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A Study Identifying Information Technology Development Strategies for Nursing Professional Development Specialists Practicing in Healthcare Settings

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The University of Southern Mississippi

A STUDY IDENTIFYING INFORMATION TECHNOLOGY DEVELOPMENT STRATEGIES FOR NURSING PROFESSIONAL DEVELOPMENT SPECIALISTS PRACTICING IN HEALTHCARE SETTINGS

by

Tammy LaBlanche Baker Means

Abstract of a Dissertation
Submitted to the Graduate School
of The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy

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ABSTRACT

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May 2015

The increased use of information systems (IS) in healthcare institutions, federal health information technology (IT) policy mandating the use of information systems in patient care, and the nursing informatics agenda force healthcare organizations to address the informatics competency of its workforce (Murphy, 2010). This study validates IT competencies for Nursing Professional Development (NPD) Specialists and determines self-directed, informal learning strategies for developing information technology competency. The NPD Specialist is responsible for the professional development of nursing caregivers in healthcare settings.

This study validated 53 IT competencies for the NPD Specialist role in healthcare settings. The validated competencies include current healthcare technology, federal health IT policy, evidence-based practice, and other necessary topics within healthcare. This study regarded 41 competencies (of the 53 validated IT competencies) as high importance, or *essential*, to the NPD Specialist's role in healthcare settings today. Strategies were also identified for developing the *essential* IT competencies. The NPD Specialists and leaders within healthcare organizations can use the validated essential IT competencies and development strategies from this study to build IT competency amongst its workforce (ANA, 2010).

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May 2015

DEDICATION

First and foremost, I must acknowledge Jehovah God for providing me the knowledge, will power and know how to accomplish such an intense undertaking. I would like to dedicate this accomplishment in my academic career to my two biological babies, Kennedy Talia "Sweet Pea" and Kenneth Akili "KM3". You two cannot imagine the sacrifices Mommy has gone through to continue achieving. Watching you two helps me strive for the highest of excellence.

For the love of my life, husband Kenneth Neal Means, Jr… Ephesians 5:28-31. Daddy & Mama, you two said I could do it…And I Did! Daddy, your intelligence and faith in your baby girl married with Mama's sacrifice and endurance produced a strong-willed young lady who will never gives up improving herself. I offer a special thanks to my blessed Roderick, Kalen, and Jikeela for their love for their second mommy.

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CHAPTER I

INTRODUCTION

Healthcare organizations have used IT since the early 1970s, but are presently implementing IT at increasing rates to improve healthcare quality and cost (Institute of Medicine [IOM], 2001). Problems within the U.S. healthcare delivery system have increased healthcare costs and decreased patient care quality (Kovner & Knickman, 2008). The IOM (1999, 2001) illuminates the lack of healthcare safety by revealing the number of lives lost due to medical errors. The Executive Office of the President (2009) identifies four causes of inefficiencies and disorganization in the U.S. healthcare delivery system. These causes provide a description of patient care quality: (a) receiving high cost, low-value treatments; (b) obtaining too little of certain types of high value care; (c) receiving care in settings that are not cost-effective; and (d) receiving extensive discrepancies in the quality of care provided (Executive Office of the President, Council on Economic Affairs, 2009; Shi & Singh, 2009). These issues need to be addressed to improve patient care quality (Shi & Singh, 2009).

President Barack Obama's stated goals of lowering healthcare costs, reducing medical errors, and improving healthcare quality by computerizing the nation's health record, constitute a substantial amount of financial and human resources (Blumenthal, 2009). The government mandate for full implementation of EHRs requires the use of information systems in delivering, documenting, and obtaining reimbursements for improving patient care (Hersh, 2010). It is essential healthcare organizations strategically use existing workforce and technologies to accomplish policy goals.

Healthcare providers and organizations that use EHR technology based on criteria set by the U.S. Federal government to increase healthcare quality and effectiveness for a consecutive five years can receive incentive payments from the Federal government (State Alliance for E-Health, 2009). The Federal government supports the adoption and use of EHRs by making available incentive payments totaling up to 27 billion dollars over 10 years, or as much as $44,000 (through Medicare) and $63,750 (through Medicaid) per clinician (Blumenthal & Tavenner, 2010). Payment adjustments began in 2015 whereas a provider who does not successfully demonstrate Meaningful Use of certified EHR technology systems will lose 1% of Medicare funding each year until the payment adjustment reaches 95%. The funding will be used to provide support for a nationwide system of EHRs (American Recovery & Reinvestment Act, 2009; Blumenthal & Tavenner, 2010; State Alliance for E-Health, 2009).

Federal policy recognizes the benefits of using IT in providing healthcare. Using information systems may improve patient care quality (Shi & Singh, 2009). Federal goals include developing a nationwide health information technology system. As healthcare institutions face challenges in implementing IT, its workforce will also experience changes that impact job competencies (Blumenthal & Tavenner, 2010). Initiatives such as the nursing informatics agenda, drives the need for an informatics-competent workforce (Fetter, 2009; Murphy, 2010). The largest healthcare workforce and primary caregivers for patients are nurses—making nurses essential operators of health IT (ANA, 2008; Dixon & Newlon, 2010; Skiba & Dulong, 2008). Nurses are tasked to effectively use IT in caring for patients. Studies reveal many nursing professionals are unprepared and incompetent in the use of IT (Fetter, 2009; Kovner &

Knickman, 2008). Nursing Professional Development (NPD) Specialists should create professional development initiatives that increase the technological and informatics skills of every practicing nurse (Dixon & Newlon, 2010; Skiba & Rizzola, 2009).

As the healthcare delivery system evolves, improvements and new hazards are introduced (IOM, 2001; U.S. Department of Health and Human Services, 2001). Implementing health information systems are expensive, thus creating cost issues that should not be underestimated. Risks to using information systems include user errors (interaction between the user and the technology), inefficiencies, and miscommunications (Weinger, 2010). Many healthcare entities do not have the knowledge or resources to properly evaluate information systems; therefore, management often makes uninformed purchase decisions that favor software meeting policy requirements rather than support staff usability and patient safety. Widespread distribution of information systems in healthcare, especially EHRs, require public trust due to the risks associated with expanded sharing of patient health information (Blumenthal, 2011; Shea & Hripcsak, 2010). Major problems delay the spread of health information systems and create the need for greater government intervention. The Medicare Payment Advisory Commission (2004) describes several of these problems:

- costs of investing in IT and uncertainty in financial returns
- physician acceptance for implementing IT and computers seen as interrupting the physician-patient relationship
- user reluctance to using IT in providing patient care and new skills required for using IT in patient care
- complexity of technology and implementation time

To minimize problems associated with healthcare delivery, the healthcare workforce should be competent in the use of health information systems such as EHRs. The NPD Specialist is a key agent in implementing change initiatives among the healthcare workforce (American Nurses Association [ANA], 2008; Blumenthal, 2011; National League for Nursing [NLN], 2009). The role of the NPD Specialist is crucial in preparing nurses to be IT competent, equipped with the knowledge to effectively use technology in order to meet healthcare policy and nursing trends. As organizations increase use of information systems, the IT competency skills of NPD Specialists should be addressed. With the constant change in technology and transformation of healthcare delivery, it is critical that NPD Specialists are able to interpret technological change and remain proficient in all levels of nursing practice (Bruce, 2009; McNeil, Elfrink, Beyea, Pierce, & Bickford, 2006). The NPD Specialist should possess expertise in using various forms of IT and its application in healthcare delivery (Armstrong, 1986).

Statement of the Problem

The federal mandate, technology-rich healthcare settings, and the nursing informatics agenda require NPD Specialists to be expert users of health information systems to retain Medicare funding and preserve patient care quality (Blumenthal, 2010; State Alliance for E-Health, 2009). Healthcare settings are increasingly technology-rich. The American Recovery and Reinvestment Act (ARRA, 2009) mandates a policy for Meaningful Use. The ARRA defines *Meaningful Use* as "using certified EHR technology in a meaningful manner" (p. 470). The NPD Specialist role is key to accomplishing this goal by preparing others for the challenge, but should first achieve IT proficiency themselves.

Currently, NPD Specialists do not possess sufficient IT competency levels to lead and address the IT professional development of others serving in technology-rich healthcare settings (Hebda & Calderone, 2010). Healthcare institutions with existing information systems have experienced an increase in medical errors due to low IT competency levels in staffs (Ludwick & Doucette, 2009). The NPD Specialist is responsible for building IT competency to reduce errors, reduce related healthcare costs and increase the quality of patient care (Hsu, Hou, & Chang, 2008).

Nursing Professional Development Specialists can apply the research and collaboration efforts of health IT Scholars and Technology Informatics Guiding Education Reform (TIGER) to increase competency (Fetter, 2007). The TIGER (2007) initiative describes IT competencies all nurses should possess, but each nursing role requires its own set of defined IT competencies (Curran, 2003; Hart, 2010; Staggers, Gassert, & Curran, 2002). The NPD Specialist in healthcare settings serves multiple intertwining roles (ANA, 2010; Brunt, 2007; Hebda & Calderone, 2010).

The NPD Specialist that is not IT proficient is not able to address the IT professional development needs of nurses. Without adequate IT competency levels and proper use of information systems within patient care settings, healthcare institutions will experience a reduction in Medicare and Medicaid funding and decrease in patient care quality (Blumenthal, 2009, 2011; State Alliance for E-Health, 2009). Information technology competencies that help meet the challenge have not been validated for NPD Specialists. Specific IT competencies should be validated to increase excellence in role performance. Healthcare organizations success in meeting Federal policy mandates for

Meaningful Use depends in part on the IT competency of its nursing workforce (NLN, 2009).

Purpose of the Study

The purpose of the current study is to validate existing IT competencies and identify IT competency development strategies. Role-specific IT competencies for nurses in staff development and continuing education (NPD Specialists) have been minimally verified and updated since Armstrong's 1986 seminal study titled *Present and Future Computer Competencies for Nurse Educators in Basic and Continuing Education*. The current study determines essential IT competencies for NPD Specialists practicing in healthcare settings and identifies self-directed, informal-learning strategies for developing each competency.

Significance of the Study

The current study addresses the IT professional development of NPD Specialists, individuals responsible for the professional development of nurses, the largest patient care workforce, and validates IT competencies specifically for NPD Specialists practicing in healthcare settings. Healthcare institutions recognize the vital role the NPD Specialist provides, but limited literature addresses the IT competency of NPD Specialists practicing in healthcare settings. The current study provides a research-based curriculum framework for preparing the NPD Specialist to lead the technology revolution within the healthcare system. Healthcare institutions' human resource departments can use the research based curriculum framework to manage talent. Current NPD Specialists can advance individual skill levels using the framework from the current study. The current study advances the field of Human Capital Development by exploring current

information technology systems and provides an updated instrument for increasing skill development. This study advances organizations and individuals within a research based curriculum framework and talent management framework associating essential IT competencies with plausible strategies for developing competencies.

Limitations, Delimitations, and Assumptions

This study is limited to NPD Specialists practicing in healthcare settings (hospitals, ambulatory care, and home care). The NPD Specialists may not hold the position title of NPD Specialist but will function in a similar, complex role. Nursing Professional Development Specialists practicing in healthcare settings recognize every nursing professional needs to possess adequate information technology competencies (knowledge, skills, and abilities). The experts selected for this study are NPD Specialists who have the expertise needed to validate IT competencies critical for NPD Specialists in healthcare settings and provide strategies for developing IT competency. The researcher assumes the selected experts for this study were honest and motivated to complete the validation form and questionnaires in a three-round Delphi method.

Delimitations are boundaries the researcher has set for the study (Roberts, 2010). Participants of the current study should meet specific criteria. The delimitations of the current study are set for participants who are current or past Nursing Professional Development Specialists with experience practicing in healthcare settings for a specified number of years. This study does not include NPD Specialists who do not possess experience practicing as a NPD Specialists in a healthcare organization. The researcher only selected participants with experience serving in a NPD role within healthcare settings to achieve the intended objectives of the current study.

Assumptions relevant to the current study are elements of the research that are understood to be true. The terms *Information Systems*, *Information Technology* and *Informatics* are used interchangeably throughout nursing, healthcare, and technology literature. The Delphi technique allows for consensus of identification of nursing role competencies. The Delphi technique was conducted via a web-based tool, making data collection easier, responses quicker, reducing attrition, reducing data collection and data entry time, and decreasing time to achieve consensus (Chang, 2007, p. 4). A review of Armstrong's (1986) seminal study identifying computer competencies for all nurses in professional development roles produces a baseline for determining applicable, valid, and reliable IT competencies for NPD Specialists serving in healthcare settings.

Research Objectives

The current study seeks to accomplish three objectives. The objectives outlined focus on participant demographics, essential competencies, and development strategies. It is important to identify the educational makeup and work experience of what NPD Specialist as IT experts, determine essential IT proficiencies and practical strategies for developing IT skills. The objectives of the current study are,

RO1: Describe the demographic characteristics of NPD Specialists serving as IT experts in healthcare settings.

RO2: Validate IT competencies essential for NPD Specialists practicing in healthcare settings.

RO3: Identify self-directed, informal learning strategies for developing essential IT competencies in NPD Specialists practicing in healthcare settings.

Conceptual Framework

The federal mandate, technology-rich healthcare settings, and the nursing informatics agenda challenge NPD Specialists to be IT proficient. The push for meeting Federal policy mandates is crucial to healthcare institutions. Nursing Professional Development Specialists, vital to accomplishing the Meaningful Use goal, should be prepared to prepare others. Essential IT competencies should be validated for the NPD Specialist practicing in healthcare settings to increase excellence in role performance (Hart, 2008; Staggers et al., 2002).

The theoretical basis of this study involves addressing the IT professional development of NPD Specialists practicing in healthcare settings. The foundation of this study was built upon theories of professional development, maximizing the use of IT, and improving human capital. This study utilizes the following foundational theories,

1. Dreyfus model of skill acquisition (Dreyfus & Dreyfus, 1980)
2. Novice to expert theory (Benner, 1982)
3. A model of the IT implementation process (Cooper & Zmud, 1990; Zmud & Apple, 1992)
4. Human capital theory (Becker, 1962)

The professional development theories of Benner (1982) and Dreyfus & Dreyfus (1980) serve as a guide for training and development professionals as they monitor individual skill levels from novice to expert. Cooper and Zmud (1990), and Zmud and Apple (1992) encourage maximizing the use of IT investments by identifying crucial factors that encourage the successful infusion of IT within organizations. Becker's (1962) human capital development theory focuses on organizations investing in

employee's knowledge to increase self-knowledge and organization growth as a whole. Figure 1 displays the study's conceptual framework.

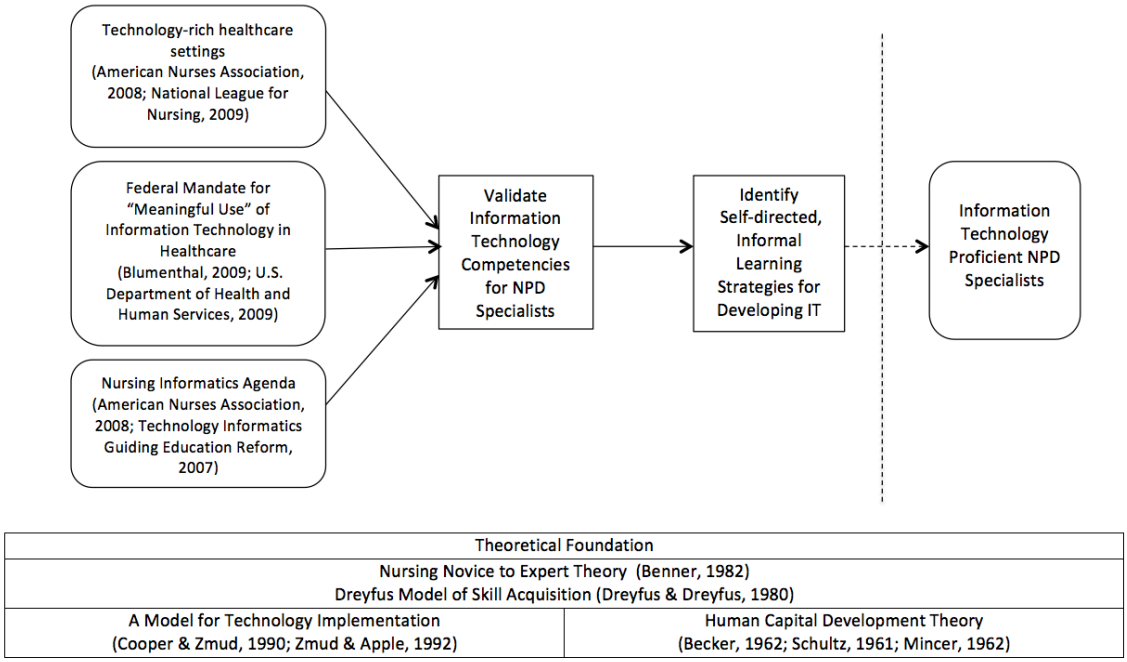

Figure 1. Conceptual Framework

Definition of Key Terms

Defining key terms aids in explaining certain singularities within the current study. Eleven terms are outlined in this section. The terms are directly related to healthcare delivery, information technology competency, and the NPD workforce.

