literacy into her courses. She stated, "In most of my classes, if we had a research assignment, they would have someone come from the library to our class to explain how to use the databases and the strategies to use for research to find scholarly articles." Robert, who was also a dual-degree student, expressed it this way:

> We never had a course specifically, but it [instruction on retrieving information online] has been integrated into individual courses. There has never been a time that I sat down with a professor and they told me, 'This is how you retrieve the

information.' I knew it was offered through the library, but I had my first formal

exposure to how to recover data online, in my Research course.

Deborah, a transfer-student participant, reflected on her perception of the

assumptions made by faculty versus the reality of herself as a student. She related her

views in the following manner:

An example is that, the first time that I was able to access peer-reviewed articles, I

figured it out on my own. I only learned about how to access peer-reviewed

articles, in Research [the research course], which was in my junior year. The

assumption by the professors was that we all know how to do it [access peer-

reviewed articles]. When the professor in my Research course asked the class,

'You all know how to do this?' the answer was silence. So, thankfully, she stated

that she would show the class how to access peer-reviewed articles. Previously,

when I had to include peer-reviewed articles in papers, which I have had to do in

almost every course, I have been lucky to find what I needed. Thank you, Google,

because they have scholarly articles and you can search peer-reviewed journals. I

would also use the library system, but I was not sure how to navigate it. However,

learning how to access EBSCO and the other [nursing] databases in research

made my life a lot easier. Unfortunately, this learning only happened, in my junior

year.

Themes Associated With Research Question 2

Research Question 2 asked: What skills regarding information management,

information literacy, and computer literacy do senior nursing students have as a result of

their lived experience in nursing education? Using the theme *skills related to technology exposure*, I asked participants questions regarding their exposure to technology as related to the development of needed skills.

Theme 1: Skills related to technology exposure. This theme covered the nursing students' skill competencies regarding computer literacy, information literacy, and information management. The following subthemes emerged: technological competencies before entering nursing education, frequently used databases, challenges and successes experienced with technical expertise, and skills most helpful in the transition to the workplace.

Subtheme 1: Technological competencies acquired before going into nursing education. Mary, the participant who denied having any prior exposure, summed up her technology skills like this, "I did not like going to the computer. I was not into research anything. So, when I came to the nursing program, it was my first time using technology. I believe, I was a novice on the computer." Mary found her main deficit to be with computer literacy. As to her exposure to information literacy, she said, "I did not know where to start." Finally, about information management, she stated, "Before entering nursing school, I did not have any experience with documenting on the patient EHR."

To my asking about information literacy, Kathleen stated, "Yes. I did know how to find information. In my high school, we did a lot of projects where I did use databases online. Another participant, Karen, stated:

I have information literacy. I think professionally since my first degree because we always had to do a report or research. For instance, when I had to do a report

on a disease, in high school and for my first degree, I always had to retrieve

information. There was always an emphasis to make sure you are using reliable

sources.

Lastly, Donna replied with a resounding Yes to the question whether she knew about

databases, but then she realized she did not know about the nursing databases. She

reconsidered:

Nursing school is my second round of college. So, that's why I know the

difference between scholarly articles, but nothing about the nursing aspect. When

you come to a school, they want things done a particular way. There is a

particular environment. I cannot pull up something from Google and expect it to

be true. Writing a paper and being an older student, as well as a dual-degree

student—no offense, if I give false information or misinformation; that is not a

good thing. I know the difference between using the newspaper and using the

journals. You cannot use the press because everyone has their opinion. Opinions

are not facts.

Patricia also stated that, because she graduated from the college, she has had exposure to

databases. Her response was:

I fall about in the middle, not an expert, but not a novice. I knew how to use the

XXXXX databases and do research. So, I had a little bit of knowledge. However,

taking the 1-day classes was a refresher and necessary as they helped with how to

identify specific terminology to use. I was taught how to narrow topics down to

an area needed for the nursing assignment. It is always good to have a refresher

because I did not remember a lot of strategies.

Robert also had graduated from college, but he stated that he found out about the nursing

databases from his current professors. He said, "Before my first degree, no I did not have

a clue. During my first degree, which was psychology, we did use a lot of the databases,

and, sometimes, I might see the nursing databases." However, some participants denied

having acquired the specific skills to obtain data from nursing databases. Transfer student

Nancy stated:

Only a handful of times have I gathered information, but I probably did not go

about it correctly. I did not know how to differentiate the sources. I did not know

all the appropriate things to look for when gathering information. So, my

information was not as forceful. I did not know how to access the proper

information electronically. I did not come in with the skill set for looking up

information on the nursing databases. So, when I did have the exposure in my

Research class, I found it a bit overwhelming at first.

Sandra did not have the skill of information literacy before entering nursing

school. She stated, "I did not know about databases before going into the nursing

program. If you are speaking of the particular search engine to use, I got that information

regarding databases from freshman studies." Carol, a transfer student, did not have FST,

and she did not have exposure to databases at her previous college. She stated

specifically, "I did not have exposure to information literacy skills, as related to the

nursing databases, before entering the nursing program." Finally, Deborah stated, "Before

nursing school, my skill sets were minimal. I never had to gather information from peer-reviewed journal articles."

From the participants' answers to my questions regarding information management skills they might have acquired prior to entering nursing school, it became apparent that the skills specifically needed for information management or useful for accessing nursing databases were present only if the participant had worked in a health institution or a doctor's office. Robert, who had started working for a health system before entering the nursing program, claimed having the ability to document electronically on the patient's record. He explained, "I started working at a hospital, a couple of months before starting nursing school, as a patient care assistant." In addition, Patricia, who worked in a health institution, stated, "I worked in an outpatient psych unit that used technology. So, I had a little bit of exposure, but I feel that doing my Clinical in the hospital was different." Carol, a dental assistant before entering nursing school, commented, "I worked for a dentist as a dental assistant. We used the paper charts, but we would document the patient history on the computer. We were in between stages, where the patient chart was part paper and part computer." Lastly, Donna compared her familiarity with databases from the business world with what she encountered when she started nursing school. She commented:

> The EHR is like Excel with a bunch of drop downs. Sometimes you can input
> blood pressure, but, most of the time, it is from a preselected drop-down.
> Microsoft Excel is part of it. You can do v-lookups. So, yes, I am familiar with
> databases.