1. *Competency*. A competency is the observation and measurement of knowledge, skills, abilities and personal attributes that contribute to superior employee performance and organizational success (University of Nebraska, n.d.). Competency domains "identified in the literature are knowledge, behaviors, attitudes, consequences, and experiences" (Roth & Mahoney, 1975, p. 4). Competencies originate from experience, observation, and validation. Competency statements are based on clinical

activities and responsibilities performed by competent NPD Specialists. Competency is the basis of excellent patient care (O'Shea, 2002).

2. *Computer literacy*. Computer literacy is a component of information literacy and involves having knowledge of computer technology and knowing how to use a computer and how to access online resources (Saranto & Leino-Kilpi, 1997). Computer literacy is defined as the knowledge and understanding of computers, combined with the ability to use them effectively (Glister, 1997; Goad, 2002; Weber & Demetrak, 2006; Whitman, Smith, Nelson, & Joos, 1996).

3. *Evidence-based practice*. Evidence-based practice (EBP) is the conscientious use of current best evidence in making decisions about patient care (Sackett, Rosenberg, Gray, Haynes, & Richardson; 1996; TIGER, 2009).

4. *Healthcare Information Technology*. Healthcare Information Technology (health IT) is the use of computer applications to record, store, protect, retrieve, and transfer clinical, administrative, and financial information electronically within healthcare settings with the ultimate goal of health IT to improve population health and the quality and efficiency of patient care. Health IT can include electronic health records, electronic medical records, and electronic prescribing applications (Health IT.gov, 2014; National Advisory Council on Nurse Education and Practice, 1997).

1. *Information*. Information literacy means finding the information one desires and successfully putting knowledge and information to use effectively and ethically (Glister, 1997; Goad, 2002; Weber & Demetrak, 2006).

2. *Information Technology*. Information technology (IT) deals with the use of electronic computers and computer software to convert, store, protect, process, transmit

and retrieve information (Rayudh, 1993; Shi & Singh, 2009). Information technology is anything that renders data, information or perceived knowledge in any visual format, processes, computer software, information systems, computer hardware, programming languages, and data constructs via any multimedia distribution mechanism (Tingoy & Gulluoglu, 2011).

3. *Information Technology competency*. Information Technology (IT) competency is the proficient use, aptitude and skill of any form of technology. An IT competent individual is able to use technology as a tool to research, organize, evaluate and communicate information (Schleicher, 2008).

4. *Meaningful Use*. Meaningful use is the set of standards defined by the Centers for Medicare & Medicaid Services (CMS) Incentive Programs that oversees the use of EHRs and allows providers and healthcare organizations to earn incentive payments by meeting specific criteria. The goal of meaningful use is to promote the spread of EHRs to improve healthcare in the United States. Benefits of Meaningful Use of EHRs include complete and accurate information, better access to information, and patient empowerment (ARRA, 2009; Blumenthal & Tavenner, 2010).

5. *Nursing informatics*. Nursing informatics (NI) is "the application of computer and information technology to all fields of nursing—nursing service, nursing education, and nursing research" (ANA, 2001, p. 12).

6. *Nursing Professional Development*. Nursing Professional Development (NPD) is a specialized nursing practice that facilitates the ongoing learning and career development of nurses in their participation in lifelong learning activities to enhance professional competency and role performance. The ultimate outcomes of which are

protection of the public and the provision of safe, quality care (ANA, 2010). The ANA uses the term *nursing professional development* to encompass all types of educational programs that a nurse may attend to maintain competence, enhance professional practice, and support the achievement of career goals (ANA, 2010).

7. *Quality*. Quality is the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge (U.S. Department of Health and Human Services, 2001).

Summary

Healthcare organizations today are implementing IT to reduce healthcare costs and increase patient care quality. The federal mandate and the nursing informatics agenda, both requiring the use of health information systems, place a heavy burden on NPD Specialists to remain leaders in implementing change within healthcare organizations. These changes include ensuring staff are competent and can effectively use information systems to achieve policy goals. It is imperative for NPD Specialists to "acquire the necessary knowledge and skills for practice in a complex, emerging technologically sophisticated, consumer-centric, global environment" (NLN, 2009, p. 1). Findings from this study will allow NPD Specialists to compare their present level of knowledge in technology to the important competencies rated by their peers. This study will produce a list of essential IT competencies and learning strategies for developing IT competency among NPD Specialists serving in healthcare settings. The updated list of competencies and development strategies will aid the NPD Specialist in becoming "a responsive decision-maker regarding computer technology" (Armstrong, 1989, p. 187).

CHAPTER II

LITERATURE REVIEW

Healthcare settings today have become increasingly technology-rich due to factors such as the federal government mandate (ARRA, 2009) for using health IT and the national nursing informatics agenda (ANA, 2009). Health IT policy mandates healthcare organizations to meaningfully use (meet Meaningful Use) information systems to decrease healthcare costs, reduce medical errors, and improve patient care quality (Hersh, 2010). The NLN (2009) created the national nursing informatics agenda, recognizing the need for IT competency among the entire nursing workforce. Nurses are essential operators of health IT in patient care (Dixon & Newlon, 2010; Skiba & Dulong, 2008). Nursing Professional Development (NPD) Specialists are responsible for the professional development of nursing caregivers (ANA, 2010). The NPD Specialist leads and mentors nurses in remaining abreast of changing trends in patient care (Nelson & Staggers, 2008). This review of literature explores IT used in healthcare settings, federal health IT policy, NPD Specialists practicing in healthcare settings, nursing informatics agenda, IT competency development strategies, and professional development theories. Healthcare institutions and NPD Specialists must be cognizant of IT competency levels (Nelson & Staggers, 2008). A need exists for greater understanding of the essential skillset vital for NPD Specialists practicing in technology-rich healthcare settings (Hart, 2008; 2010).

IT in Healthcare Settings

Information systems are vital in managing information used in delivering patient care, improving patient care quality, reducing costs, managing patient billing and

collections, and other aspects of operating healthcare institutions. Healthcare institutions are transitioning from manual documentation to automation of clinical, financial, and administrative data to improve overall patient care quality and reduction of long-term costs (Shi & Singh, 2009). Healthcare institutions are utilizing IT and systems to care for patients from admittance to discharge, including entering patient demographics, insurance and billing, clinical intake, diagnosis, administering and ordering medications, and scheduling follow-up care (IOM, 2001; Shi & Singh, 2009). Multiple types of health IT are used throughout institutions to improve healthcare delivery and safety, improve patient care quality, and reduce healthcare costs.

Types of Health Information Technology

Healthcare institutions use multiple types of IT systems to accomplish automated tasks once fulfilled using manual paper-based methods. The goal of health IT policy is interoperability and the ability for health information to flow among patient care settings to improve patient care quality, access to information, and reduce healthcare costs (MedPAC, 2004). The Medicare Payment Advisory Committee (MedPAC) (2004) and Shi & Singh (2009) group health IT systems in health services delivery into three categories (See Table 1):

1. Administrative and financial systems facilitating billing and accounting;
2. Clinical systems enabling input into the care process; and
3. Infrastructure supporting administrative and clinical systems.

Table 1

Information Technology in Healthcare Settings

Types of IT	Systems
Administrative and financial	General Ledger and Billing Cost accounting systems Patient registration and Scheduling Personnel and payroll Decision support systems Electronic materials management
Clinical	Biomedical monitoring devices Computerized provider order entry Picture archiving (imaging) Results reporting of laboratory Clinical decision support systems (CDSS) Electronic health record (EHR) Prescription drug fulfillment, error-alert, transcriptions Electronic monitoring of patients Education and reference applications Receiving clinical results online Electronic prescribing Email communication with patients Telemedicine
Infrastructure	Desktop, laptop, cart-based, and tablet computers Handheld technology Servers and computer networks Voice recognition systems Inventory bar-coding technology Information security systems Internet and E-Health

Administrative information systems transmit financial data such as patient accounting, staff scheduling, materials management, budgeting, and office automation

(MedPAC, 2004). Clinical Information Systems (CIS) organize, process, store, and retrieve clinical information such as vitals, medications, and diagnoses to support patient care delivery. Nursing professionals use CIS in providing patient care by collecting, storing, retrieving, and transferring patient health information electronically (Haux, 2006; Hersh & Wright, 2008; MedPAC, 2004).

Clinical Decision Support Systems are one example used by caregivers to seek evidence-based knowledge in diagnoses and reduce repeated tests to better care for patients (TIGER, 2009). The automated or electronic health information aids organizations in building a health information infrastructure with joined networks and standards permitting providers and caregivers to electronically share information regarding a particular patient, certain diagnoses, epidemics, and other healthcare concerns (Haux, 2006; Hersh & Wright, 2008; MedPAC, 2004).

Infrastructure systems serve as the basis for other technologies and include telecommunications, wireless connections and voice recognition systems. The right information infrastructure provides for electronic clinical information to be shared among healthcare institutions, whereas, electronic health information can be created at one facility and accessed and updated at another facility. A solid infrastructure creates greater accessibility to patients' primary care physicians in sharing information regarding a particular patient, diagnosis, or epidemic (MedPAC, 2004).

Multiple types of IT already exist in healthcare institutions today in delivering patient care. Technologies found in clinical practice areas include "electronic documentation, medication administration, smart infusion pumps, bedside monitoring, nurse communication and tracking devices, remote and telehealth technologies, consumer

applications, and interactive technologies" (Hebda & Calerone, 2010, p. 58). All healthcare institutions are now being required by the federal government to use IT in caring for patients with the aim to increase patient care quality in the United States. Improving quality of care involves creating a healthcare system able to translate knowledge into practice, and able to apply new technology safely and suitably while increasing the use of evidence-based practice (Ludwick & Doucette, 2009; TIGER, 2009). The subsequent section outlines Federal health IT policy and quality improvement goals using information systems.

Information Technology for Quality Improvement

Quality is a major foundation of healthcare delivery. High quality patient care assures patients receive appropriate treatments to achieve health outcomes. High quality healthcare can be described as striving for excellent standards of care and includes assessing the relevance of medical tests, treatments, and measures to continually improve a patient's overall health. The federal government examined the condition of the healthcare delivery system and has made efforts to address patient care quality levels (Ludwick & Doucette, 2009). Congress launched a series of hearings on patient safety. The Agency for Healthcare Research and Quality (AHRQ) tested new technologies to reduce medical errors, improve safety interventions and innovate error-reporting strategies (IOM, 2000; White House, 2000).

The Committee on the Quality of Health Care in America researched quality of care and discovered approaches and policies for raising public awareness of healthcare quality concerns. The committee identified forces encouraging and impeding efforts to improve quality, developed strategies for fostering greater accountability for quality, and

identified areas for additional investigation (IOM, 2001). The committee proposed six aims for building a stronger healthcare system. These aims are safety, effectiveness, patient-centeredness, timeliness, efficiency, and equality (IOM, 2001; 2002). The demand to create a safer, more efficient healthcare delivery system has initiated efforts to improve patient care quality using IT (IOM, 2002; MedPAC, 2004).

The IOM (2002) stresses the importance that healthcare delivery be timely, reducing wait time for those who receive and provide care. Healthcare delivery should be efficient while avoiding waste, including waste of equipment, supplies, ideas, and energy. Healthcare delivery should be equitable, providing care that does not vary in quality because of gender, ethnicity, geographic location, and socioeconomic status. The use of IT systems allows access to automated clinical information, diagnostic tests, and treatment results and delivers an array of options for interacting with clinicians (IOM, 2001).

Information technology systems are effective in presenting relevant knowledge to clinicians at the time of decision making (in diagnosing and prescribing patients) and improve patient care quality (Agrawal, 2009; Bastable, 2008). Automated reminder systems improve compliance with clinical practice guidelines and indicate computer-assisted diagnosis and management to improve quality. According to the IOM (2001), healthcare delivery should be patient-centered and ensure patient values guide clinical decisions. Information Technology patient-centered care facilitates access to clinical knowledge through reliable web portals and online support groups, customized health education, and disease management (IOM, 2001). Clinical decision support systems are

used in patient-centered care to adapt information according to an individual patient's characteristics, genetic makeup, and specific conditions (IOM, 2001).

The current healthcare delivery system is overwhelmed with problems and should be safe, effective, patient-centered, timely, efficient, and equal to all (IOM, 2000; 2001). The federal government has made efforts to minimize the problems in the healthcare delivery system and emphasize the six aims, outlined previously, to improving patient care quality (IOM, 2002). Federal policy mandates healthcare institutions use IT systems to improve patient care to create a safer, more efficient healthcare delivery system (Hebda & Calderone, 2010; MedPAC, 2004).

Health IT Policy

The book *To Err is Human: Building a Safer Health System* (IOM, 2000) illuminates the unsafe practices of healthcare in the United States and reveals the countless lives lost due to medical errors. Medical errors are a leading cause for patient death and injury, but these human errors can be prevented (IOM, 2000). The current healthcare delivery system is complex and creates increased risks for errors (IOM, 2001; Kovner & Knickman, 2008). *The Economic Case for Health Care Reform*, a report developed by the Executive Office of the President Council of Economic Advisers (2009), identifies causes of inefficiencies and disorganization in the U.S. healthcare delivery system:

- Patients receiving high cost, low-value treatments.
- Patients obtaining too little of certain types of high value care.
- Patients frequently not receiving care in the most cost-effective setting.
- Patients receiving extensive discrepancy in the quality of care provided.

The core of health IT policy is to achieve a threshold of change in increasing healthcare quality (IOM, 2001; U.S. Department of Health and Human Services, 2001). The goal to creating efficiency is to develop a healthcare system that,

- Responds to patient care at all times using multiple means.
- Anticipates patient needs proactively.
- Uses evidence-based decision-making where patients receive the best available scientific knowledge.
- Emphasizes patient safety as a critical quality component.
- Decreases waste in resources and patient time.
- Collaborates with other clinicians to ensure appropriate exchange of information and coordination of care (IOM, 2000; 2001).

The Clinton, Bush, and Obama Administrations implemented policy to improve patient care delivery through effective development and use of health IT (Blumenthal, 2011; Shi & Singh, 2009; White House, 2000, 2004). The Bush Administration proposed a national healthcare IT agenda in 2004, forming the Office of the National Coordinator for Health IT to advise on creating a computerized patient record for every American (Hebda & Calderone, 2010; Shi & Singh, 2001, 2009).

Health Information Technology for Economic and Clinical Health Act

President Barack Obama signed the ARRA allocating 19 billion dollars for healthcare institutions and providers to achieve *Meaningful Use* (MU) of IT systems. Meaningful Use is discussed in detail in a subset of the ARRA known as the Health Information Technology for Economic and Clinical Health (HITECH) Act (p. 470). Meaningful Use is defined as using certified electronic health record (EHR) technology

to improve quality, safety, and efficiency by engaging patients; improving care coordination and maintaining privacy and security of patient health information. Meaningful use sets specific objectives healthcare professionals and healthcare institutions must achieve to be eligible for CMS Incentive Programs (Health IT, n.d.). The objectives evolve in three stages as described in Table 2.

Table 2

Stages of Meaningful Use

Stage	Year	Outcome
1	2011-2012	Data capture and sharing
2	2014	Advance clinical processes
3	2016	Improved outcomes

Note. Adapted from "EHR Incentives & Certification"," by Health IT, n.d. to depict the relationship of each meaningful use stage, its year to be obtained and expected outcomes retrieved from http://www.healthit.gov/providers-professionals/meaningful-use-definition-objectives.

The HITECH Act is an effort to restructure the way health information is collected and stored by mandating healthcare organizations use EHRs. The HITECH Act provides financial incentives to providers and institutions that use EHRs to improve health outcomes, but places financial penalties on those refusing to comply. Providers not achieving Meaningful Use Core Objectives by 2015 will lose a percentage of Medicare fees each year. Meaningful Use Core Objectives outline criteria measures for providers and organizations to adopt EHRs in ways to improve patient quality, safety, and efficiency (Blumenthal, 2009; Blumenthal & Tavenner, 2010; HHS, 2012). The HITECH Act fosters development of a national electronic health IT infrastructure improving the

efficiency and access of healthcare to all Americans by providing grants for research and implementation (ARRA, 2009, Blumenthal & Tavenner, 2010; TIGER 2007). The overarching goal is to improve the population's health through a transformed healthcare delivery system with the use of electronic information systems. Anderson et al. (2006) and Shea and Hripcsak (2010) explain how electronic health records improve patient care quality by,

- Securing patient health information
- Improving healthcare quality
- Reducing medical errors
- Advancing the delivery of patient centered medical care
- Reducing healthcare costs resulting from inefficiencies
- Providing appropriate information to help guide medical decisions
- Including meaningful public input
- Improving the coordination of care and information among health entities
- Improving public health activities by facilitating early detection and rapid response to public health threats
- Facilitating health and clinical research
- Promoting early detection, prevention, and management of chronic diseases

Using IT systems in healthcare delivery forces the healthcare workforce to re-examine and reinvent the way it collects, processes, and uses health information (Anderson, 1992). It is believed the use of EHRs can bring benefits to the overall healthcare delivery system such as improved outcomes in healthcare services. Connecting healthcare information electronically creates shared information among

physicians, hospitals, imaging centers, clinical laboratories, patients and insurance payors. Implementing a health IT system, especially an EHR system, is a complex task. Organizations should have a workforce possessing the necessary expertise to implement EHRs, support and educate on EHRs, and effectively adopt and use EHRs (Ash & Bates, 2004).

Implications for the Healthcare Workforce

Healthcare organizations face barriers when implementing EHRs. Implementing an EHR system is a difficult task. Healthcare organization workforces should have the necessary expertise to implement EHRs, support and educate on EHRs, and effectively adopt and use EHRs. Providers and nurses lack the necessary IT knowledge and skills and are slow to adopt EHRs. Obstacles in the lack of human resources and technical expertise present challenges when implementing EHR systems. Healthcare organizations require technical expertise to maintain systems as technology improves (Blumenthal, 2009). Rodkey (2010) points out healthcare workers lack experience in the commercial and technical aspects of EHRs, skills necessary for meeting meaningful use criteria outlined in the HITECH Act. The adoption of the HITECH Act and its meaningful use criteria measures require a transformed workforce to be able to interpret health IT policy and effectively use health IT systems (Classen & Bates, 2011; Blumenthal, 2011; Blumenthal & Tavenner, 2010). Technology-rich healthcare settings, the nursing informatics agenda, and health IT policy accelerate the need to ensure the healthcare workforce obtain the necessary competencies to work with EHRs and other forms of health IT (NLN, 2009; TIGER, 2007, 2009, n.d.). An innovative workforce able to

effectively implement and use health IT is critical to healthcare's success in maximizing the use of EHRs and attaining current policy goals (AHIMA, 2006; Hersh, 2010).

NPD Specialists in Healthcare Settings

The NPD specialty is central for developing the nursing workforce. The NPD Specialty builds on educational and experiential foundations to enhance nursing practice and maintain quality healthcare. This is accomplish through orientation, continuing education, in-service and staff development (ANA, 2010). The NPD Specialist is a nurse educator who teaches in a patient care setting (Dorin, 2010). The NPD Specialists should be equipped to mentor and guide practicing nurses for "the high-touch, high-technology patient-centered care of the 21st century" (Hebda & Calderone, 2010, p. 56). The NPD Specialist is an experienced licensed registered nurse proficient in the professional development domain. The NPD Specialist plays a pivotal role in clinical, administration, education, and research in healthcare institutions. The NPD Specialist may hold position titles such as education specialist, nurse educator, clinical educator, in-service educator, department or unit educator, staff development coordinator, professional development specialist, and clinical resource coordinator (Armstrong, 1986; Dorin, 2010; O'Shea, 2007). The NPD Specialist serves as a leader in healthcare institutions while promoting lifelong learning, education, and mentorship. They enhance learner competence by acting as a role model and provide opportunities for developing staff intellectual, technical, and clinical skills (Avillion, 2011; ANA, 2008; Bastable, 2008; O'Shea, 2007; Turner, 2010).

Roles and Responsibilities of the NPD Specialist

In the past, practicing nurses, nurse educators, researchers, and consultants served their respective roles, but today the roles of the practicing nurse, nurse educator, researcher, and consultant are intertwined into the NPD Specialist role (Armstrong, 1986; O'Connor, 1984; O'Shea, 2007; Swihart & Johnstone, 2010). The NPD Specialist serves diverse roles in healthcare organizations. The ANA (2010), Brunt (2007), and O'Shea (2007) identify six intertwining roles for NPD Specialists: (a) educator, (b) facilitator, (c) consultant, (d) change agent, (e) leader, and (f) researcher.

The six intertwining roles of a NPD Specialist make up a foundation for professional success. Bastable (2008) states, "the role of the educator is not primarily to teach, but to promote learning" (p. 13). Educators provide for an environment that fosters learning by assuming leadership in curriculum development, instruction, and evaluation in healthcare settings (Cherry & Jacob, 2008). The facilitator role enables the education process by focusing on assisting the learner in applying nursing competency, supporting team building, and fostering individual educational needs (O'Shea, 2007). The consultant role serves as a resource, identifies internal and external educational opportunities, aids in designing educational experiences, provides access to experiences, assists with defining problems, and provides feedback to learners and organizations concerning the effectiveness of the learning. The NPD Specialist embraces and guides change. The change agent role facilitates the initiation, adoption, and adaptation to changing trends in healthcare, policy, nursing practice, and patient care. The change agent also develops strategies to facilitate appropriate outcomes and influences policy and procedures to create positive change within the healthcare organization (Strickland & O'Leary-Kelley, 2009). The leader role supports organizational structures, manages

human and financial resources, and participates in activities external to the organization. The researcher role is active in the research process of designing, creating, and applying research and outcomes into practice; and helps develop the knowledge and skills of others in the research process (Brunt, 2007; ANA, 2010).

The NPD Specialist is responsible for the professional development and growth of others—a laborious and specialized task. NPD Specialists should address their own professional development by remaining up to date and proficient on required competencies (ANA, 2001; Brunt, 2007; O'Shea, 2007). The NPD Specialist should seek learning opportunities, embrace change, adapt to emerging patient and employee needs, and develop confidence that will enable success (Avillion, 2008). Brunt (2005) suggest the NPD Specialist develop certain attributes for success in the role including,

- Maintaining educational and clinical competencies
- Promoting lifelong learning concept
- Establishing credibility with other professionals
- Serving as a role model
- Seeking opportunities to develop staff
- Participating in activities external to practice settings

Aside from the recommended competencies, NPD Specialists should possess expertise in IT (Brunt, 2005). With the continuing emergence of new technologies in healthcare, NPD Specialists should be competent in using various types of IT to enhance education, practice, and research (Repique, 2007). Kelly (2012) states, "The explosion of information requires nursing professionals to be on the cutting edge of knowledge" meaning "every nurse should be computer literate" (p. 152). Information technology

competency incorporates computer and information literacy and the ability to successfully use electronic information to make patient care decisions (Perez & Murray, 2010). Nelson and Staggers (2008) describe computer literacy using the concept of "fluency with information technology" outlined by the National Academy of Science Committee on Information Technology Literacy (p. 93).

Fluency requires integration of contemporary skills, foundational concepts, and intellectual abilities (Glister, 1997; Goad, 2002). Contemporary skills are the use of hardware and software application to accomplish a task, such as a computer screen and operating system navigation, word processing, email, Web browsers, databases, spreadsheets, and slide presentations (McCartney, 2010). Contemporary skills change rapidly as the technology changes and are device-specific. In nursing, these skills are used with clinical documentation systems, digital monitoring devices, computer medication dispensing cabinets, medication barcode scanning, and handheld computers (McCartney, 2010; Nelson & Staggers, 2008). Foundational computer concepts consists of digital information representation, networks, information management, algorithms, human computer interaction, and the impact of IT on society. In nursing, the concepts are used with ethics, privacy, confidentiality, security, audit trails, encryption, firewalls, interoperability, bibliographic search concepts, and information systems life cycle (McCartney, 2010; Nelson & Staggers, 2008). Intellectual capabilities include the use of information structures and technology in problem solving contexts (planning, executing, evaluating, and communicating) to evaluate information and test solutions. In nursing, these capabilities are used with project management, request for proposals, database development, standardized nursing languages, and evidence-based practice for clinical

research (Nelson & Staggers, 2008; Paquette, 2006). Foundational concepts and intellectual capabilities are longer lasting in terms of how the skills are used in nursing practice (Hart, 2008; Nelson & Staggers, 2008; Saranto & Leino-Kilpi, 1997).

Information technology proficient NPD Specialists should possess knowledge in IT contemporary, foundational and intellectual abilities to effectively use various forms of health IT (Hart, 2008; Nelson & Staggers, 2008; Saranto & Leino-Kilpi, 1997). Researchers encourage stronger IT competency attainment among nurses in specialty domains (Curran, 2003; Nelson & Staggers, 2008; Repique, 2007). The NPD Specialist should be IT proficient and able to effectively use software applications, such as word processing software, spreadsheet software, presentation and graphics software, and statistical software for research. Information technology competency requires having a deep understanding of systems used in clinical practice, education, and research settings (Cherry & Jacob, 2008; Hobbs, 2002; Kudless & White, 2007; McCabe, 2006; Paquette, 2006; Repique, 2007;).

The TIGER (2009) suggests NPD Specialists be informatics competent and fluent to integrate and apply health IT systems throughout multiple healthcare settings. Nursing informatics, IT applied to nursing practice. Nursing informatics incorporates nursing science, computer science, and information science to manage and communicate data, information, and knowledge (HIMSS, n.d.). The ANA emphasizes all nurses should have the necessary knowledge and skills to use IT and NPD Specialists IT skills should be beyond those associated with practicing nurses (ANA, 2001). Initiatives have been developed to further advance nursing professionals in the use of IT (TIGER, 2007).

The increased use of IT impacts the NPD Specialist role in healthcare settings (Hwang et al., 2008). Specialists serve in diverse, complex roles within healthcare settings. The NPD Specialist should be prepared to effectively use nursing informatics to provide information and instruction on health IT so learners can be informed and be creative decision makers in multiple healthcare settings (ANA, 2008; Armstrong, 1986; Hardin & Skiba, 1982; NLN, 2009). The NPD Specialist within the healthcare setting plays a significant role in the adoption of new technology by developing skills and providing nursing informatics support in a variety of settings with multiple IT systems.

Nursing Professionals IT Competency Levels

Information technology is a fundamental part of professional nursing practice, used for nursing administration and professional roles of the NPD Specialist (Brunt, 2007; Turner, 2010). When new IT systems are introduced, education on new IT systems is often provided by vendors, outside consultants, or *super users*; an individual's basic IT skillset is seldom addressed. The provided education usually does not address system benefits or how to use the system to improve nursing practices and patient care quality (TIGER, 2009).

The need for IT competent nursing professionals is not a new concept. This concept was termed as nursing informatics over 20 years ago (Staggers & Thompson, 2001; TIGER, 2007). Nursing informatics pioneers such as Susan Grobe (1988, 1989), Myrna Armstrong (1986, 1989), Nancy Staggers (2001, 2002), and Christine Curran (2003) aided in establishing a foundation for the informatics competencies vital for practicing nurses, nurse educators, and nurse practitioners. Practicing nurses, students, and nurse educators have various IT skill levels (Carter & Axford, 1993; Grobe, 1988;

Hwang et al., 2008). Deficits in IT competency levels are of concern because technology-rich healthcare settings and the federal mandate require the use of IT to deliver and document patient care for healthcare organizations to obtain reimbursements (Fetter, 2009; Walker, 2010).

Nursing practice is under intense pressure to improve patient care using IT (Ash & Bates, 2004), and NPD Specialists are not prepared to meet the new and increasing demands associated with implementing technology (Buxton, 2001). With a shortage of nurses and academic educators, increasing healthcare costs, and limitations on educational budgets, many NPD Specialists learn to use technology through self-taught techniques (Cornell, Riodan, & Herrin-Griffith., 2010; Hart, 2008; Stepankova & Engova, 2006). Many NPD Specialists attended school at a time when computers at higher education institutions was either limited or nonexistent. Educational institutions "offering nursing programs have been criticized for failing to instruct students using technology and computers in their workplace" (Buxton, 2001, p. 8), and fewer institutions focus on informatics and the use of EHRs (Pravikoff, Tanner, & Pierce, 2005). Alpay and Russell (2002) and Courtney, Demiris, and Alexander (2005) reveal nursing professionals express frustration at not having sufficient IT skills to examine patient records for trends or accessing external reference databases. The lack of IT skills can be attributed to minimal resources available to develop IT skills while working in patient care settings. Whatever the reason for the lack of IT competency, a need still exists for NPD specialists to adequately prepare others to effectively care for patients using informatics tools. Academic NPD Specialists are not preparing nurses to provide patient care in informatics-infused healthcare settings, and NPD Specialists serving in

healthcare settings are not adequately preparing technology-savvy nurses to use informatics tools to provide safe, patient-centered, quality care (NLN, 2009; TIGER, n.d.).

McCormick (1983) states, “Nursing that is technologically applied, based on knowledge…, can confront the technologic future with confidence” (p. 382). Whatever the reasons for the lack of IT competence among NPD Specialists, the Specialist should be highly skilled in information management and communication to support major areas of practice. The NPD Specialist should use modern informatics solutions and collaborate with informatics nurse specialists to provide enhancements to informatics solutions (Staggers, 2002).

Nursing Informatics Agenda

Nursing organizations such as the NLN (2009), ANA (2008), and ANI recognize the need for NPD Specialists to effectively practice in patient-centered and informatics-infused healthcare environments (Cherry & Jacob, 2008; O'Grady, 2007; Skiba & Rizzola, 2009; TIGER, n.d.). The NLN (2009) states, “it is important nurses acquire the necessary knowledge and skills for practice in a complex, emerging technologically sophisticated, consumer-centric, global environment” (p. 1). The nursing informatics agenda is a national agenda of energizing efforts to ensure all nurses are prepared to practice in patient-centered, technology-rich healthcare settings. The nursing informatics agenda encourages all nurses to use evidence-based practice in making decisions about patient care (ANA, 2001; Skiba & Rizzolo, 2009). Informatics knowledge involves the use of technology in providing of patient care (ANA, 2001). Management of information, knowledge of electronic access, and retrieval of information from multiple

sources is a critical component of competent professional nursing practice. Nursing practice that applies technology based on competency is able to adapt to changes in healthcare. Researchers have identified baseline informatics competencies all nurses can use as a guide when using IT systems.

Nursing Informatics Competency Studies

Researchers have identified IT competencies for nurses serving various professional roles (Grobe, 1988, 1989; Hart, 2008; Staggers et al., 2002; TIGER, 2007). Staggers et al. (2002) identify informatics competencies for experienced nurses and organize competencies into categories: computer skills, information literacy skills, and overall informatics competencies. Studies further emphasize role specific IT competencies among nurse practitioners, researchers, and nurses practicing in other countries. Curran (2003) identifies informatics competencies for nurse practitioners and acknowledges the need to specify informatics competencies for advanced practice nurses. Nursing professionals educated in the informatics specialty are needed to apply IT appropriately and responsibly. Comprehensive categories of informatics competencies have been recommended for nursing (Curran, 2003).

Armstrong (1986) and Grobe (1988, 1989) focus on staff development roles throughout academic and healthcare institutions while other researchers (Nelson & Staggers, 2008; Hart, 2008) concentrate on nurse manager, administrator, educator and student roles. Armstrong (1986) identifies, critiques, and ranks computer competencies for nurse educators in basic and continuing education (now, termed NPD Specialists). Within Armstrong's study, the Delphi methodology was used and the expert panel consisted of hospital staff development nurses, academic nurse educators, nurse

consultants, and nurses from leading nursing organizations. Armstrong notes four areas of nursing influenced by IT: (a) administration, (b) research, (c) education, and (d) clinical practice. Armstrong's findings allowed educators to compare their present level of knowledge in technology to the important competencies ranked by their peers. Education strategies could then be designed so the "educator can be a responsive decision-maker regarding computer technology" (Armstrong, 1989, p. 187). Although both healthcare and IT fields have changed drastically in the last two decades, Armstrong's study serves as the foundation for developing and identifying IT competencies essential for the unique roles NPD Specialists serve in healthcare settings today.

Grobe (1988) explores the responsibilities nursing informatics will bring to the nurse educator and nurse researcher roles. Grobe's study provides insight in preparing nurse educators and researchers for nursing informatics. Since nursing's primary body of knowledge is stored electronically, Grobe stresses the "absolute necessity for informed technology use" (p. 25)—recognizing the knowledge base of nursing is unmanageable by using paper-based methods. Grobe states, "computer systems and technology are one means for studying, analyzing, and managing nursing information" (p. 29). Nursing informatics competencies include skills in software technology for managing nursing data and information creating nursing knowledge (Grobe, 1989). A distinction between the various nursing roles depends on information handling tasks (Grobe, 1988).

Grobe (1989) identified informatics competencies for nurse administrators, practicing nurses, nurse educators, and nurse researchers classifying the competencies according to three levels: a user level, a modifier level, and innovator level. At the user

level and individual is able to use the tool. At the developer level an individual is able to participate knowledgeably in development. At the innovator level an individual is able to direct computer system development and implementation, possibly servicing as a knowledgeable evaluator or researcher (p. 267).

Staggers, Gassert, and Curran (2002, 2003) provide a research-based list of informatics (computer skills, informatics knowledge, and informatics skills) competencies for nurses at beginner, experienced, specialist, and innovator levels. The study provides a foundation in establishing a core set of informatics competencies for all levels of nursing. The study recommends identifying role-specific IT competencies for each nursing role to promote excellence in nursing practice.