Subtheme 2: Databases frequently used and their reliability. The participants shared their information regarding databases and search engines they used for their assignments (listed in Figure 4). The participants contributed information on the databases and search engines they used as well the reasons for their choice. The most frequently quoted database and used most often for nursing assignments was EBSCO.

Participant Barbara stated that GALE and EBSCO were two of the databases she used; however, she pointed out her favorite by stating, "EBSCO is the one I use the most." Deborah said that she used "EBSCO, ProQuest, GOOGLE Scholar, and SAGE." She echoed Barbara in stating, "I primarily use EBSCO." Another database used and suggested as useful by Donna was CINAHL, the third-most reported databases of the six databases shown in Figure 4. Donna stated:

Oh, I Google everything. I use Google Scholar, CINAHL, and I use filters for peer-reviewed, keyword, and time articles. Unfortunately, I cannot remember a lot of databases. I usually use CINAHL, which is what I use for my critical care.

EBSCO was also mentioned first by James, who stated, "I often use EBSCO, ProQuest, and GALE."
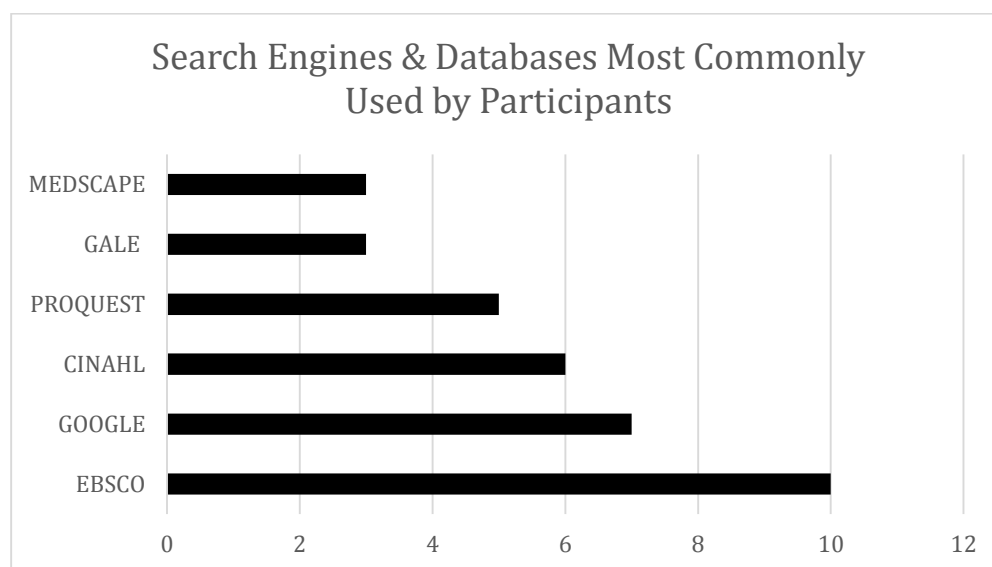
Figure 4. Search engines and databases most often used by participants.

Reliability and a peer-reviewed status appeared as the rationale for using databases and Websites. Robert stated, "As a student, you tend to go to the college databases and pretty much judge that everything on their Website is reliable." Patricia also added her reasons for using particular databases: They were provided by her professor and "because they were peer-reviewed." Nancy also stated that her instructor indicated that the library databases were reliable and that she should select articles from peer-reviewed journals.

Robert also mentioned Websites, as he remarked, "I know when I get information for research papers, they have to be from the library databases or from Websites ending in .gov or .edu." Barbara mentioned similar sites, as well as some that she would not use. She specified, "I was told to use .org, .edu, and .gov, but I don't use .com. I use the former because they are supposed to be more accurate information-Websites; other people can't just edit them like Wikipedia."

Subtheme 3: Challenges and successes with technology skills. This subtheme encompassed the challenges and success that participants experienced with technology in their clinical and course work. Barbara spoke of her difficulty with information management. She felt like being in a fog with documentation, as she commented:

> I would say that the EHR was a struggle at the beginning. I struggled with trying to figure out where to find information in the EHR, while in Clinical, and writing patient notes because I did not know how to do that type of documentation at all.

As a result of providing the definition of *information management* at the start of each interview (after the first three interviewees appeared to be mystified by my question), Sandra also talked about her difficulty with documentation technology during her Nursing Clinical:

> Well, now that you mentioned EHR, I still have difficulties with that because it has not been taught in a class setting, which I believe would be helpful. When we go to Clinical, and they say, 'Oh document this,' they do not show us, or they do not take the time to show or navigate through it because it is a lot of stuff. I still get confused with that type of things because it is not something that is focused on during our nursing education.

But sometimes the difficulty, or challenge, regarding information management was with the first-time exposure to equipment used in Clinical, as described by Mary, "A difficulty was probably just learning how the technology such as intravenous pumps worked." At other times, it could be a simple matter of information literacy, as, for

example, when one tries to access nursing databases from a different computer. Carol

described her first experience in this way:

> To access the college library, you have to type in your identification number
>
> which is about 18 digits long. So, when I would use the search engines from the
>
> home computer, I realized that, if I went to another computer, I needed my card.
>
> So, initially accessing technology was a problem.

Carol also experienced difficulty with information literacy in obtaining data for her

assignments: "I guess how to narrow down a topic. Sometimes, I know exactly what I am

looking for, and with filters, I should be able to narrow it down better." Deborah provided

a similar example for her difficulty, specifying, "I had a problem finding what I was

specifically looking for as sources in a paper. It might have been that I needed an exact

time frame, or it had to be exclusive to the topic that I was researching." However, she

did comment in her interview that she has learned to figure things out. Donna expressed

her difficulty with information literacy in this way, "Just getting a million hits." Her

strategy became to "keep it simple. In the beginning, I could not keep it simple, but now I

can." Karen denied having a challenge and expressed her dealings with technology like

this:

> I did not believe that there was anything difficult. I believed that it was a matter of
>
> getting used to it [technology]. It was always said that it was a whole different
>
> mindset. When you come into nursing, you have different things you want to look
>
> up. Sometimes, I was not properly trained on the system, so now I am trying to
>
> find the information without someone explicitly telling me where something is

found. But difficult? No, I think everything was manageable. I think that I can find what I need, but I think the first couple of times at a clinical site, it may be rougher to get what you need. I may not have gotten everything on the first go-around, so I may have to back and do it again.