Chang (2007) identifies informatics competencies for Taiwan nurses from Staggers et al. (2002) master list of nursing informatics competencies. Chang updated the study conducted by Staggers et al. (2002) to meet the needs of Taiwan nurses in integrating nursing informatics competencies into curricula on an international level. Chang identifies informatics competencies required of Taiwan nurses through a Modified Delphi methodology using an expert panel of nurse educators and administrators. The results provide educators with necessary guidelines to establish informatics competencies as part of the curricula and recruitment into healthcare delivery systems.

McNeil et al. (2003, 2006) describes the importance of IT integration into nursing curricula for clinicians and educators. Academic nurse educator, practicing nurse, and student nurse technology competencies were examined from 266 nursing programs throughout the United States (McNeil et al., 2003, 2006). Forty six percent of nursing programs reported having no future plans of teaching IT in education. Less than one-

third of nursing programs address nursing informatics in curricula. Little evidence indicates academic educators are teaching the appropriate IT content and skills. Many educators are at the novice or advanced beginner level skill level in the use of IT systems and tools (Dearnley, Haigh, & Fairhall, 2008). A large number of academic educators are unprepared to teach IT or use IT tools to train future nurses for professional practice (Fetter, 2009). McNeil et al. (2003) concludes academic leaders perceive a need for educators to lead change associated with technology initiatives.

Fetter (2009) discusses the importance of psychiatric mental health nurses enhancing their IT competencies to enable using "evidence-based practice and other innovations to transform clinical care, education, and research" (p. 3). The study identifies novice IT skill levels for academic educators and students. Nurses in specialty roles are encouraged to take advantage of resources provided by TIGER and remain up-to-date and fully understand the TIGER initiative.

Westra and Delaney (2008) develop a comprehensive list of informatics competencies addressing the unique knowledge and skills for nurse managers, administrators, and executives. The American Organization of Nurse Executives (AONE) points out the importance of informatics skills and practical use. Westra and Delaney use the Delphi methodology to,

- identify leadership roles from the AONE Nursing Executive Competencies,
- identify informatics competencies from the literature,
- categorize informatics competencies using Staggers et al. (2002) framework.

The Delphi expert panel participants were asked to rate the importance for each informatics competency to the nursing leader role. A consensus of competencies was

reached after three Delphi rounds. The researchers concluded that a need exists for nursing leaders to be prepared in the selection, adoption, and use of EHRs.

Hart (2010) identifies core informatics competencies for nurse managers. Hart applied Staggers et al. (2002) master list of nursing informatics competencies for nurses at the expert level. Hart used the Delphi methodology with a panel of 25 informatics experts. Experts selected role-specific competencies to develop a master list of informatics competencies for the nurse manager role. Hart recommends identifying role specific informatics competencies for greater performance in other nursing specialty roles.

The American Health Information Management Association (AHIMA) and the American Medical Informatics Association (AMIA) identify competencies for using EHRs. It is imperative nurses are able to use EHRs in coordinated care, as well as, other forms of technology (AHIMA, 2006; Alexander, Ramsay, & Thomson, 2004; Dixon & Newlon, 2010; Hersh, 2010; IOM, 2003; Shugars, 1991). Nursing professionals should be able to provide "patient-centered care as members of an interdisciplinary team, using evidence-based practice, and quality improvement approaches and informatics" (Hebda & Calderone, 2010, p. 56).

The TIGER (2007) states, even though "Nursing Informatics is a highly specialized field, there are foundational informatics competencies that all practicing nurses and graduating nursing students should possess to meet the standards of providing safe, quality, and competent care" (p. 3). The TIGER Informatics Competency Collaborative (TICC) developed the TIGER Nursing Informatics Competencies Model for practicing nurses and nursing students. The Model consists of basic computer

competencies, information literacy, and information management derived from an extensive literature review of nursing researchers. The list of competencies for each category includes knowledge and skills "to enter, retrieve and manipulate data; interpret and organize data into information to affect nursing practice; and foundational informatics competencies" (TIGER, 2007, p. 5). The foundational informatics competencies in the model is recommended to aid in meeting the standards of providing safe and quality care.

Researchers have defined competencies for various nursing specialty roles and specific clinical applications (AHIMA, 2006; Armstrong, 1986; Chang, 2007; Fetter, 2009; Grobe, 1988; Westa & Delaney, 2008). Researchers recommend identifying role-specific IT competencies for all nursing specialty roles (Fetter, 2009; Hart, 2010; Staggers et al., 2002). The progress in information processing and IT is changing the way nurses provide patient care. The progress of nursing practice depends on how well professional nurses are prepared for nursing practice today and how adequately they capitalize on using IT to define the body of nursing knowledge. The NPD Specialist must transform themselves to become IT proficient. This transformation will assist in maximizing the use of IT to increase patient care quality and develop IT skills in practicing nurses.

NPD Workforce Transformation: Academic and Practice

The role of the nursing professional has evolved from task performance to the planning, coordination, and management of patient care (Grobe, 1988). New technology enables nurses to access, analyze, and synthesize information (Cornell, Herrin-Griffith et al., 2010; Cornell, Riodan, & Herrin-Griffith., 2010). There is concern that practicing

nurses do not possess the required IT competencies, and NPD Specialists are not prepared to teach them (Fetter, 2009). As discussed in previous sections, the NPD Specialist should possess greater IT competence than the practicing nurse (Avillion, 2011; Bastable, 2008; Johnson, 2002; O'Connor, 1986). The NPD Specialist should master informatics knowledge and skills in order to teach informatics knowledge and skills to other nursing caregivers.

As healthcare organizations are confronted with implementing additional technologies, NPD Specialists should adapt to meeting the demands of a technology-rich environment (McCormick, 1983; Skiba & Dulong, 2008). McCormick states, "in order to educate future practitioners to safely apply technologies in healthcare, educators should be cognizant of what is on the horizon" (McCormick, 1983, p. 380-382). The NPD Specialist must remain up-to-date on new technologies used to provide patient care.

The TIGER initiative, a federally supported intervention created to improve IT skill competency among all nursing professionals. The TIGER brings together key nursing stakeholders and acts to develop strategies for improving nursing practice, nursing education, and delivery of patient care (Anderson & Sensmeier, 2011; Skiba & Dulong, 2008). The TIGER vision is for "transformational leadership, collaboration, and skillful management to use IT to power and execute necessary changes in healthcare delivery" (Fetter, 2009, p. 5). The TIGER developed collaborative groups to expedite its vision. Key areas of TIGER collaborative groups are: (a) standards and interoperability for data exchange, (b) the national health IT agenda, (c) informatics competencies, (d) education and educator development, (e) staff development and continuing education, (f)

usability and clinical design, (g) developing a virtual learning center, (h) developing leadership, and (i) empowering the consumer (Hebda & Calerone, 2010).

Hebda and Calderone (2010) point out even though the TIGER initiative is crucial, "few educators have operationalized TIGER or adopted its plan to transform nursing practice … to better prepare nurses to practice in technology rich healthcare environments" (p. 56). Hebda and Calderone encourage NPD Specialists to adopt the TIGER vision. The TIGER encourages partnerships and collaboration among NPD Specialists, informaticists, healthcare institutions, and vendors to maximize the diffusion of technology related skills throughout nursing practice (Hebda & Calderone, 2010).

Health IT Scholars is an intervention created to improve IT skill competency among academic nurse educators (Fetter, 2009; Hebda & Calderone, 2010). Health IT Scholars was developed by a group of informatics-intense educational institutions to educate and empower nursing academic educators in nursing informatics. The intervention promotes the concept of educators as innovation champions by serving as mentors and resources in their respective organizations (Fetter, 2009).

Nursing transformation is required to prepare nursing professionals to practice in informatics-infused environments. The NPD Specialist should "examine… [her] own attitudes, knowledge, and skill levels to enrich the… learning experiences" (Hebda & Calderone, 2010, p. 59) of others. The NPD Specialist role should be transformed to adapt to changing healthcare environments by encouraging a culture that embraces IT. This shift advances NPD, nursing practice, and IT competency development (Dixon & Newlon, 2010; Fetter, 2009; Griffin-Sobel et al., 2010). Successful healthcare

organizations identify and validate the necessary competencies for NPD workforce in deploying technology systems (Davis, Stullenbarger, Dearman, & Kelley, 2005).

IT Competency Validation

Competencies assist in leveraging IT and integrating these technologies into education, practice, and research. As healthcare is transformed with IT, NPD Specialists can effectively educate and mentor on the applicable competencies to perform individual work roles (O'Shea, 2007). Healthcare organizations can then accurately identify informatics competency needs for evidence-based practice and overall informatics skills (Hart, 2008, p. 321).

Leaders in healthcare organizations and educational institutions want informatics competencies identified and validated for various nursing roles (ANA, 2010). Informatics competencies have been identified for nurses but have not been validated (or verified) specifically for those that develop nurses in healthcare settings—that is, NPD Specialists. The validation of IT competencies provides insight into the knowledge and skills needed within healthcare organizations, helping to focus on further developments and implementations. Markus, Cooper-Thomas, and Allpress (2005) state "Validation is important because competencies describe normative behaviors, the organization wishes to promote and develop to enhance organizational effectiveness" (p. 121). The validation of competencies is a technique using multiple tools to assess, identify and make visible the knowledge and skills that an individual or group should develop (HRSA, 2013). The validation of competencies is a step-by-step procedure and consists of research techniques using questionnaires and expert panel review (Armstrong, 1986; Chang, 2007; Hart, 2010; HRSA, 2013; Staggers et al, 2002; Westra & Delaney, 2008). Healthcare

institutions should be interested in validating competencies for NPD because licensed healthcare professionals have an obligation to the public to validate their education, examination, and experience (Harrison, McPeak, & Greenberg, 2004). Through the validation process, employees develop self-confidence, which increases job satisfaction and retention, and organizations develop its human capital, strengthening the organization as a whole. Although validated competencies are essential for individual growth, TIGER (n.d.) encourages the development of strategies specifically for developing and infusing IT knowledge, skills, and ability.

IT Competency Development Strategies

Many NPD Specialists are pursuing formal education in informatics to advance their IT knowledge. The NPD Specialist cannot rely solely on the knowledge acquired during their full-time education throughout their careers. The NPD Specialist should continue to learn during all stages of her career (Hart, 2008; Stepankova & Engova, 2006). The infusion of IT in healthcare settings requires NPD Specialists to develop technology skills, but learning to effectively use technology is time consuming (Turner, 2010). The growing need to continuously update knowledge increases the need for standardized methods of knowledge certification. Practical (realistic, useful, and handy) strategies for learning IT competencies are needed. A strategy in this study is defined as any actionable approach, tactic, or resource used to develop IT competency. This section explores self-directed, informal learning strategies for developing IT competency.

The best way to acquire IT skills is through hands-on experience (Simpson, 1994). The NPD Specialist can become proficient with IT systems by using the available internal resources, such as the information systems department and support staff

(O'Shea, 2007; Simpson, 1994). The NPD Specialist practicing in patient care settings can also collaborate with IT system vendors and educational institutions to expand their knowledge base (Turner, 2010).

Education on IT systems is one of the largest costs when implementing new technology. Efforts to reduce education costs sometimes means limiting the education to *how to use the system* instead of *how to use the system to deliver safer, more effective patient care* (TIGER, 2009; Turner, 2010). The goal is to provide care using IT systems to increase healthcare quality. With healthcare and education budget constraints, there is minimal time and money that can be used for educating NPD Specialists (McNeil et al., 2003, 2006; Simpson, 2005; Turner, 2010). Informal learning strategies can prove useful for quickly advancing IT knowledge and skills. The next section explores informal learning.

Informal Learning

Informal learning is any activity involving the pursuit of understanding, knowledge, or skill occurring outside the curricula of educational institutions (Livingston, 1999; Schugurensky, 2000). Informal learning reinforces learning acquired in formal and nonformal education. Informal learning can occur in an individual or group setting, at any place or space.

Schugurensky (2000) identified three types of informal learning: incidental learning, socialization, and self-directed learning. Incidental learning refers to learning experiences where the learner does not have intention of learning something out of a particular experience, but after the experience the learner becomes aware that learning has taken place. Incidental learning is "unintentional but conscious" learning

(Schugurensky, 2000, p. 4). Socialization (or tacit learning) "refers to the internalization of values, attitudes, behaviors, and skills that occur during everyday life" (Schugurensky, 2000, p. 4). The learner has no prior intention of acquiring the particular skill, and no awareness that she has learned a new skill. Self-directed learning is both intentional and conscious learning. Self-directed learning will be the focus of this study due to its practical and immediate application to NPD Specialists (Merriam, 2006). The next section discusses informal aspects of self-directed learning in greater detail.

Informal Self-directed Learning

Self-directed learning encourages learner responsibility, and the learner has the motivation of learning something before the learning process begins. In self-directed learning, learners control the objectives and means of learning (Mocker & Spear, 1982). The learner discovers the need to be proficient and embarks on conscious activities such as on the job training, webinars, workshops, reference manuals, technical journals, projects, and associations (Armstrong, 1987; Sensmeier, 2007; Simpson, 1994). Self-directed learners undertake learning projects to develop their own skillset. These projects are assumed without the assistance of an educator, but may sometimes utilize a knowledgeable resource. Terms related to self-directed learning are: self-planning learning, self-teaching, individualized learning, autonomous learning, autodidactic activity, isolated learning, and independent adult learning. An example of an informal learning strategy that is self-directed is where a NPD Specialist establishes an infrastructure support system within the healthcare setting using internal experts for consulting technology-related problems. This strategy bridges the technology learning

gap and increases IT competency in the NPD Specialist and her staff (Winter et al., 1997).

Strategies to sustain expertise in clinical practice and professional growth include keeping abreast of the literature from technology and nursing, participating in activities of professional organizations, attending conferences, networking, working with a mentor, and using technology (Mateo & Fahje, 1998). Partnerships with key nursing organizations, healthcare vendors, and healthcare institutions provide learning experiences in emerging technologies (Hebda & Calerone, 2010; Simpson, 1994). Several resources are available for acquiring skills in using emerging technologies. The ANA and ANPD offers independent study modules to broaden knowledge and skills in nursing practice, NPD, CISs, and other current topics. See Appendix A Baseline List of IT Development Strategies gathered from an extensive literature review. This list includes a full listing of resources for developing IT skills from the literature and NPD resources and organizations.

The NPD Specialist should use informal self-directed learning strategies and resources to sustain expertise in clinical practice and professional growth. Conscious and intentional ways to learn are less costly than formal education and aid in quickly advancing IT knowledge progression. Using informal self-directed learning strategies to develop an IT proficient NPD workforce is crucial. As a basis for the IT professional development of NPD Specialists, theories of human capital development, competency, and professional development are explored in the subsequent section.

Theoretical Foundation

Theories of human capital development, competency, and professional development serve as the foundation for addressing nursing IT professional development within organizations. Key theories outlined are,

1. Dreyfus model of skill acquisition (Dreyfus & Dreyfus, 1980)
2. Novice to expert theory (Benner, 1982)
3. A model of the IT implementation process (Cooper & Zmud, 1990; Zmud & Apple, 1992)
4. Human capital theory (Becker, 1962)

The increased use of health IT and nursing informatics has increased the need for highly experienced NPD Specialists. The complexity and responsibility of the NPD Specialist role requires long-term and ongoing career development and requires an understanding of the transformations between the experienced and the novice (Benner, 1982; Dreyfus & Dreyfus, 1980; Turner, 2010). Current healthcare settings are technology rich—requiring the *infusion* and *routinization* of IT within organizations (Cooper & Zmud, 1990; Hersh, 2010; NLN, 2009; Zmud & Apple, 1992). Healthcare institutions should recognize infusion (effective use) and routinization (efficient use) requires an IT proficient workforce, thus requiring organizations to invest in developing their human capital (Becker, 1962; Sundaram et al., 2007).

Dreyfus Model of Skill Acquisition

In acquiring skill and experience, individuals progress through five developmental stages. Dreyfus & Dreyfus (1980, 1988) describe these stages as: novice, advanced

beginner, competence, proficient, and expert in the Dreyfus model of skill acquisition. The five stages of the Dreyfus Model (1980, 1984, 1986, 1988) are defined in Table 3.

Table 3

Dreyfus Model of Skill Acquisition Stages

Dreyfus Model Stages	Definition
Novice	Learns to recognize various objective facts and features relevant to the skill and acquires rules for determining actions based upon those facts and features.
Advanced Beginner	Performance improves to a marginally acceptable level after the novice has considerable experience in coping with real situations encouraging the learner to consider more context-free facts and to use more sophisticated rules.
Competence	Sees a situation as a set of facts; no longer merely follows rules designed to enable operation; adopt a hierarchical procedure of decision-making; with a combination of non-objectivity and necessity.
Proficient	Intuitively organizing and understanding his talk but may still find himself analytically thinking about what to do; intuition or know how, as we understand it is nether wild guessing nor supernatural inspiration, but the sort of ability we all use all the time as we go about everyday tasks.
Expert	Knows what to do based on mature and practiced learning

Note: Adapted from "A five-stage model of the mental activities involved in direct skill acquisition," by S. E. Dreyfus and H. L. Dreyfus, 1980 and "Putting computers in their proper place: analysis versus intuition in the classroom," by H. L. Dreyfus and S. E. Dreyfus, 1984.

A detailed understanding of the stages through which skillful performance develops is essential in determining capacities an individual has acquired and the next capacity to attain. As the individual skills are acquired, there is less dependence on abstract principles and more on concrete experience (Dreyfus & Dreyfus, 1986). Concrete "experience is relevant to problem solving performance" (Johnson-Laird &

Wason, 1977, p. 153). Beginning skill is produced by following abstract rules, but experience plays a principal role in further acquiring skill (Dreyfus & Dreyfus, 1980).

Ramsburg (2010) uses the Dreyfus model to understand the dynamic process of NPD Specialist skill acquisition, to assess progress in the development of skills, to define a desired level of competence, and to determine when the NPD Specialist is ready (or competent) to educate others. The NPD Specialist should always be aware of her own developmental stage and the stage of her learners to facilitate progression to the next stage (Dreyfus & Dreyfus, 1980; 1986). The Dreyfus Model is an excellent guide to use in describing and interpreting skill acquisition in many subjects and themes. Benner (1982) applied the Dreyfus model to advancing IT skills in nursing practice (Turner, 2010).

Novice to Expert Theory

In the novice to expert theory, Benner (1982, 1984) applied the Dreyfus model to nursing practice to aid in understanding how individuals progress, develop, and master skills. The novice to expert theory describes and interprets skill acquisition. The novice to expert theory includes additions in skilled performance based upon experience and education and provides a baseline for clinical knowledge development and career progression in clinical nursing (Benner, 1984). The novice to expert theory is linked to obtaining essential competencies in the nursing field, while promoting continuous learning and excellence in nursing practice (Benner, 1982, 1984). There are five stages to the novice to expert theory: (a) novice, (b) advanced beginner, (c) competent, (d) proficient, and (e) expert. The novice to expert theory explains how nursing professionals develop and move from novice to expert based on education, strategies, and

experience. Michelle Turner (2010, p. 294) applied Benner's novice to expert theory to individuals acquiring competency in using IT systems used to document patient care.

An IT novice is described as one who has been exposed to a computer and word processing, spreadsheet, or email applications, but has minimal experience on a specific system used to document patient care (Benner, 1982; Turner, 2010). An advanced beginner demonstrates "marginally acceptable performance" (Benner, 1982, p. 403) in using a specific IT system (Turner, 2010). The advanced beginner has experienced enough real situation using the IT system to develop "recurrent meaningful situational components" (Benner, 1982, p. 403; Turner, 2010). As the advanced beginner moves to becoming competent, the primary activity is experience on the IT system from which the user learns and progresses (Turner, 2010). The competent user can navigate the system in a nonlinear fashion. The competent user has used the system enough to learn other ways to navigate in the system. The competent user develops skills by using the system appropriately and efficiently. The proficient user effectively uses decision-support capabilities of the IT system to support patient care, thus understanding the entirety of the system. The expert is "no longer relies on analytic principle to connect his understanding of the situation to an appropriate action" (Benner, 1982, p. 405). The expert operates from a deep understanding of the total situation and views the IT system as an "upstream source of information" (Alquraini et al., 2004; Turner, 2010, p. 295).

Benner examined skill acquisition and learning through direct experience in nursing practice. Benner's work demonstrates why practicing nurses should be retained and rewarded for their clinical expertise (Benner, 1982; 2004; Turner, 2010). Nursing organizations use Benner's novice to expert theory in discussing professional

development for all nursing professionals. Nursing practice “grows through experiential learning and through transmitting learning in practical settings" (Benner, 2001, p. vi).

Nursing Professional Development Specialists should follow Benner’s Novice to Expert Theory in professional development and use it as a guiding concept to continue as experts in practice (Benner, 1982; Turner, 2010). The Dreyfus model and novice to expert theory can be used to explain progression and mastery of NPD Specialist IT skills (Ramsburg, 2010; Turner, 2010). A model of the IT implementation process focuses on maximizing the use of IT within organizations. The next section further discusses diffusion and infusion of IT within healthcare organizations to develop human capital.

A Model of the IT Implementation Process

Kwon and Zmud (1987) focus on a variety of individual, organizational, and technological forces important to the effectiveness of IT implementations. Organizations execute and diffuse IT within the business through IT implementations. Increasing the depth and breadth of IT diffusion into an organization leads to increased efficiency and effectiveness. Cooper and Zmud (1990), and Zmud and Apple (1992) describe the process in a series of stages through a model of the IT implementation process. The stages include Initiation, Adoption, Adaptation, Acceptance, Routinization, and Infusion. The model explains the process of the beginning three phases of implementing an IT system into an organization, the organization adopting the IT system, and adapting and modifying its current processes to the new IT system. The latter three stages of the model examine post-adoption behaviors of acceptance, routinization, and infusion of IT systems. Acceptance involves the intent to use the system, routinization refers to efficient and competent use of IT, and infusion refers to effective use of IT (Sundaram, Schwartz,

Jones, & Chin, 2007). The significance of the infusion process is obtained by using IT in a comprehensive and integrative (holistic) manner to support higher level aspects of organizational work (Cooper & Zmud, 1990). When an organization uses IT system at its maximum potential, the organization has reached the infusion stage (Cooper & Zmud, 1990; Kwon & Zmud, 1987; Zmud & Apple, 1992).

Factors in the environment influence the capability of a healthcare organization to routinize and infuse IT (Cooper & Zmud, 1990). To achieve successful implementation, organizations should understand the factors that impact infusion. Sundaram et al. (2007, p. 103) state, "the act of incorporation for a person is the process of use during which an individual's… routines may need to be altered and the technology is used to its fullest potential'. Sundaram et al., (2007, p. 103) suggests three types of use,

1. the degree to which the individual uses the IT system
2. the degree to which the individual adapts to using the IT system (routinization)
3. the degree to which the individual maximizes the potential of the IT system (infusion).

An interrelationship exists among frequency, routinization, and infusion of IT systems. To achieve routinization and infusion, an individual should formulate an intent (or acceptance) to use the technology and follow through with the intended use. The increased usage creates an opportunity for the technology to be routinized and infused. Cooper and Zmud (1990) propose routinization precedes infusion, and acquiring higher infusion levels requires behavioral changes to enable a stable working-level set of routines in the individual and organizational processes. The success of creating IT

proficient NPD Specialists in healthcare settings requires a substantial investment in the individual. Human capital development theories may suggest processes to foster routinization and infusion of IT functions.

Human Capital Development Theory

When implementing new IT systems within healthcare organizations, the goals is to use these systems efficiently and effectively (Sundaram et al., 2007). Effective and efficient (competent) use of IT systems involves positive change in the behavior of individual users (human capital). Human capital within healthcare organizations should be managed to improve the performance of individuals serving in critical roles—that is, NPD Specialists—with the biggest impact on core competencies. Human capital development focuses on improving the performance of individuals serving in critical organization roles (Huselid, Becker, & Beatty, 2005)

Healthcare organization leaders should see their NPD workforce as capital and resources to yield a return on investment (Becker, 1962). The human capital development theory (Becker, 1962) encourages organizations to make investments in their workforce to achieve the greatest gain in human capital assets (knowledge and skill). These investments in the workforce yield economic gains for organizations and individuals (Skiba & Dulong, 2008). Healthcare organizations should continue to make investments in its NPD workforce because these are the individuals responsible for the professional development of nurses, the largest healthcare workforce.

Summary

As health IT policy forces healthcare organizations to implement and *meaningfully use* technology to increase patient care quality and reduce healthcare costs,

healthcare settings are becoming increasingly technology-rich. The emphasis of using technology in patient care places a heavy burden on nursing professionals including NPD Specialists. The role of the NPD Specialist in healthcare settings is vital to the professional development of nursing caregivers and is central to leading change initiatives and policy in healthcare. It is imperative that NPD Specialists be proficient users of IT in order to competently lead others. The nursing informatics agenda pushes all nursing professionals to be IT competent by way of the TIGER initiative. Although TIGER and others have produced a compilation of informatics competencies required of all nurses, a core set of IT competencies specifically for nursing specialty roles to increase role performance is recommended (Hart, 2010). Validation of appropriate IT competencies for nursing professional roles develops human capital, reinforces the nursing informatics agenda, strengthens healthcare organizations, and supports achieving health IT policy. Nursing organizations encourage NPD Specialists to use informal learning strategies to develop proficiency in using IT systems. The next chapter details the research and methodology used to accomplish study objectives.

CHAPTER III

RESEARCH DESIGN AND METHODOLOGY

Technology-rich healthcare settings, federal health IT policy, and the nursing informatics agenda challenge NPD Specialists to proficiently serve in healthcare settings. The major role of NPD Specialists in healthcare settings is to address the professional development needs of nurses to meet current and future nursing practice and policy demands. The push for meeting the Federal mandate is critical and NPD Specialists are key to accomplishing this goal, but role-specific IT competencies for NPD Specialists have not been updated or verified since Armstrong's 1986 study.

The purpose of this study is twofold: (a) validate IT competencies essential for NPD Specialists in healthcare settings and (b) identify informal self-directed learning strategies for developing IT competency (Armstrong, 1989; Staggers et al., 2002; Hart, 2010; Turner, 2010). This chapter discusses the research design used to accomplish the following research objectives:

RO1: Describe the demographic characteristics of NPD Specialists serving as IT experts in healthcare settings.

RO2: Validate IT competencies essential for NPD Specialists practicing in healthcare settings.

RO3: Identify self-directed, informal learning strategies for developing essential IT competencies in NPD Specialists practicing in healthcare settings.

Research Design

In this section the study's scope, methodology, data collection methods, and data analysis plan are discussed. The current study uses a qualitative research design

employing the Delphi technique. A qualitative research design is cyclic in nature and can lead to deeper investigation and refined theory. The qualitative research process is inductive and seeks to discover, explore, and describe a phenomenon. The discovery captures and represents perceptions and meaning—using a theoretical lens to guide the study (Myers, 2008). The researcher sought detailed understanding about IT competencies essential for the NPD Specialist workforce and development strategies to make meaning and describe certain phenomena. The researcher used qualitative methods to look for new concepts and emerging themes. The subsequent section discusses the research design and methodologies used in detail.

Qualitative techniques and data collection methods were used to gain in-depth insight into essential competencies and strategies experienced NPD Specialists use to develop IT proficiency in themselves and others. This study used qualitative research methods throughout four phases to discover specific competencies and self-directed, informal learning strategies important for this population (NPD Specialists). Qualitative data were gathered through the use of the Delphi technique utilizing questionnaires to describe ways expert NPD Specialists have adapted to practicing in technology-rich healthcare settings.

The Delphi Technique

Helmer defines the Delphi technique as a "systematic method of collecting opinions from a group of experts through a series of questionnaires" (Helmer, 1972, cited in Yousuf, 2007, p. 1). Characteristics of the Delphi technique include, (a) anonymity of responses; (b) iterative process; (c) controlled feedback; and (d) statistical group response (Hsu & Sandford, 2007; Koivunen, Valimaki, Jakobsson & Pitkanen, 2008). The Delphi

method was originally developed and used as a forecasting method (Linstone & Turoff, 2002). The method has been used for a variety of purposes within healthcare, nursing, IT, and competency development (Armstrong, 1986; Westra & Delaney, 2008; Hart, 2010). Feedback is derived from previous questionnaire responses. The responses are reduced and returned to participants for re-evaluation (Linstone & Turoff, 2002).

The Delphi method is a "structured communication process effective in allowing a group of individuals, as a whole, to deal with a complex problem" (Linstone & Turoff, 1975, p. 3). Using the Delphi methodology is suitable to prevent personal judgments based on data collection procedures. The Delphi method contributes to the investigation of a problem by experts who have a background regarding their experiences or expertise in a specific area (Linstone & Turoff, 1975). The Delphi technique's use of an expert panel increases understanding of broad views from experts and achieves consensus via accumulated intelligence.

Three rounds of Delphi were used in the current study to rate competencies and list strategies for competencies rated high in importance (Armstrong, 1986). In the pre-Delphi phase, expert validators updated and validated Armstrong's competencies. Thus the list derived from the pre-Delphi phase became the validated listed used throughout the three Delphi rounds. The researcher started with an existing validated list of competencies as a baseline for expert panelists to rate the validated list of IT competencies by importance for the role NPD Specialists serve in healthcare settings. The Delphi can be repeated up to four rounds, but the calculated means of the responses shift very little after the second round (Rossman & Bunning, 1978; Cochran, 1983; Borg & Damien, 1984). Delbecq, Van de Ven, and Koenig (1976) suggest a minimum of 45

days to administer a Delphi study. This study was administered over the course of four months. Stines (2003) informs that the Delphi process includes five steps:

1. Iteration for each round involves a questionnaire sent to experts, completed, and returned to the researcher.
2. Researcher analyzes data, provides feedback to experts, and offers a second questionnaire based on the results of the first iteration.
3. Experts complete the second questionnaire and return it to the researcher.
4. Process repeats with a possible third questionnaire created from the second iteration and is then distributed to experts to complete and return.
5. Data from the final round is analyzed and results are generated

The Delphi technique was chosen because it offers a flexible, iterative process allowing for multiple rounds to answer specific research questions (Isaac & Michael, 1981). The Delphi method was appropriate because experts were geographically separated (Towles, 1978). The current study used the Delphi to collect essential IT competencies and strategies for developing each competency from an expert panel of NPD Specialists.

Population

Two groups of NPD Specialists were used to accomplish the study goals: expert validators and expert champions. These two groups were required to have extensive experience practicing in a NPD role in a healthcare setting and must possess IT proficiency. Expert validators verified competencies for NPD Specialists, while expert champions rated the importance of those competencies. Expert champions also contributed to the study by identifying strategies for developing IT competency. All

participants were Registered Nurses (RN) with five or more years of experience practicing in a NPD role in a healthcare setting and had experience teaching, supporting, and using IT (Sharoff, 2006; Chang, 2007). Benner (1983) states, "experience is a prerequisite for expertise" (p. 3).

Three expert validators were selected from professional contacts. Expert validators were selected because of their nursing and IT knowledge and experience (Morse, 1994). Expert validators met specific criteria to participate in the current study:

1. Licensed as a Registered Nurse
2. Served a minimum of 5 years in a NPD role
3. Served at least 5 years teaching or supporting IT
4. Published at least one study in healthcare, nursing, nursing informatics, or information technology

Expert validators participated in the pre-Delphi phase (Delphi Round 0). The goal of the pre-Delphi phase was to validate IT competencies for NPD Specialists practicing in healthcare settings. Expert validators updated Armstrong's list of competencies (Appendix B) with current nursing and IT terminology. Expert validators verified IT competencies for the role NPD Specialists serve in healthcare settings. The validated list of IT competencies produced in the pre-Delphi phase was used in Delphi Round 1.

The second group of participants for the study, defined by the researcher and referred to in this study as expert champions, served on the Delphi expert panel participating in Delphi Rounds 1, 2, and 3. Expert champions possessed IT expertise and NPD experience in a healthcare setting. Expert champions participated in Delphi Round

1 to rate competencies by importance, Round 2 to list strategies for developing competencies, and Round 3 to list additional strategies for developing competencies. Expert champions met specific criteria to participate in the study:

1. Licensed as a Registered Nurse
2. Currently serving in a NPD role, or served a minimum of 5 years in NPD role
3. Involved with IT implementations or education in a healthcare setting
4. Obtained a degree or certification in IT, or served at least 5 years in an IT role (teaching, supporting, or using IT)

Delbeq (1975) suggests at least 10-15 individuals are needed for a homogeneous (participants who share common characteristics) sample to conduct the Delphi process. In order to attain the suggested number of individual participants throughout the Delphi process, the researcher increased the initial participation numbers.

Expert champions were selected from within the Health Information and Management Systems Society (HIMSS) organization. The HIMSS organization is a global organization that focuses on better health through the use of IT systems and leads efforts to optimize health engagements and care outcomes using IT. The HIMSS representative made initial contact with 180 study prospects, from various healthcare settings throughout the United States, who currently serve in a NPD role. The HIMSS representative emailed an Invitation to Participate (Appendix C) to study prospects. These prospects were invited to participate in the study based on criteria specified in the Invitation to Participate.

The researcher also used a Snowball Sampling technique to recruit additional NPD Specialists who were *hidden* in healthcare institutions and not easily accessible.

Snowball sampling is a technique used for gathering research participants through identifying an initial participant who can suggest additional study prospects. The strategy has been used to reach concealed populations (Faugier & Sargeant, 1997; Patton, 1990). Participants were asked to refer others in Delphi Round 1 Questionnaire 1. A modified Invitation to Participate (Appendix D) was emailed to participant referrals. Forty-one prospects accepted the invitation to serve as expert champions.

Research Instruments

The researcher adapted Armstrong's instruments for the current study (See Table 4 and Appendix E). Self-administered survey questionnaires were used to collect data in the current study.