The participants shared their challenges, but they also elaborated on their success stories. Carol shared the following, "I have made progress in information literacy. I feel comfortable going through the databases. I use it even when it is not required. I know now that the database is the accurate source to use to look up topics." James also communicated his successful progress with information literacy:

Probably, it is in my critical care course. I had to do an annotative bibliography. I found it so much easier, just finding the articles. I felt a lot more comfortable. Managing the length and finding articles that were relevant rather than having the extra information.

Kathleen saw her success in information management as indicated in her statement:

I was at a hospital that offered Web-based tutorials (WBTs) for their clinical information system in both medical and surgical Clinical. So after the WBTs, I got comfortable with the computer system. I also did an externship with the same health institution, so I became very comfortable with their computer system. They gave crash courses, which is great because it will benefit us in the long run.

Kathleen thought that computer skills would be beneficial for her future, as she pondered, "If I wanted to get a job there, it would be a positive attribute to know the computer system."

Subtheme 4: Routine for gathering data for patient assignments. Responses that constitute this theme described collecting data for clinical or course assignments. Barbara shared her perception of collecting data for a course assignment, "In the beginning, it was so much information. When I went to the databases, and there is like a million articles, and I would have to sift through them to find the right ones." When asked how she decided which articles to select, she responded, "I would grab the first few and if they worked, I would use them."

However, most participants, who responded to gathering data for patient assignments, viewed the question from the actions they utilized in Clinical. Patricia noted:

> In preparing for Clinical, the instructor would assign a patient to me, who I needed to look up the medications for; for example, what the actions and side effects were for the drug. We also needed to make a nursing diagnosis for the patient.

When asked what she use as a strategy for gathering the most useful information, Patricia explained it as follows:

> I used phone apps, which are convenient. I have a drug guide on my phone, which even calculates medications, and a nursing-diagnosis app. I found them helpful for nursing care plans, etc. So if someone had hypertension, it would give you a few nursing diagnoses. It is easier to carry them around than the book. I found it helpful when doing my care plans. They have apps for everything.

Deborah explained gathering data for her assignments by using popular online

Websites. She told that "in Fundamentals Clinical and Medical-Surgical Clinical, our

patient assignments were given the night before Clinical. We would get the patient's age

and medical diagnosis. I would research via the Internet." James also stated his usage of

online availabilities to prepare for his patient assignment. As he indicated that

> in the Clinical, I received the patient assignment the night before, and then at
>
> other times, it was given the same day. I think getting it before was helpful. I
>
> would go on GOOGLE to investigate the medical diagnosis, and I would have a
>
> preconceived view of what I should be looking out for as signs and symptoms for
>
> the patient.

Subtheme 5: Skills most helpful in the transition to the workplace. This

subtheme provided information on exposures that would be helpful in the participants'

transition to a health institution. For instance, Donna referred to her exposure to

information literacy and its influence on her transition to the workplace:

> If I want to reduce pressure ulcers and I need to find articles, I need to have
>
> reputable articles of what is out there on the subject. I cannot bring an article from
>
> Google. I know the difference between good and bad information because of my
>
> nursing education.

She further elaborated, "If I come out of XXXXX College, providing only useful

information, then I will be seen as respectable. But if I bring up misinformation, they will

question the school's standing. No one will listen to me." Robert also alluded to

information literacy and how it may assist in his transition to the workplace, "As much I

did not take advantage of what is available regarding how to navigate databases, one of the areas that always was stressed in my nursing classes was the importance of reliability and evidence-based research."

Other participants felt that exposure to information management would assist with their transition to the workplace. For example, Nancy stated, "The exposure to the patient record electronically—because I will be dealing with that every day. So that exposure is helpful. It might include a different program, but at least I will have some knowledge." Kathleen thought that the exposure to information management would make her marketable as she exclaimed, "I think that having the exposure in Clinical to the computer system! I am hoping it will be a selling point to have knowledge of the system."

Finally, there were some participants who chose both information management and information literacy as exposures that would enhance their transition to the workplace. James indicated that "the researching online" would be helpful. He commented, "I am now knowledgeable on how to access reliable information. Also, I believe documentation in the EHR is a good thing, as I now feel more comfortable." Kathleen also pointed to both information literacy and computer literacy in her response:

> I think that having the exposure, in Clinical, to the computer system. I am hoping it will be a selling point to have knowledge of the computer system. Also, the understanding of the nursing databases is valuable for any continuing education programs that I decide to go to.

Themes Associated With Research Question 3

Research Question 3: What are senior nursing students' perceptions regarding their lived experiences as they relate to information management, information literacy, and computer literacy for workplace competency and safe patient care?

Theme 1: Attitudes and views toward technology and patient care. Two subthemes emerged regarding this theme: attitudes and beliefs and recommendations.

Subtheme 1: Attitudes and beliefs. Regarding this theme, James commented positively, "I believe technology is beneficial to patient care as you can see a picture of the patient's progress. The documentation is more thorough, which probably enhances patient care." Similarly, Mary agreed, as she commented, "I think it's very helpful." When asked why, she responded, "Well technology used with the patient—for example, using an IV pump—can be more efficient, safer, and accurate." Robert as well viewed technology as increasing safety in patient care:

I think that the overall care of the patient is better because of programs such as Lexicon [used to look up medications]. I have seen health providers looking up medications. We also used Lexicon during our Clinical when we did not know about a drug. It gave the drug interactions, and health providers can access information quickly, which is an improvement to patient care management.

The positive attitude barely outweighed the number of mixed emotions expressed by the participants regarding the effect of technology on patient care. The participants with mixed attitudes and beliefs made positive as well as negative depositions regarding

technology and patient care. For instance, Patricia reported her mixed emotions by stating that, while technology provides some benefits, it also harbors some negatives:

> I am ambivalent about it. I know everything is going to the computer. It is easier and quicker. My ambivalent feelings, regarding the impact of technology, relate to patient interaction. When I go to a doctor's visit and the nurse comes in, she goes straight to the computer. There is minuscule face-to-face contact. They are asking questions and looking at the computer.

Karen described a similar attitude:

> Good and bad. I think that having the glucometer, the cardiac monitor does put things all together in one spot. The monitors, you look up and can see what the patient is doing. So, I think it is good in that way. It is quick and easy. But sometimes you just look at the numbers and don't realize that there is a person in the bed.

Nancy contended that there were benefits, but she was also concerned about potential mechanical problems that might occur:

> I think technology helps. It is better because it is easier to understand than when it's on paper. It keeps the patient safer as now you can better understand another person's writing, especially if it is a medication order. I think it's very organized online. But if we have an emergency, like a blackout, it could be a problem. It is safe and also educational.