Table 4

Instruments

Research Objective	Delphi Round	Instrument	Participants	Data Output
R01, R02	0	Pre-Delphi: Validation Form	expert validators	Validated List of Competencies
R01, R02	1	Questionnaire 1: Rating Competencies Questionnaire	expert champions	Competencies Rated by Importance, Baseline Strategies
R03	2	Questionnaire 2: Collecting Strategies Questionnaire	expert champions	Strategies
R03	3	Questionnaire 3: Collecting Additional Strategies Questionnaire	expert champions	Additional Strategies

Questionnaires for data collection are (a) Pre-Delphi Validation Form, (b) Delphi Round 1 Questionnaire 1, (c) Delphi Round 2 Questionnaire 2, and (d) Delphi Round 3 Questionnaire 3. Each Delphi round used a different questionnaire to accomplish a specific objective.

Pre-Delphi Validation Form

The purpose of the Validation Form was to gather demographic information from expert validators and to verify competencies for NPD Specialists serving in healthcare settings. The Validation Form (Appendix F) asked specific demographic questions related to participant education and work experience. The Validation Form contained Armstrong's 107 competency statements categorized by the four areas of nursing: Administration, Research, Clinical Practice, and Education. Expert validators were asked to evaluate each competency statement and their appropriateness for the role NPD Specialists serve in today's healthcare settings. Open-ended comment boxes were provided throughout the form for participants' unrestricted feedback.

Delphi Questionnaires

Delphi questionnaires were created using Survey Monkey. Delphi Round 1 Questionnaire 1 (Appendix G) contained a list of validated competencies categorized by NPD roles. Expert champions were to rate the validated competencies using 5-point Likert scale (1 = of no importance, 2 = of low importance, 3 = of medium importance, 4 = of high importance, 5 = of extreme importance). Delphi Round 2 Questionnaire 2 (Appendix H) started with a suggested list of strategies for participants to use in determining specific strategies for developing competencies. Questionnaire 2 contained a listing of competencies rated high in Delphi Round 1 and space provided to list specific

strategies for developing each competency. Delphi Round 3 Questionnaire 3 (Appendix I) contained a listing of competencies rated high in Delphi Round 1 and displayed strategies collected from Delphi Round 2. Space was provided for participants to confirm strategies listed in Round 2 and to list additional strategies for developing each competency. In Questionnaires 1, 2, and 3, participants were given space to provide unrestricted feedback and comments regarding the questionnaires and study. As suggested by Patton (2002), study instruments were developed and refined as the study progressed.

Data Collection Procedures

Data was collected in the current study using survey questionnaires, a form of interviewing to survey a population without face-to-face interaction. Self-administered questionnaires were used for data collection to capture participant demographics, to determine core IT competencies and to identify self-directed, informal learning strategies for developing IT competencies. The questionnaires included purposeful, concrete questions and statements, easy to respond to, and free of uncertainty (Dillman, 2000). Data collection of competencies was complete after expert champions rated each validated competency. Data collection of strategies was complete after at least two corresponding strategies were identified for each competency rated high in importance.

Before beginning data collection, the researcher obtained approval from the University of Southern Mississippi (USM) Institutional Review Board (IRB) (Appendix N). To accomplish the research objectives, the researcher followed the timeline set to reduce attrition. Table 5 displays the study timeline.

Table 5

Timeline of Procedures

Source	Timeframe	Method/Instrument
Phase One		*Competency Validation*
Researcher	Week 1	• Developed skeleton of all study instruments
Researcher	Week 2	• Finalized instrument for Delphi Round 0 • Emailed Invitations to Participate, Consent Forms and Validation Forms to expert validators
Expert Validators	Week 2-4	• Expert validators complete and return Consent Forms and Validation Forms
Researcher	Weeks 4-5	• Summarized Validation Form data • Revised and finalized Delphi Round 1 instrument
Phase Two		*Competency Rating*
Researcher (HIMSS representative)	Week 6	• HIMSS representative emailed Invitation to Participate, Consent Form, Instructions, and Questionnaire 1 to expert champions
Expert Champion	Weeks 5-8	• Completed and returned Consent Forms and Questionnaire 1
Researcher	Week 5-8	• Summarized Questionnaire 1 data • Assigned random, unique numbers • Revised and finalized Delphi Round 2 instrument
Phase Three		*Strategies Listing*
Researcher	Week 9	• Emailed Delphi Round 2 Questionnaire 2
Expert Champions	Weeks 10-13	• Completed and returned Questionnaire 2
Researcher	Week 10-13	• Summarized Questionnaire 2 data • Revised and Finalized Delphi Round 3 instrument
Phase Four		*Additional Strategies Listing*
Researcher	Week 14	• Emailed Delphi Round 3 Questionnaire 3
Expert Champions	Week 15-18	• Completed and returned Questionnaire 3
Researcher	Week 15-18	• Summarized Questionnaire 3 data • Verified each competency had at least two development strategies
Researcher	Week 19-20	• Reviewed previous round responses for inaccuracies and miscalculations

The study objectives were accomplished using a four-phase method (Figure 2). Phase one consisted of a literature review and competency validation. Phase two involved determining competencies of high importance. Phases three and four entailed identifying development strategies for important competencies.

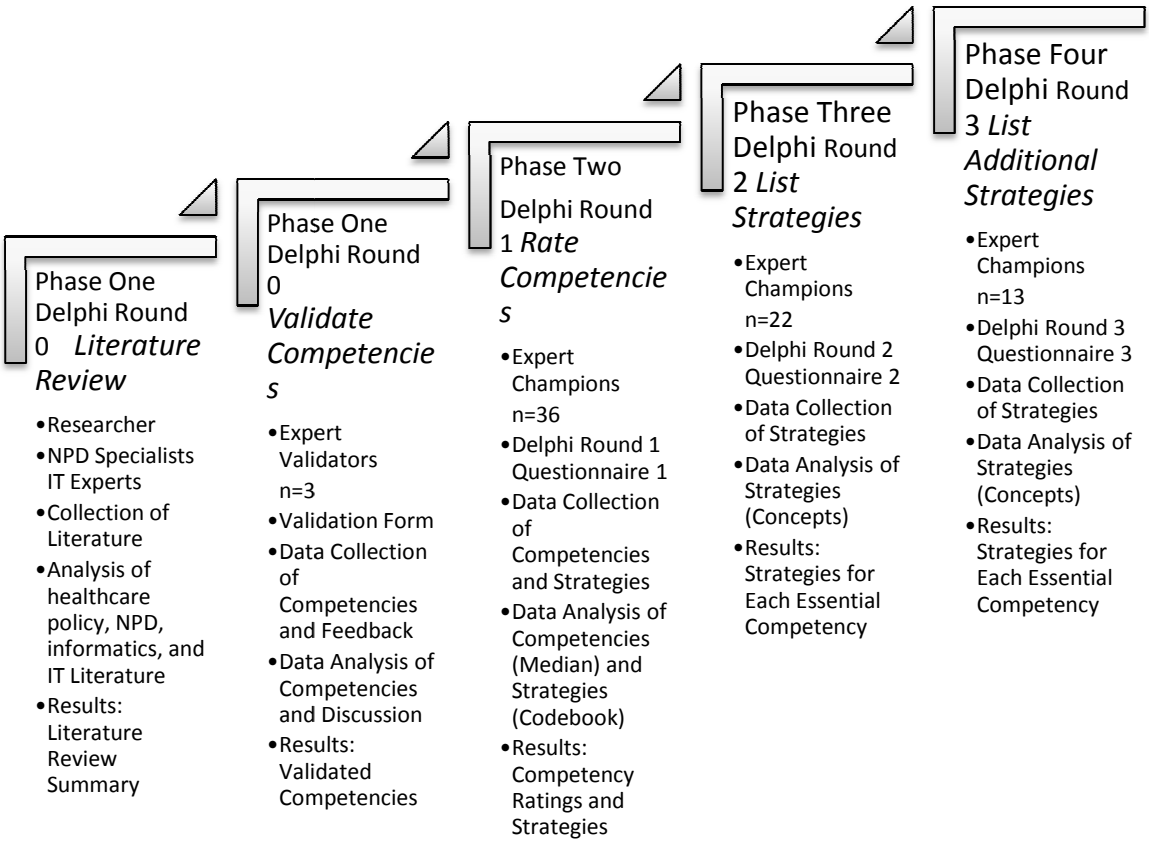

Figure 2. Methodology Phases.

Delphi Round 0

This study spanned over the course of five months and included four crucial phases: competency validation, competency rating, strategies listing, and additional strategies listing. Data collection began in March of 2014 and was completed August of 2014. On February 24 and March 17, 2014, expert validators were emailed a Letter of Introduction, Consent Form, and Validation Form (Appendix F). Expert validators were

given seven days to critique, update, and validate Armstrong's 107 competencies for NPD Specialists serving in today's healthcare settings. Expert validators were to return the Consent Form and Validation Form via email to researcher within seven days. The researcher used two weeks to review and summarize data collected on the Validation Form. The researcher created a Microsoft Excel Workbook: *Competency_Validation.xls* to capture all data collected for the study. Validator Form data was manually entered data into the Microsoft Excel workbook and summarized. Competencies were categorized in preparation for the next phase—Delphi Round 1.

Delphi Round 1

On April 11, 2014, a HIMSS representative emailed an Invitation to Participate (Appendix C), Consent Form (Appendix G), and Delphi Round 1 Questionnaire 1 (Appendix G) to 180 NPD Specialists in healthcare settings throughout the United States. Respondents were assured that their names and personal information would remain anonymous. Participants were asked to complete and return the study Consent Form and Questionnaire 1 to the researcher within 14 days. This timeframe was later increased to 21 days to increase study participation. As participants returned Questionnaire 1, each was assigned a random, unique number for anonymity. Questionnaire 1 data was summarized as it was submitted to the researcher. Questionnaire 1 data was exported from Survey Monkey to Microsoft Excel *Study_Summary_Workbook.xls* then summarized. The median competency ratings summarized from Round 1 were categorized based on importance levels. The researcher made revisions to the Delphi Round 2 instrument including only competencies rated high in importance from Round 1.

Delphi Rounds 2 and 3

On May 5, 2014, expert champions were emailed Delphi Round 2 Introduction Letter and Questionnaire 2 (Appendix H). Expert champions were given three weeks to complete Questionnaire 2 listing IT development strategies. Questionnaire 2 data was summarized as it was received. Questionnaire 2 data was exported from Survey Monkey to Microsoft Excel *Study_Summary_Workbook.xls* then summarized. The researcher made revisions to the Delphi Round 3 instrument. On July 16, 2014, expert champions were emailed Delphi Round 3 Introduction Letter and Questionnaire 3 (Appendix I) and asked to add additional IT development strategies and confirm the strategies listed. Expert champions were given two weeks to complete and return Questionnaire 3. The researcher summarized data from Questionnaire 3 as they were received from participants. Questionnaire 3 data was exported from Survey Monkey to Microsoft Excel *Study_Summary_Workbook.xls* then summarized. Data collection concluded after each competency rated high in importance received at least two corresponding informal learning strategies. In August 2014, the researcher used three weeks to review previous round responses and summarized data for inaccuracies and miscalculations.

Data Analysis

The results of the current study are a tool that can be applied by NPD Specialists, other healthcare professionals, healthcare institutions, and academic institutions. The competencies rated as important in Round 1 and strategies identified in Rounds 2 and 3 can be used to aid in learning informatics. Data review and analysis were performed in conjunction with data collection. In qualitative studies, data is often collected and

analyzed concurrently as the researcher discovers new themes and concepts (Patton, 2002).

The researcher conducted analysis on the data collected in this study (competencies, strategies, and comments). Competencies rated by expert champions were statistically analyzed using Microsoft Excel to compute medians. Strategies determined by expert champions were coded and categorized based on common themes using level one coding [American Society for Training and Development (ASTD), 2006].

Data Analysis of Competencies

Multiple forms of data analysis were used to summarize competencies to achieve study goals. Competencies were validated (in Delphi Round 0) and rated by importance (in Delphi Round 1). The researcher performed qualitative analysis of validated competencies (from Delphi Round 0) and quantitative analysis of competency ratings.

Data Analysis of Delphi Round 0: Competency Validation. The goal of Delphi Round 0 was to validate IT competencies for NPD Specialists in healthcare settings. The researcher documented the data and the process of data collection. The researcher created a Microsoft Excel Workbook named *Competency_Validation.xls* exclusively for monitoring the process of competency validation. The researcher manually entered Armstrong's (1986) original final list of competencies into the Excel *Competency_Validation.xls* workbook. One participant suggested the researcher use the ANCC Role Delineation study (2010) to replace and update the competencies from Armstrong's study.

The researcher manually entered the data from the Validation Form into the Microsoft Excel workbook as expert validators returned the completed Validation Forms.

Expert validators' proposed validated lists of competencies were entered in spreadsheet columns alongside each other to make four separate lists (Armstrong, expert champion 1, expert champion 2, and expert champion 3) for comparison. These proposed lists were checked for accuracy, the researcher made comparisons one competency statement at a time. Competency statement comparisons and contrasts were made to determine which competencies should be omitted and which competencies should be revised.

In instances where one expert validator suggested a competency be omitted, and another suggested the competency remain; the researcher took the most conservative action and kept the competency as part of the final validation list to be rated by importance in Delphi Round 1. If participants had a difference in opinion of how to revise a particular competency statement, then the researcher made the final decision using credible nursing literature. The researcher collaborated closely with expert validators in finalizations. Throughout the data analysis of determining competency validation, the researcher often referred to credible nursing informatics resources such as the Nursing Informatics: Scope & Standards of Practice (2008), the TIGER initiative, the HIMSS organization, the *Computers, Informatics, Nursing* journal, the ANCC informatics data, and nursing informatics professionals. The researcher made detailed notes within the Excel workbook to keep a tally on the number of Armstrong's competencies that were omitted, revised and combined. After extensive comparisons and distinctions, the researcher finalized the list of validated IT competencies for NPD Specialists in healthcare settings. This validated list of IT competencies was used in a subsequent Delphi round to rate competencies by importance.

Data Analysis of Delphi Round 1: Competency Ratings. Expert champions rated the importance of each validated competency statement derived from Delphi Round 0 in Delphi Round 1 Questionnaire 1. Expert champions rated each competency using a five point Likert scale (1= of no importance to 5 = of extreme importance). Questionnaire 1 data was exported from Survey Monkey into the Excel workbook *Study_Summary_Workbook.xls* for further analysis. The researcher created separate worksheets within the workbook to reflect the individual competency categories: Change Agent/Consultant, Leader, Educator/Facilitator, and Researcher. Each competency was listed in its appropriate category sheet along with individual ratings for each competency. The researcher verified competencies and ratings were in appropriate format to calculate median (measures central tendency) ratings for each competency. Ehigie and Ehigie (2005) state, in the Delphi "majority opinion is represented by the median score" (p. 631). The median indicates the tendency of feeling toward a particular competency statement. A higher median indicated the perceived importance of the competency statement (Armstrong, 1986). Competencies rated high and extreme importance were recognized as *essential IT competencies for NPD Specialists in healthcare settings* (Armstrong, 1986). Competencies with median ratings of 4.0 and above with a minimum 80% panel consensus were considered high in importance. Competencies with median ratings of 3.00-3.99 were considered of medium importance; competencies with median ratings of 2.00-2.99 were considered of low importance; and competencies below 2.00 were considered of no importance. Missing data was documented in a descriptive write up (Fink, 2003; *The Survey Kit, 2nd ed.,* Book 9). Competencies considered high in

importance were used in Delphi Rounds 2 and 3 to determine corresponding development strategies.

Data Analysis of Strategies

Data Analysis of Delphi Round 1: Unrestricted Listing of Strategies. A Codebook of Strategies (See Table 13) was created to better organize and categorize strategies collected. The Codebook was developed to better categorize strategies of informal learning: educational websites, organizations, resources, books, courses, exercises, simulations, and other themes. In Delphi Round 1 Questionnaire 1 expert champions were asked in one open-ended question to list strategies for developing IT competency in general. All responses were exported into an Excel worksheet for data analysis. Data analysis of strategies collected in Round 1 involved organization and categorization of strategies into concepts and themes originally set in the Codebook of Strategies. Each response was reviewed and added to a specific category in the Codebook. The Codebook was refined as additional categories were added based on frequency of participant responses. Strategies collected from Round 1 were coded for frequency of themes and patterns using open coding to identify categories and themes and to add additional categories to the Codebook (Patton, 2002). Competencies were reported as listed by participants, but all personal data was concealed.

Data Analysis of Delphi Round 2: Listing of Strategies. In Delphi Round 2 Questionnaire 2 expert champions were asked to list informal learning strategies for each IT competency rated high in importance. Participants listed strategies alongside competencies. Strategies were coded for frequency of themes, concepts, and patterns to streamline duplicate responses to produce a concise list of strategies for each

competency. The final result of Round 2 was a list of strategies for developing each corresponding competency.

Data Analysis of Delphi Round 3: Listing of Additional Strategies. In Delphi Round 3 Questionnaire 3 expert champions were asked to list additional informal learning strategies for each IT competency rated high in importance. Participants listed additional strategies alongside each competency. Strategies were coded for frequency of themes, concepts, and patterns. The final result of Round 3 was a list of strategies for developing each competency. The researcher verified at least two strategies for each essential competency was listed.

Data Analysis of Comments

Data from qualitative items on the questionnaires were analyzed to capture participant thoughts on the study. On the Validation Form and Delphi Questionnaires 1, 2 and 3, participants were allowed to add comments, questions, and concerns regarding the individual questionnaires or study. Data collected from the Comments sections was exported into the Excel workbook. All participant comments were summarized. The next section discusses the validity of the findings.

Validity and Reliability

Ensuring the rigor and trustworthiness of qualitative research involves taking measures and precautions to increase study 1) credibility, 2) transferability, 3) dependability, 4) conformability, 5) reliability, and 6) validity (Creswell, 2008; Patton, 2002; Shenton, 2004). Techniques used to increase the rigor of this study included asking the right questions, using multiple data collection methods (literature review and questionnaires), and using multiple data analysis (statistical analysis of competencies and

coding of qualitative strategies) procedures. Techniques used to increase the study rigor allowed the researcher to view the topic from different perspectives, test explanations, use multiple subject-matter experts, verify the credibility of each study participant through member checking, and use an audit trail to increase the accuracy of study results (Creswell, 2008; Patton, 2002; Shenton, 2004).

Trustworthiness of the study captured the internal validity, reliability, generalizability, and external validity. Triangulation was employed to address internal validity of interpretation. Appropriate population criteria were established to meet the test of construct validity. Multiple sources of evidence and a review of Delphi iteration 1 and 2 summaries by panel participants helped establish construct validity (Yin, 1994). Expert champions reviewed Delphi Round 1 and 2 results to confirm their voice and expert opinion was present. Recursive checks assisted the researcher in determining if the realities of participants were reflected in the study findings (Sharoff, 2004).

Two separate groups of experts (expert champions and expert validators) were used to capture knowledge, skills and abilities needed to be successful IT proficient NPD Specialists. The use of multiple and diverse expert panelists from various healthcare settings and regions was used in this study to increase credibility and transferability of study results. Three expert validators verified competencies to create a baseline list of competencies to be rated in Delphi Round 1. Expert validators updated and validated nursing terminology, role responsibilities, competency statements, competency categories and the Delphi Round 1 Questionnaire 1 (Armstrong, 1986; Lincoln & Guba, 1994).

Limitations

Limitations of the present study include aspects for which the researcher has no control. The nature of this study depends on snowball sampling, a technique relying on the assistance of others for referrals to the study. The term *Nursing Professional Development Specialist* is used by the American Nurses Association (ANA) and the Association for Nursing Professional Development (ANPD). The term *Nursing Professional Development Specialist* encompasses all nurse educators, clinical educators, and other nurses in professional development, yet nurses may not be familiar with this term. The NPD specialty is defined by standards based on research and is critical to patient care quality and incentives. This study uses the Delphi methodology involving the use of expert panelists selected by the researcher based on specific criteria. The methodology entails a multi-iteration process that is subject to participant attrition.

Summary

This study updated Armstrong's (1986) study by providing a valid list of IT competencies important for NPD Specialists in healthcare settings today. In addition, strategies for developing each competency were collected. Two groups of NPD Specialists were used to validate essential competencies and list IT development strategies. The methodology used in this study was appropriate for the data desired to be collected. The findings were validated for accuracy and transferability. The output of the current study can serve as a talent development tool within healthcare organizations. The next chapter presents research findings: participant demographics, validated essential competencies, and development strategies.

CHAPTER IV

RESEARCH FINDINGS

The purpose of this study was to validate IT competencies essential for NPD Specialists practicing in healthcare settings today and to determine strategies for developing IT competency. This chapter examines three main objectives: the profile of the NPD Specialist as an IT Expert, IT competencies essential for NPD Specialists serving in healthcare settings, and strategies for developing essential competencies. The first objective identifies characteristics of NPD Specialists considered IT experts.

The second objective validates IT competencies important for NPD Specialists practicing in healthcare settings. Although Armstrong's (1986) study identified competencies based on the four areas of nursing: Administration, Education, Clinical Practice, and Research; the current study updates competencies based on the six roles NPD Specialists currently serve in healthcare settings (ANA, 2010; Brunt, 2007). The ANA (2010) and Brunt (2007) define the six roles of the NPD Specialists as educator (teach and foster learning), facilitator (assist the learner in applying competency), consultant (resource for internal and external education opportunities and experiences), change agent (embrace and guide change), leader (support organizational structure and manages human capital), and researcher (active in designing, creating, and applying research and outcomes into practice).

The third objective identifies strategies for developing important competencies. The Delphi methodology was selected for this study because it provides a framework to develop group consensus from expert NPD Specialists on primary competencies and development strategies (Faugier & Sargeant, 1997). Consensus of competencies and

strategies was developed through three rounds of inquiry from expert NPD Specialists (expert champions). This study was completed in four phases: Pre-Delphi, Delphi Round 1, Delphi Round 2, and Delphi Round 3 using two groups of NPD Specialists (expert validators and expert champions).

Demographic Characteristics of NPD Specialists as IT Experts

Research Objective 1: Describe the demographic characteristics of NPD Specialists serving as IT experts in healthcare settings.

Demographic characteristics of each participant (expert validators and expert champions) were collected. The knowledge and experiences of the expert validators and expert champions provided data from which the profile of the NPD Specialist as IT expert was created. Demographics of expert validators were captured using a validation form in a pre-Delphi phase, and demographics of expert champions were captured using Questionnaire 1 in Delphi Round 1.

Expert validators were professional contacts of the researcher, and expert champions were either professional contacts of the researcher, members of the HIMSS organization or participant referrals. Demographic characteristics of study participants are described in the subsequent section.

Pre-Delphi Study Participants: Expert Validators

Expert validators participated prior to the start of the Delphi study in a pre-Delphi phase in validating and updating IT competencies for NPD Specialists practicing in healthcare settings. Three expert validators participated in the pre-Delphi phase. Two of the three expert validators were professional contacts of the researcher, and one was referred from a professional contact. The three expert validators reported a total of 63.5

years of experience serving in a NPD role, and 74 years of experience in teaching, supporting, and using IT. Expert validators reported holding multiple degrees (including doctorate level) and certifications in Informatics. Expert Validators were fluent in various forms of IT, health IT applications, clinical information systems, EHRs, barcode technology, and other types of technology. Participants reported publishing multiple studies in healthcare, nursing, and informatics journals and books. Participants also reported actively attending and participating in various healthcare, nursing, and informatics conferences.

IT Experience. Expert validators reported an average of 25 years of experience teaching, supporting, and using IT. Expert validators reported experience using multiple health information systems such as Cerner EHR, bar-code technology, Omnicell, MUSE Cardiology, Clinicomp's Essentris, and other clinical IS and databases used throughout healthcare settings. Participants reported serving in a role actively supporting the hospital Information Systems department. Participants reported serving in a super user or subject-matter expert role supporting and training on various health information software systems. One expert validator is a HIMSS Fellow member with selection based on substantial service and contributions to HIMSS and the health IT industry through presentations, publications, and participation (HIMSS, n.d.). One expert validator reported experience developing and teaching nursing informatics courses at the graduate level. This same participant developed a Doctorate of Nursing Practice informatics course. Another expert validator reported serving in a role responsible for system selection, design, build, testing, implementation, training design and instruction, and hardware selection.

Expert validators met the study criteria which included being licensed as a Registered Nurse, having served a minimum of 5 years in a NPD role, having served at least 5 years teaching or supporting IT, and published at least one study in healthcare, nursing, nursing informatics, or information technology. Expert validators possessed the required expertise and experience to validate competencies important NPD Specialists. Table 6 displays expert validator demographics (experience in NPD and IT).

Table 6

Delphi Round 0: Demographic Inventory of Expert Validators

Expert Validator (EV)	EV1	EV2	EV3
Currently Serving in Nursing Professional Development Role	Yes	No	Yes
Years in Nursing Professional Development Role	15.5	30	18
Years of Experience in Information Technology	>20	>33	>21
Healthcare Setting Experience	Hospital, Academia	Hospital	Hospital
Published Studies	1+	48+	28+
Degrees	Doctor of Nursing Practice, Master of Science in Nursing, Bachelor of Science in Nursing, Associate Degree in Nursing	Doctor of Philosophy, Masters in Nursing Education, Master of Science in Information Systems, Bachelor of Science in Nursing, Nursing Diploma	Doctor of Nursing Practice (in progress), Master of Science in Nursing, Nursing Diploma
Certifications	HIV/AIDS Certification, Diabetes Educator, Basic Life Support, Non-crisis Intervention	American Nurses Credentialing Center Board Certified in Nursing, Certified Nurse Educator	Certified Professional in Healthcare Information & Management Systems, Inpatient Obstetrics, American Nurses Credentialing Center Board Certified in Nursing Informatics

Expert validators selected for this study met the study criteria through education, certification, and experience. Expert validators also met study criteria for scholarly publishing with expert validator #1 having published one study, expert validator # 2 published 48 studies, and expert validator # 3 published 28 studies. In this pre-Delphi phase expert validators used knowledge and expertise to review, validate, and update competencies. The validated competency list was used in a subsequent phase of the study by a second group of experts to rate by importance.

Delphi Rounds 1-3 Study Participants: Expert Champions

The second group of expert NPD Specialists, expert champions, participated in Delphi Rounds 1, 2, and 3 as expert panelists. Expert champions met study criteria including being licensed as a Registered Nurse, currently serve or served greater than 5 years in a NPD role, involved with IT implementation project or education in a healthcare setting, and obtained a degree or certification in IT or served at least 5 years in an IT role. Expert champions possessed the necessary IT expertise to rate competencies by importance to the role NPD Specialists serve in healthcare settings and to identify strategies for developing key competencies for NPD Specialists. The researcher invited 180 prospects to participate in the study; 41 accepted the invitation to participate in all three Delphi rounds. Thirty-six expert champions participated in Delphi Round 1, 22 expert champions participated in Delphi Round 2, and 13 expert champions participated in Delphi Round 3 (Table 7). See Appendix J for a full list of Delphi panel participant demographics.

Table 7

Delphi Round Participant Count

Round	Number of Participants
Delphi Round 1	36
Delphi Round 2	22
Delphi Round 3	13

Delphi Round 1. While 41 individuals responded to the invitation, 36 completed Delphi Round 1 Questionnaire 1 (Figure 3). Two participants were professional contacts of the researcher. Thirty participants were members of the HIMSS Nursing Informatics Task Force. The HIMSS participants referred four additional participants.

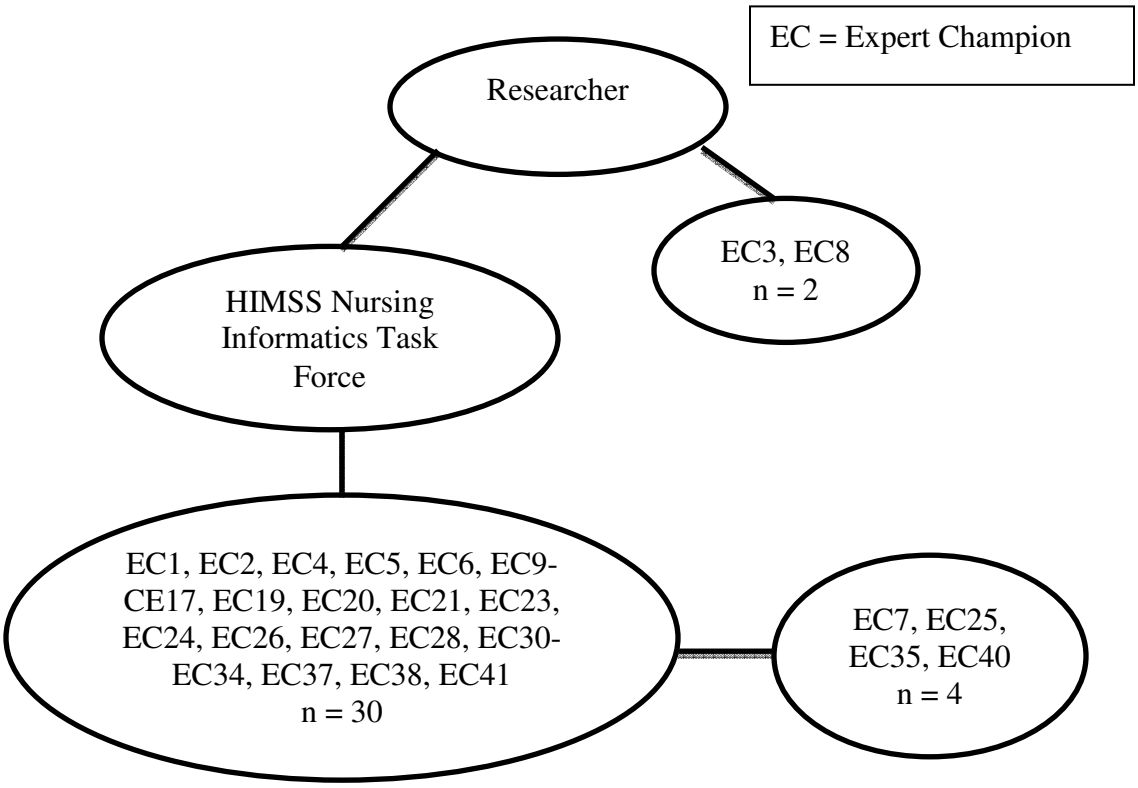

Figure 3. Delphi Round 1 Expert Champions Snowball Sampling Diagram (n = 36).

The thirty-six expert champions used their knowledge and expertise to review and rate competencies in Delphi Round 1. The number of participants decreased in Delphi Round 2.

Delphi Round 2. Twenty-two expert champions completed Delphi Round 2 Questionnaire 2, which decreased the response by 39% from Round 1 (Figure 4). Nineteen members of the HIMSS Nursing Informatics Task Force, one professional contact and two referrals participated in this round. Figure 3 displays a diagram of expert champions who participated in Round 2.

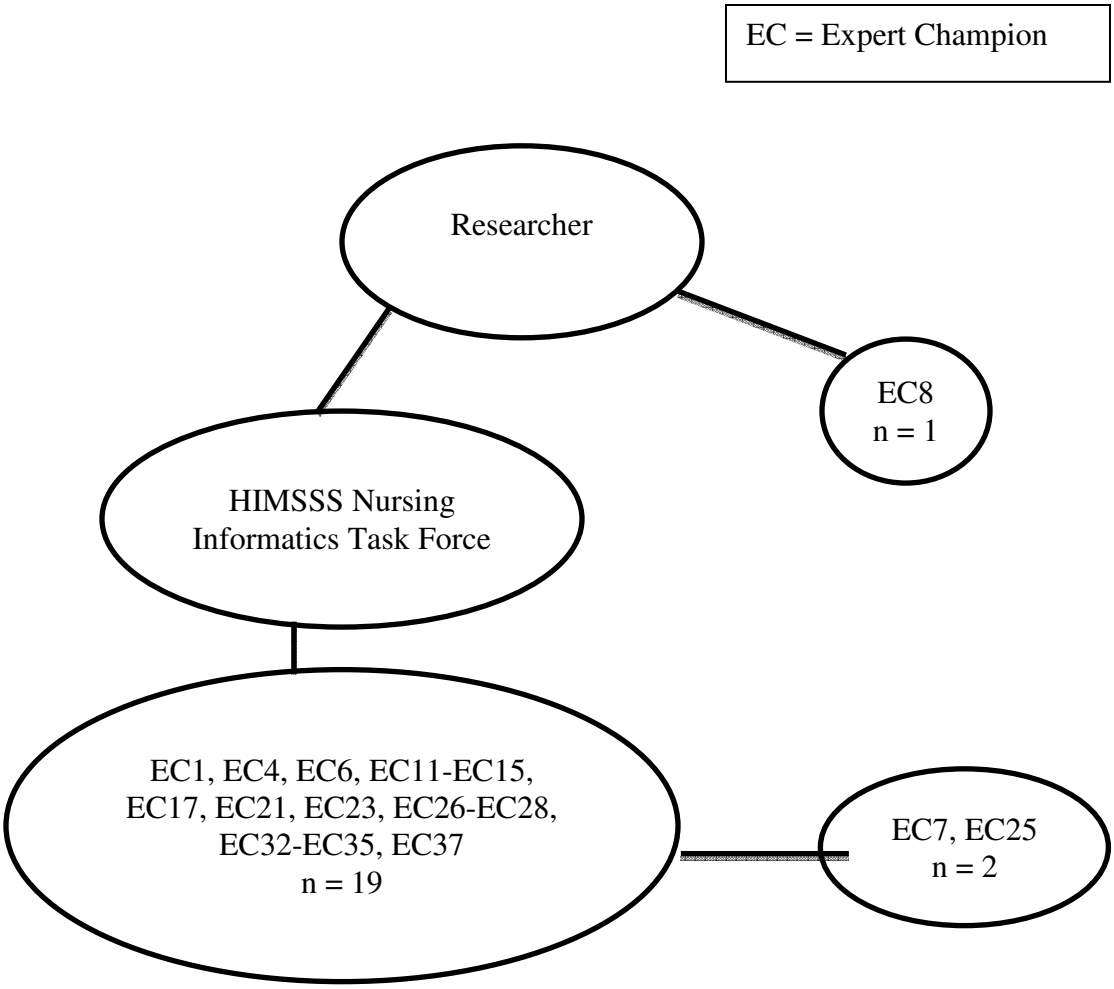

Figure 4. Delphi Round 2 Expert Champions (n = 22).