Theme 2: Recommendations. Last, the participants provided recommendations, during their interviews, for what would improve their experience with technology. James, for example, suggested the following:

I believe it would be a good idea to incorporate information literacy more into the Freshmen Studies course or as a separate course. I think it would be helpful because it was a little bit challenging at first. I had all these papers due, and I was not able to find the articles in the right way. It was a challenge to make the adjustment from high school to college, where the databases were different. I think that, maybe, a longer session that is more detailed would be useful.

Kathleen thought that informatics should be integrated within courses and that students who may not have the necessary skill competency should receive the proper attention; she stated, "I think it necessary to incorporate informatics for some that may not have the foundation. Everything in health care is computerized; so it's important to have a knowledge of technology." Barbara also commented, "I think maybe not a whole course, but make it a more interactive class." Deborah, a transfer student, requested having exposure earlier as she commented:

I think the nursing program needs to add training. I did not learn about the databases until my junior year. Since everything that we do needs to be evidence-based, we need to have knowledge about the databases earlier than junior year.

Nancy also requested increased exposure as she stated:

I believe we should have more exposure when it comes to retrieving data. It

would be helpful so that, when I do have to refer to research as a nurse, it will

become easier to access. It was good exposure, but more would be even better.

Carol's recommendation related to information management, as she commented,

"I strongly feel a course would have also helped in finding the right place to document."

Mary also thought that a course should include information management because her

exposure in the Clinical was to various clinical information systems; she communicated:

I think we should have a course on how to research articles, as well as on the

different EHR in hospitals because they have many different systems. When you

go into a hospital and they ask you to document on a patient, it is an entirely

different system from the last hospital, and I do not know what to click. I think to

myself; I am not sure how to work this. I feel lost.

Sandra also recommended for the educational system to "teach us more about

EHR in school. It will help us navigate more around the patient record and find more

patient information, instead of me clicking around randomly for the information."

Last, Patricia's recommendation was to increase exposure to informatics as she

spoke about information management, "It is very interesting that during our nursing

education the emphasis is on basic technological skills and databases, but we do not get a

lot of exposure to information management." Robert's comment provided another area to

focus on within information management that he felt was at a deficit, "One of the things

is documentation. I do not recall getting much training in that area."

Summary and Transition Statement

In this chapter, I presented the lived experiences, as reported by senior-level nursing students, regarding their exposure to technology while they attended nursing school. To answer the research questions posed for this study, I interviewed 12 senior nursing students and produced data regarding their exposure to technology during their nursing education. I used NVivo 11 for data analysis. Significant data emerged that were related to the participants' educational history.

Chapter 5 includes an interpretative answer to the research questions, based on the results of the study and the themes deliberated in Chapter 4. Also included and discussed are the limitations of the study and recommendations for further research. Finally, I will conclude the chapter with social change implications.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of this qualitative phenomenological study was to explore and analyze the perceptions, attitudes, behaviors, and experiences of undergraduate students concerning exposure to technological competencies while enrolled in nursing school in the northeastern region of the United States. The Quality and Safety Education for Nurses (QSEN) project includes informatics as a required core competency for undergraduate nursing graduates (Cronenwett et al., 2007). This mandates that nursing programs place emphasis on student exposure to computer literacy, information literacy, and information management. Using the phenomenological approach, I determined that technological competency exposure is closely related to computer literacy exposure. There appeared to be a difference for undergraduate nursing students between exposure to information literacy and exposure to information management.

Interpretation of Findings

Four themes emerged from the literature review and the interviews with study participants to answer the research questions pertinent to exposure to technology, skills, attitudes and beliefs, and the impact of technology on patient care. Additionally, participants gave suggestions for enhancing their exposure during their nursing education.

Research Question 1

Research Question 1: What are senior nursing students' lived experiences of information management, information literacy, and computer literacy during their nursing

education? The theme *exposure* yielded three subthemes: course and clinical access, roles and relationships, and timing.

   Course and clinical exposure and access. All 12 participants related exposure to technology during their nursing education. The participants all agreed that there had been adequate exposure to technology in the classroom and in clinical environments during their nursing education. Using the Dreyfus (2004) model of skill acquisition in their senior year, the participants' exposure resulted in the participants being at the minimum level of advanced beginner with course and clinical exposure to technology. The senior participants all stated that they had had exposure to technology during their nursing education. A major challenge with technology during nursing education, as noted by the participants, existed with respect to information management. All participants in the clinical cited limited access to information management as a problem. In a study of student usage of the EHR, Jones and Donell (2011) reported that education and orientation appeared to be needed. These researchers emphasized the importance of teaching nursing students about patient information, confidentiality, and security. Nonetheless, the participants in the present study spoke of varied exposure as they revealed having various levels of access to technology with regard to patient information during their clinical rotation.

   The participants reported having read-only access to documents in clinical information systems. They conveyed that they sometimes had direct access and sometimes had limited access through a faculty person—a situation similar to the weakness noted in Beers and Gurdak's (2015) study, where the student participants found

it challenging to gain access to desktop computers during nursing clinical. A frequent

response by participants in this study was that hospital access depended on policy. The

participants shared mixed responses concerning the adequacy of their information

management exposure. They reported satisfaction as well as dissatisfaction with each

exposure.

When the participants did have access, they shared that they did not feel

comfortable with documentation. Mostly, the participants in this study reported that they

did not feel that they had adequate training on the clinical information systems. In a

survey of student nurses and midwives, it was reported that a key barrier to use of the

EHR was lack of training (Baille, Chadwick, Mann, & Brooke-Read, 2012). The

participants also reported that they experienced discomfort because documentation was

not emphasized during their nursing education. However, they saw the benefits of being

able to document and viewed documentation as a positive skill to have during their

nursing education.

Participants also responded to a question on additional technological exposure. In

the return results from running the most-frequent-words feature in NVivo 11 software

regarding the most reported technological equipment exposure among participants were

glucometers, *intravenous pumps*, *kangaroo pumps*, *laboratory simulations*, and

ventilators.

Roles and relationships subtheme. The participants also reported through the

word frequency search that those persons or things that most influenced participant

development regarding technological exposure to the online databases required for

assignments were the library, librarians, professors, colleagues, sisters, and friends. King and Lapidus (2015) reported that participants' use of librarians involved the necessary information skill set to contribute teaching content beyond a narrow library focus. Although many participants in this study proclaimed that they taught themselves the skill of information literacy, they did appear at times to use the librarians, which may have further developed their online retrieval data for assignments.

Timing subtheme. The participant interviews identified information literacy as a challenge. In examining the perceptions between generic, dual-degree, and transfer student participants' introduction to information literacy, the exposure to each appeared to differ with the participant's educational history. Participants who were generic students had early exposure in their freshman studies (FST) or a class within their freshman or sophomore year in the nursing program. The other eight participants were dual-degree or transfer students. These participants did not have to take Freshman Studies when they entered the nursing program. They spoke about getting instruction in information literacy pertaining to the nursing databases through integration of this content within their courses or within a research course that occurred during their junior year. Most generic participants responded that they wished for more time spent with the class offered during FST as well, as it could have been more interactive or could have occurred earlier in their studies.

Research Question 2

Research Question 2: What skills regarding information management, information literacy, and computer literacy do senior nursing students have as a result of

their lived experience in nursing education? The theme *skill competencies related to technology* yielded three subthemes pertaining to competencies before nursing education: challenges and successes with technology, routine for gathering data for patient assignments, and transition to the workplace.

Skill competencies related to technology subtheme. Only one participant denied having exposure to computer literacy before admission to nursing school. The majority of participants stated that they had exposure to computer literacy. This was consistent with the findings of Folami and Adeoye (2012), who reported in their study that overall, students recorded greatest competencies with respect to computer literacy. In the interviews, 11 of the 12 participants confirmed having exposure to and feeling comfortable with technology before entering the nursing program. Using the framework of Bandura's (1991) self-efficacy and Dreyfus's skill acquisition model (Benner, 2009), most senior students appeared to be advanced beginners in computer literacy and had the tools of computer literacy needed to master experiences in order to progress with information literacy and information management.

Challenges and successes with technology subtheme. Only one participant denied having the skill competency of computer literacy. However, most participants stated that their challenge was with information literacy. Many participants expressed a range of skills in relation to information literacy. It surfaced that for most participants, differences in exposure to information literacy skills appeared to be related to their education history. For example, some participants interviewed were from high school. Their technology exposure occurred during their freshmen year. For others who had

another degree or were transfer student participants from another college, technology

exposure appeared much later.

The participants shared their difficulties and successes with technology during

their nursing education. Although one participant shared a lack of exposure to computers

before entering the nursing program, in reviewing interview transcripts, I found that none

of the participants commented about challenges with computer literacy during their

nursing education. A major challenge quoted by the participants was information

management, with an emerging theme being documentation on the patient's chart.

The participants provided information on a few experiences regarding their skill

exposure during nursing education. For example, they felt that information literacy was

encouraged, which was in compliance with the recommendation of QSEN (Sherwood &

Barnsteiner, 2012) that students rely on research to develop an evidence-based practice.

In discussions, most participants were knowledgeable of the databases and discussed the

reliability of the college databases and search engines as the reason they used them. The

participants reported that professors as well as librarians had instilled in them that certain

databases were reliable and peer reviewed. In addition to databases, participants

mentioned websites that were acceptable to use to gather information for assignments.

The participants described websites with .org, .edu, and .gov domain names as having

reliable information.

Routine for gathering data for patient assignments subtheme. A paradigm

shift was displayed as participants moved away from books and went online for

preparation of their nursing clinical and course assignments. During their nursing

education, in their clinical and course assignments, participants claimed that they were initially overwhelmed with instructor requests to gather information, given their limited exposure to information literacy. This is consistent with the research of Edwards and O'Connor (2011), who reported that some beginning students felt course overload and were not ready because of inadequate technology skills and their informatics comfort level. Initially, the participants were novices in the use of databases. All of the participants appeared to have needed to obtain the necessary tools for online retrieval and to have a period to adjust to the newness of nursing databases.

Transition to the workplace subtheme. Finally, the participants imparted that they felt that technology exposure assisted in their transition to the workplace. However, Feng and Tsai (2012), in their qualitative descriptive study, reported that the participants felt that the transition from new graduate nurse to practicing nurse was stressful. The views of participants in this study varied regarding how their exposure would assist in their transition to the workplace. Some participants mentioned information literacy exposure, others mentioned information management, and others mentioned both. Mitchell (2015) contended that the relationship between individuals feeling more confident and their competence should be explored further. Overall, participants gave a positive response to the question regarding exposure to technology but suggested that even more would have been helpful.

Research Question 3

Research Question 3: What are senior nursing students' perceptions regarding their lived experiences as they relate to information management, information literacy,

and computer literacy for workplace competency and safe patient care? The theme *attitudes and views toward technology and patient care* provided one subtheme.

Attitudes and views toward technology and patient care subtheme. The views of the participants appeared to be a double-edged sword, as reflected in their statements regarding attitudes and beliefs. Some of the participants shared that they had mixed emotions toward technology as it related to patient care. They saw positive and negative aspects of technology in this regard. In a study on attitudes and barriers of postbasic students in relation to technology, it was found that 93.3% perceived that technology improved patient care in nursing practice (Nkosi, Asah, & Pillay, 2011). Although participants appeared to express positive and negative aspects of technology, they appeared to support technology use in patient care.

Recommendations From Comments by Participants

The subtheme identified from the comments of the participants was that they requested further education on clinical information systems during their nursing education. This subtheme regarding students needing more training during their nursing education is in agreement with Bartholomew and Heart's (2011) study, which indicated that the etiquette of clinical information systems needed reinforcement to be performed in the classroom. The authors (Bartholomew & Heart, 2011) also stated that the core principle for safe practice of technology should be addressed in the curriculum. In addition, the participants commented that there is a need for personal access to clinical information systems, which is consistent with the recommendation of students in a study by Beers and Gurdak (2015). The comments and recommendations displayed the

participants' acceptance of and readiness for technological exposure and development of their technological skills.

Limitations

The study examined the lived experiences of 12 senior students in relation to technology exposure during their undergraduate nursing education. The study's aim was to gain an understanding of the lived experience of senior nursing students. The use of a single site was a limitation of the study. The sample size of 12 participants and data collection from only one nursing programs were noted as limitations. Due to limitations of sample size and data collection, the study findings may not be generalizable to a larger population. Additionally, the sample was restricted to senior nursing students, which resulted in the findings not being generalizable to all levels of nursing populations.

Another important limitation of this research related to the participants' demographic makeup. The sample consisted of generic, transfer, and dual-degree nursing students. The research did not control for the educational history of the participants. Therefore, participants' varied educational histories may have weakened the strength of the findings of the study. This limitation may also affect the generalizability of the study findings.

Finally, the self-assessment of skills by the participants in the interviews may have introduced the potential for errors in accuracy, in that participants may have over- or underreported their competency. Mitchell's (2015) study reported inconsistencies between participant confidence and competence. Specifically, Mitchell found that in relation to electronic documentation, new nurses expressed more confidence than was

supported by their actual competence. The confidence of the participants may result from their proficiency with computer literacy skills, which they may transfer to other technological competencies.

Recommendations

Recommendations for future research include further validation of students' perceptions. For example, it may be beneficial to conduct a quantitative study to examine self-efficacy of undergraduate students' skills in nursing informatics. Future researchers could use a standardize test to examine the self-efficacy of student competencies, as it relates to computer literacy and information literacy upon entering the nursing program. Also, a standardize test should be issued for information management as the student exits the nursing program. Finally, a larger scale study that would include more nursing programs could assist in generalizability of the findings. Another recommendation for future researchers is to examine faculty expectation of technological standards for nursing students.

Social Change Implications

Dissemination of study findings to nursing program administrators may inform on how to improve student exposure to technology. In a self-report study, the core competencies most used in course and clinical objectives accounted for more than half of course objectives at 56% (Morris & Hancock, 2013). The core competencies and their percentage were patient centered care (39%), evidence based practice (8%), informatics (5%), and interdisciplinary teams (4%). With the rise in technology in health institutions, informatics placed at only 5% may need to increase. The social change implications of

this study's findings have the ability to influence policy as it relates to nursing curriculums.

Technological standards may be required for nursing students to have upon graduation. The change may also lead to increasing the percentage of informatics within undergraduate nursing curriculums. In addition, faculty can use the data to begin to provide a uniform integration of nursing informatics into the undergraduate curriculum. Although their remains the need to for standards, earlier research does recognize the need for standardized training (Baille, Chadwick, Mann, & Brooke-Read, 2012). Thus, the positive social implication is that nurse graduates will be presented with a uniform set of skills to make a smooth transition to working in an electronic environment.

Conclusion

The conceptual frameworks of Bandura's (1997) self-efficacy theory and the Dreyfus model of skill acquisition (Benner, 2009) helped examined the exposure and perceptions to technology for senior nursing students. There appeared 1 novice and 11 advance beginners to computer literacy. Because of the knowledge and exposure to technology during their nursing education, participants' self-efficacy was increase and students may be able to make a smoother transition to the workplace. Regarding technology, the frameworks of Dreyfus noted different levels of skill acquisition noticeable of participants' discussion at nursing program in the beginning related to education history. Skill acquisition appeared to become increasing uniformed by the senior year of nursing education.

In this study, I interviewed 12 senior nursing student participants, who self-assessed their technology exposure, skill proficiency and obtainment, as well as their view of technology impact on patient care. The interviews provided data that address technology needs of the participants based on their educational history. The study found that most participants appeared confident about computer literacy before entering the nursing program and during their status as a student. The participants' status of their position on information literacy varied depending on their education history. Although most participants revealed to be comfortable with computer literacy, more exposure may be needed regarding information management and information literacy. Positive social change for health services are that the findings of the study may influence faculty decision regarding uniformly adding and increasing the percentage of informatics within the curriculums. The acknowledgement of the need of standards may allow faculty to consider providing uniform technological exposure for undergraduate nursing students.

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Appendix A: Demographics Questionnaire

1. Are you at present a student of the primary researcher?

    a. Yes ___

    b. No ____

2. Highest year in Nursing School

    a. Freshman ___

    b. Sophomore ___

    c. Junior ___

    d. Senior ___

3. Do you agree to be interviewed (45-60 minutes) for this research?

    a. Yes ___

    b. No ___

4. What is the best way to communicate with you? Please enter details of the communication medium to use?

    a. E-mail _____

    b. Text _____

    c. Phone _____

    d. In person _____

    e. Skype

5. Gender

    a. Male ___

    b. Female ___

6. Race or ethnicity _____

7. What is your age?

    a. 18-25 ____

    b. 25-50 ____

    c. 50+ ____

8. Did you have any formal computer training prior to admittance to Nursing

    School?

    a. Yes ____

    b. No ____

9. Would you be interested to hear about the finding of this research?

    a. Yes ____

    b. No ____

Appendix B: Informed Consent Form

You are invited to participate in a research study about the exposure to technological competencies in undergraduate nursing education. The researcher is inviting senior nursing students to be in the study. This form is part of a process called "informed consent" to allow you to understand this study before deciding if you want to participate. The researcher named Patricia Bennett, who is a doctoral student at Walden University, is conducting this study. You might already know the researcher as faculty, but this study is separate from that role.

Background Information:

The purpose of this study is to explore the technological exposure that nursing students perceived themselves to have had during their nursing education.

Procedures:

If you agree to be in this study, you will be asked to:

- Partake in a face-to-face interview (approximately 45 minutes), as well as a follow up meeting to review interview transcripts, and confirm the validity of the researcher's interpretation (approximately 15 minutes). .
- **Agree to be audio taped**.
- Agree to complete a demographics form.
- Agree to the publication of findings in a dissertation and possibly a journal article.

Here are some sample questions:

1. In your undergraduate nursing education, were you able to access technology such as e-mail, the Internet, or library and educational software (e.g., to learn about growth and development)?
2. During clinical, did you or your faculty have access to the EHR used in the health institution?

Voluntary Nature of the Study:

This study is voluntary. Everyone will respect your decision whether or not you choose to be in the study. There is no penalty if you decide not to be part of the study. If you decide to join the study now, you can still change your mind later. You may stop at any time.

Inclusion/Exclusion of Participants

In order to reduce a conflict of interest, I do not wish to use students who are currently in my course.

Risks and Benefits of Being in the Study:

Being in this study does not pose any risk to your safety. The potential benefits are that nursing education will gain insight into the technological skill sets needed by undergraduate nursing students.

Payment:

<mark>A thank you gift of $5 will take place between researcher and participant after completion of the 2nd interview.</mark>

Privacy:

Any information you provide will be kept confidential. The researcher will not use your personal information for any purposes outside of this research project. Also, the researcher will not include your name or anything else that could identify you in the study reports. Reporting of the data will be in aggregate form. Additionally, the researcher will assign participants an alphanumerical code. Secure storage of the data after the dissertation is approved will be in a fireproof, locked filing cabinet. The participants' data will be kept on a flash drive and on software that will be password protected. Data must be kept for 5 years after completion of the study, as required by the university; then they will be destroyed.

Contacts and Questions:

You may ask any questions you have now. Or if you have questions later, you may contact the researcher via pbenn001@waldenu.edu. If you want to talk privately about your rights as a participant, you can call Dr. Leilani Endicott. She is the Walden University representative who can discuss this with you. Her phone number is 612-312-1210. Walden University's approval number for this study is **05-09-16-0095009** and it expires on **May 8, 2017.**

The researcher will give you a copy of this form to keep.

Obtaining Your Consent

If you feel you understand the study well enough to make a decision about it, please indicate your consent by signing below or replying to this e-mail with the words, "I consent."

Informed Consent Form Printed Name of Participant

_____

Date of consent:

_____

Participant's Signature:

_____

Researcher's Signature:

_____

Appendix C: Interview Protocol

Date:_____   Location: (telephone? Interview Room?)

Interviewer: _____   Interviewee (initials): _____

Recording Device: Folder: Date   Time Started: _____
File # _____
Ext. _____   Time Completed: _____

Script (use as needed)

"Thank you for agreeing to answer these few questions I've developed for my dissertation research project where the purpose is to examine "the senior student exposure to technological competencies in undergraduate nursing education." **Review and have participant sign consent form** (provide a copy to participant)**.** As you probably know, I would like to ask a few specific questions about you in the program. The interview will be approximately 45 minutes I will be recording this interview and transcribe it, but your (**Confidentiality**) identity will be not be shared when we compile responses from other senior nursing students who are in the undergraduate program. Can I assume that you know this is for research but, nonetheless, your participation and whatever you might disclose is voluntary and you can stop at any time?" (Wait for response).

It is nice to meet you. How is the semester going?

"OK. Here are a few specific questions that I will obtain before starting the recording to protect your identity. Tell me about your back ground."

1. Gender

    a. Male ___

    b. Female ___

2. What is your age? _____

3. Do you agree to be interviewed (45 min+ 15 min) for this research?

    a. Yes ___

    b. No ___

4. Current year in Nursing School

    a. Freshman ___

    b. Sophomore ___

    c. Junior ___

    d. Senior ___

5. Is this your first semester or second semester at this level?

6. What is the best way to communicate with you? Please enter details of the communication medium to use?

    a. E-mail _____

    b. Text _____

    c. Phone _____

    d. In person _____

7. Race or ethnicity

    a. American Indian/Alaskan Native

    b. Asian/Pacific Islander

    c. Black/African American

    d. Hispanic/Latino

    e. White/Caucasian

    f. Other

8. Did you have any formal computer training prior to admittance to Nursing School?

    a. Yes ___

    b. No ___

9. Are you presently working in a health institution?

    a. Yes___

    b. No___

10. Would you be interested to hear about the findings of this research?

    a. Yes ___

    b. No ___

"Again, thank you for your participation. I would first like to define a few terms: Computer literacy, information literacy, and information management. Now I would like to start to record and ask you a few questions about your technological experiences in nursing school?"

The following terms are defined for the interview:
    Computer skills and computer literacy: The basic functions used by individuals with information technology (Staggers, Gassert, & Curran, 2002).
    Informatics: Helps to manage care through documentation, utilize skill in computer literacy to retrieve information as it relates to patient care management (Sherwood & Barnsteiner, 2012).
    Information literacy: The ability to recognize when information is needed, to locate, evaluate, and use the information effectively. Additionally, information literacy is interwoven and supported by information technology (American Library Association, 2015).
    Information management: documenting patient care and nursing practice on-line; accessing information; using data and information; coordinating information flow electronically (Stephens-Lee, Lu, & Wilson, 2013).

*1.What is your perception of undergraduate nursing students' use of nursing informatics during their nursing education?

*2. Do you feel that undergraduate students have adequate nursing informatics competencies?

*3. During your nursing education, have you ever had a course on how to retrieve data online that was pertinent to the health sciences or your assignments related to your patient care?

*4. Before you entered nursing school describe the use of your technology skills?

*5. Can describe any difficulties/successes you may have had at the beginning of you nursing education with regard to accessing technology?

*6. What databases or search engines do you frequently use to complete your nursing assignments?

*7. Tell me about your technology exposure (additional information).

*8. What were the challenges or successful strategies utilized in your use of technology and what skills did you feel you needed to use to gather information for patient management?

*9. Describe an example of technology usage when you had to gather information about a patient you were assigned to take care of for clinical or report on an illness that you patient may have had in the hospital?

*10. During clinical did you have access to technology used in the hospital to assist with patient care?

*11. During your nursing education, how do you feel technology /nursing informatics has affected the quality of patient care?

*12. What stands out in your technological exposure as something that will help you transition into the workplace?
*13. Comments?

You have been so helpful. I really appreciate the time you've taken to talk with me. Thank you for your participation. I appreciate the time you took for an interview. Your responses from this interview or any future interview will be kept confidential. I have included information A copy of the interview transcript will be e-mailed to you to confirm accuracy and I will also contact you to clarify or validate the transcript.

Field notes

Appendix D: Approval by the Institutional Review Board of Walden University

Dear Ms. Bennett,

This e-mail is to notify you that the Institutional Review Board (IRB) has approved your application for the study entitled, "Senior Students' Technological Competencies in Nursing Education: Experiences, Perspectives, and Attitudes," conditional upon the approval of the research partner, as documented in the partner's signed notification of approval, which will need to be submitted to the Walden IRB when obtained. The researcher may not commence the study until the Walden IRB confirms receipt of that notification of approval.

Your approval # is 05-09-16-0095009. You will need to reference this number in your dissertation and in any future funding or publication submissions. Also attached to this e-mail is the IRB approved consent form. Please note, if this is already in an on-line format, you will need to update that consent document to include the IRB approval number and expiration date.

Your IRB approval expires on May 8, 2017. One month before this expiration date, you will be sent a Continuing Review Form, which must be submitted if you wish to collect data beyond the approval expiration date.

Please note that this letter indicates that the IRB has approved your research. You may **NOT** begin the research phase of your doctoral study, however, until you have received official notification from the IRB to do so. Once you have received this notification by e-mail, you may begin your data collection. Your IRB approval is contingent upon your adherence to the exact procedures described in the final version of the IRB application materials that have been submitted as of this date. This includes maintaining your current status with the university. Your IRB approval is only valid while you are an actively enrolled student at Walden University. If you need to take a leave of absence or are otherwise unable to remain actively enrolled, your IRB approval is suspended. Absolutely NO participant recruitment or data collection may occur while a student is not actively enrolled.

If you need to make any changes to your research staff or procedures, you must obtain IRB approval by submitting the IRB Request for Change in Procedures Form. You will receive confirmation with a status update of the request within 1 week of submitting the change request form and are not permitted to implement changes prior to receiving approval. Please note that Walden University does not accept responsibility or liability for research activities conducted without the IRB's approval, and the University will not accept or grant credit for student work that fails to comply with the policies and procedures related to ethical standards in research.

When you submitted your IRB application, you a made commitment to communicate both discrete adverse events and general problems to the IRB within 1 week of their occurrence/realization. Failure to do so may result in invalidation of data, loss of academic credit, and/or loss of legal protections otherwise available to the researcher.

Both the Adverse Event Reporting form and Request for Change in Procedures form can be obtained at the IRB section of the Walden website: http://academicguides.waldenu.edu/researchcenter/orec

Researchers are expected to keep detailed records of their research activities (i.e., participant log sheets, completed consent forms, etc.) for the same period of time they retain the original data. If, in the future, you require copies of the originally submitted IRB materials, you may request them from Institutional Review Board.

Both students and faculty are invited to provide feedback on this IRB experience at the link below:

Sincerely,
Libby Munson
Research Ethics Support Specialist
Office of Research Ethics and Compliance
irb@waldenu.edu
Fax: 626-605-0472
Phone: 612-312-1283
Office address for Walden University:
100 Washington Avenue South, Suite 900
Minneapolis, MN 55401

Appendix E: Approval by the Institutional Review Board of XXXX College

Institutional Review Board
XXXX
Tel. XXX.XXX.XXXX
Tel. XXX.XXX.XXXX

Date: June 27, 2016
To: Patricia Bennett
From: XXXXXXXX XXXXX, Ph.D.
Co-Chair, XXXXXX Institutional Review Board
XXXXX XXXX, Ph.D., RN
Co-Chair, XXXXXX Institutional Review Board
SUBJECT: XXXXX IRB REVIEW AND DETERMINATION OF EXPEDITED STATUS
Study Title: Senior Students' Technological Competencies in Nursing Education: Experiences,
Perspectives and Attitudes

Approved: June 27, 2016
Approval No: 16020514-0627

Dear Patricia:

The Institutional Review Board (IRB) of XXXXX

 College has reviewed the above-mentioned research proposal and determined that this proposal is approved by the committee. It is considered an EXPEDITED review per the requirements of Department of Health and Human Services (DHHS) regulations for the protection of human subjects as defined in 45CFR46.101(b) and has met the conditions for conducting the research. Please note that as Principal Investigator (PI), it is your responsibility to be CITI Certified and submit the evidence in order to conduct your research.
You may proceed with your research. Please submit a report to the committee at the conclusion of your project.
Changes to the Research: It is the responsibility of the Principal Investigator to inform the XXXXXX College IRB of any changes to this research. A change in the research may change the project from EXPEDITED status that would require communication with the IRB.

Sincerely,
XXXXX XXXXX, Ph.D.
XXXXX XXXXX, Ph.D., RN

Institutional Review Board

XXXXXX

Tel. XXX.XXX.XXXX
Tel. XXX.XXX.XXXX

Date: August 2, 2016
To: Patricia Bennett
From: XXXXXXXX XXXXX, Ph.D.
              Co-Chair, XXXXX College Institutional Review Board
              XXXXXXXX XXXX, Ph.D., RN
              Co-Chair, XXXXX College Institutional Review Board

**SUBJECT: XXXXXX IRB REVIEW OF AMENDMENT TO PREVIOUSLY
APPROVED STUDY**
Study Title: Senior Students' Technological Competencies in Nursing Education:
              Experiences, Perspectives and Attitudes
Approved: August 2, 2016
Approval No: 16020514-0627

Dear Patricia:

The Institutional Review Board (IRB) of XXXXXX College approves the amendment to
the above-mentioned study that was previously approved as an EXPEDITED review per
the requirements of Department of Health and Human Services (DHHS) regulations for
the protection of human subjects as defined in 45CFR46.101(b) and has met the
conditions for conducting the research. The amendment involves soliciting participants
and providing a thank you gift of five dollars or less.

Changes to the Research: It is the responsibility of the Principal Investigator to inform the
XXXXXX College IRB of any changes to this research. A change in the research may
change the project from EXEMPT status that would require communication with the
IRB.

Sincerely,

XXXXX XXXXX, Ph.D.

XXXXXX XXXXX, Ph.D., RN

Appendix F: Invitational E-mail Letter

Dear Student

Congratulations on making it to the senior year! As a doctoral candidate and as part of my doctoral requirements for a PhD, I am conducting a research study to gain insights into the exposure to technological competencies for undergraduate nursing students at XXXXX College and I would like for you to participate. I should also mention that I am faculty at XXXXX College.
Your participation will consist of an initial face to face individual interview and a follow-up telephone interview. The data gathered from your interview will provide an increased understanding for nursing education regarding technology competencies that hopefully, will be incorporated as standards into undergraduate nursing education curriculums.

There are no foreseeable risks or hazards to you as a participant, and your participation is strictly voluntary. The participants' information will be confidential and the data reported will be in aggregate form. Additionally, the participants can choose at any time to withdraw from the study without penalty. Maintaining your confidentiality will be my primary concern.

Your participation will contribute to valuable research and the results will be available to participants who request to see them. The individual interviews should take initially 45 minutes and a follow-up second interview lasting 15 minutes. If you decide to partake in the study, I e-mail the consent form for your perusal but I will also review it with you during our initial interview and will give the consent to you to keep as a contract of our agreement.

This study has been approved by XXXXX College IRB. If you have any questions, or agree to partake in the study, please e-mail me at pbenn001@waldenu.edu.

Thank you for your consideration of participating in this study.
Best regards

Patricia Bennett, MS MBA RN
PhD Candidate
Walden University