Delphi Round 3. Thirteen expert champions completed Delphi Round 3 Questionnaire 3 (Figure 5). Expert champion participation decreased by 59% in Round 3 from Round 2. Ten members of the HIMSS Nursing Informatics Task Force, one professional contact, and two referrals participated in this round.

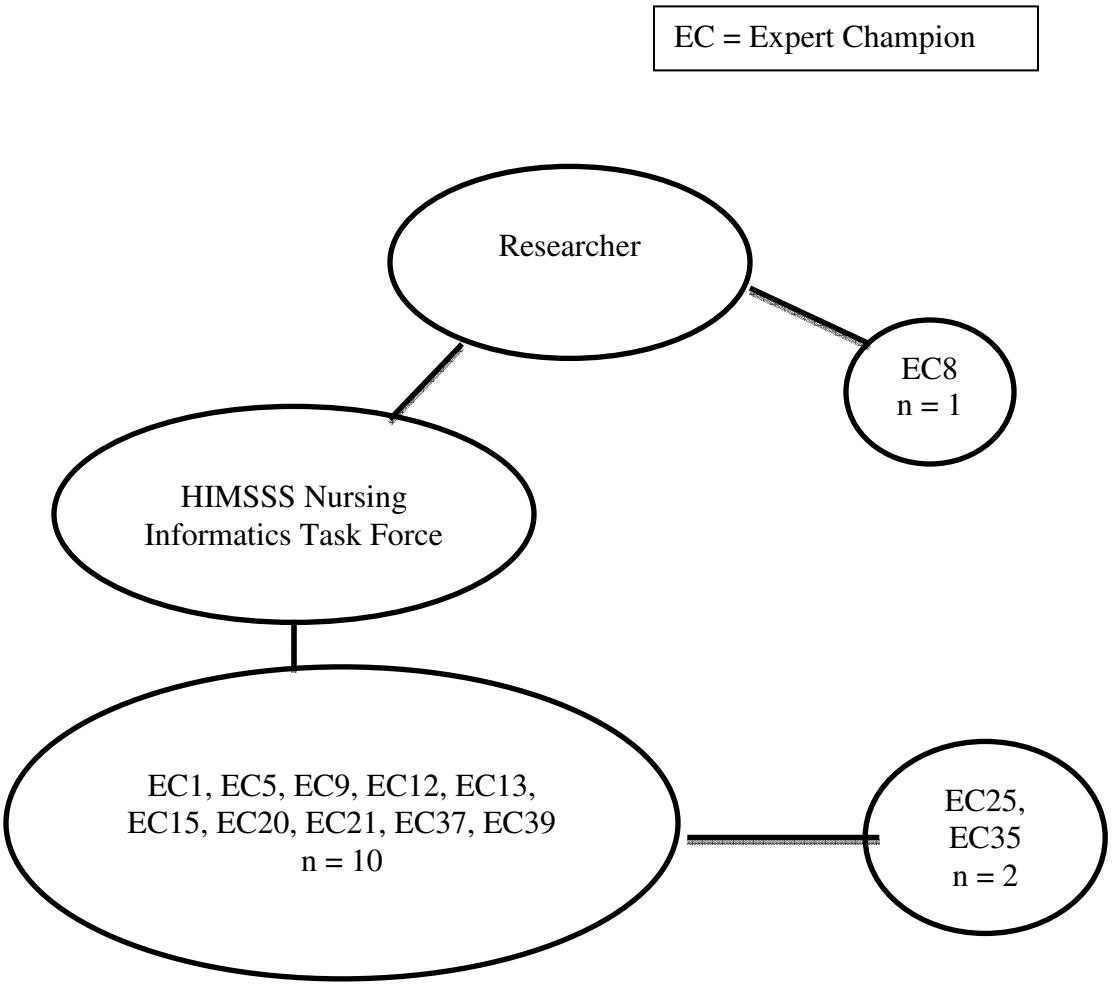

Figure 5. Delphi Round 3 Expert Champions (n=13).

State of Residence. Expert champions reported residing in locations throughout the United States. These locations include 19 states (Figure 6). The majority of participants were from Texas (n = 6) and California (n = 5).

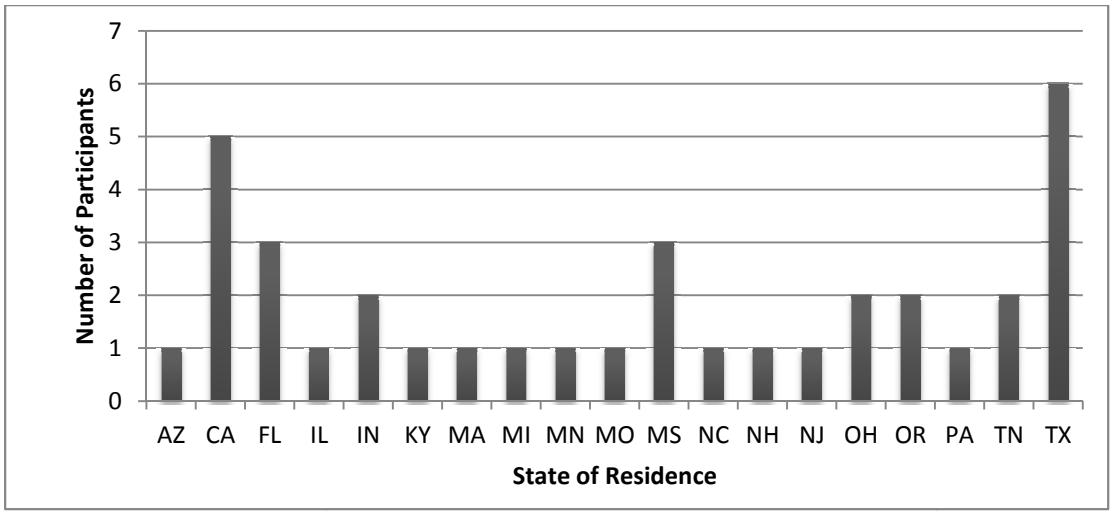

Figure 6. Expert Champions State of Residence (n = 36).

Experience. Expert Champions reported serving in multiple types of healthcare settings such as hospitals, ambulatory, and home care settings. Participants also reported serving in professional development and information technology roles. All 36 participants reported experience in hospital care settings while some had additional experience in home-care, ambulatory, academia settings, corporate settings, quality improvement agencies, and governmental settings. Figure 7 categorizes participant healthcare setting experiences.

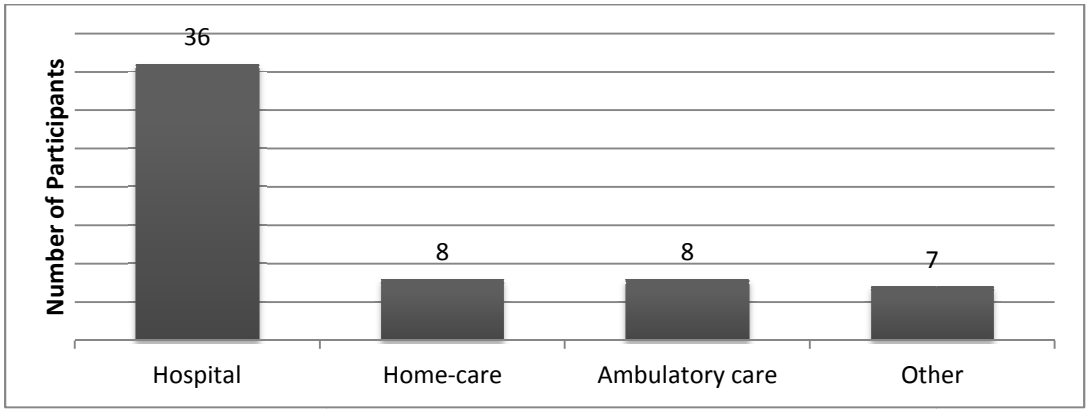

Figure 7. Expert Champions Healthcare Settings Experience (n = 36).

Expert champions reported number of years of experience serving in NPD roles. Expert champions reported serving in roles directly or indirectly responsible for nurses and caregivers in a healthcare settings ranging from 1 year to greater than 20 years. The majority of participants served 1 to 4 years in a NPD role. Figure 8 captures expert champions years of experience serving as a NPD Specialist.

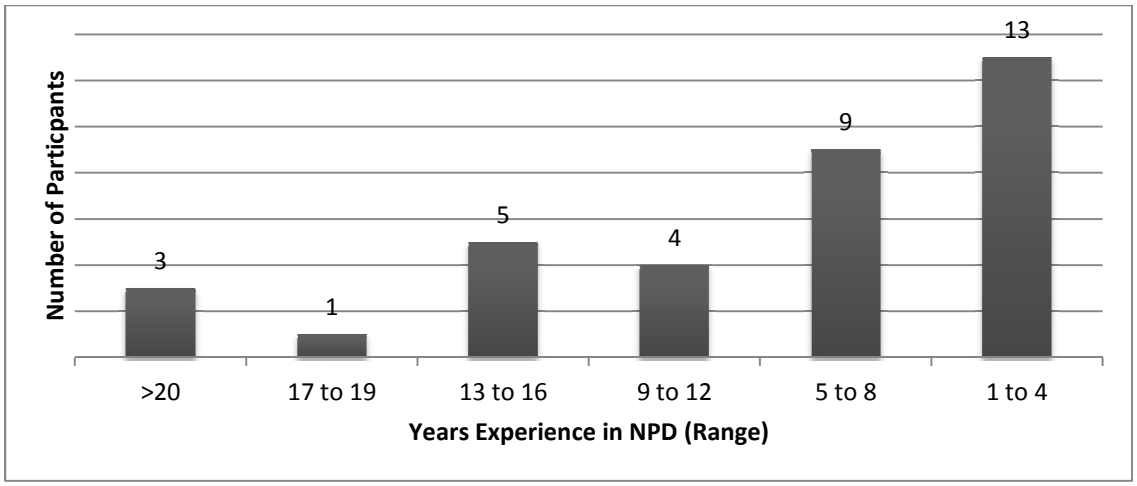

Figure 8. Expert Champions Years of Experience in NPD (n = 36).

Thirty-one out of the 36 expert champions (86.1%) currently serve in a NPD role, whereas five (14%) participants reported not serving in a NPD role. Out of the five participants who self-reported not currently serving in a NPD role, three reported not having five or more years of experience in a NPD role. After further review, the three participants revealed a variety of nursing informatics experience, supporting and teaching informatics, and having obtained informatics and IT degrees and certifications. Figure 9 displays participants currently serving in a NPD role and participants not serving in a NPD role.

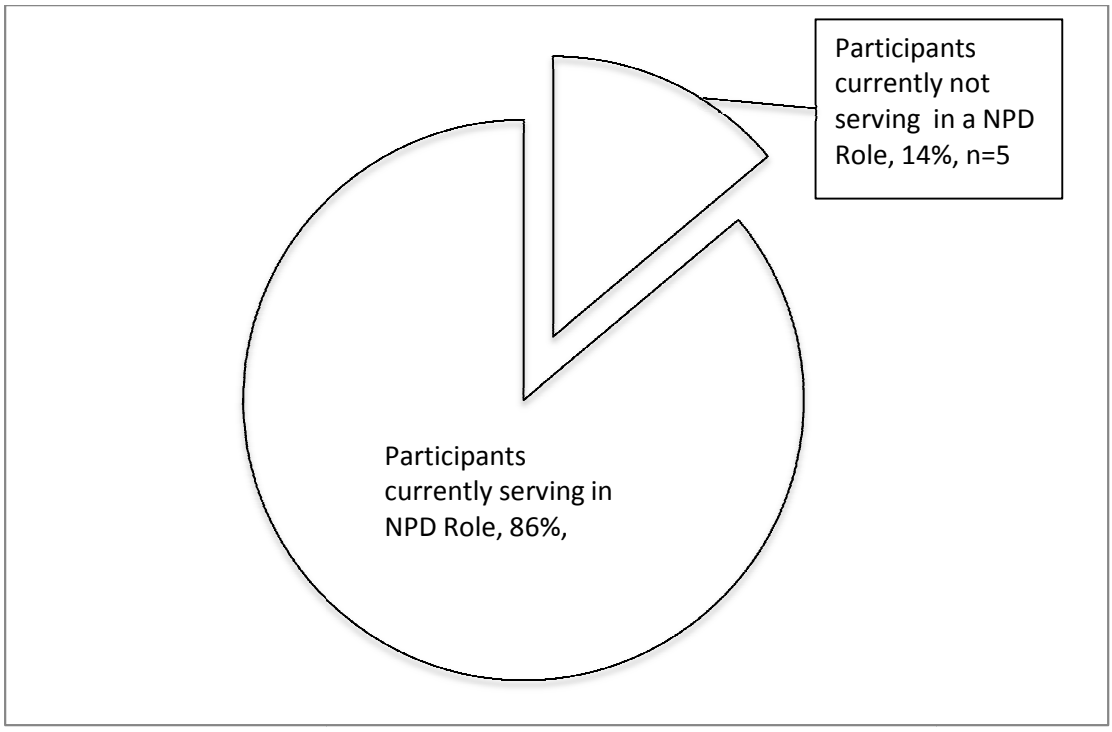

Figure 9. Expert Champions Serving in NPD Role (n = 36).

Participants reported a range of IT proficiency teaching, supporting, and using various forms of IT. Experiences include knowledge and skills in information system design and development. 78% of participants (n = 28) had 5 or more years of experience serving in an IT role. Figure 10 shows participant years of experience in an IT role.

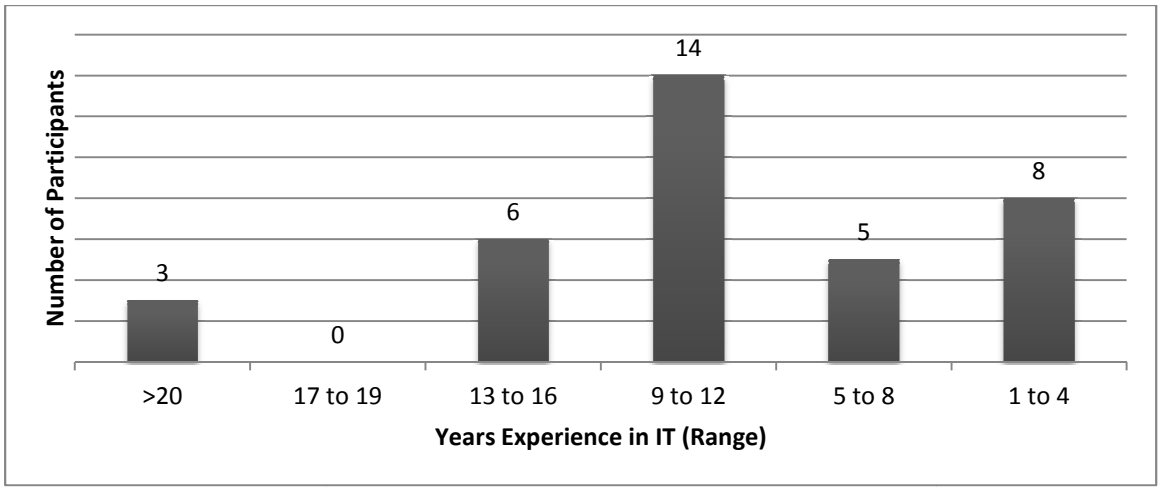

Figure 10. Participant Years of Experience in IT (n = 36).

Education. The criteria for this study required expert champions to have a nursing degree, but many expert champions also possessed a degree or certification in IT. All 36 expert champions were Registered Nurses, with 17 reporting advanced degrees in Nursing and Informatics. Eight participants reported having one degree with the majority being an Associate or Bachelor of Nursing degree. Eleven participants reported having two degrees, nine participants reported having three degrees, one participant reported having four degrees, and one participant reported having five degrees (see Table 8).

Table 8

Summary of Expert Champion Number of Degrees

Number of Degrees	Number of Participants
1 degree	8
2 degrees	11
3 degrees	9
4 degrees	1
5 degrees	1

Participants with more than two degrees also possessed a degree in Nursing Informatics. See Appendix J Demographic Inventory for a expert champions' formal education (degrees and certifications). Four participants reported pursuing a Doctorate of Nursing degree at the time of the study. Seventeen expert champions reported having informatics degrees such as Master of Nursing Informatics and Doctorate of Nursing Informatics. One participant had at least two informatics degrees and three participants reported pursuing a Doctorate of Nursing Informatics at the time of the study (Table 9).

Table 9

Summary of Expert Champion Informatics Degrees

Participants with an informatics degree	Number of Participants
Participants with 1 informatics degree	16
Participants with 2 informatics degrees	1
Participants pursuing Doctorate of Nursing Informatics degree	3

Sixteen participants reported having at least one informatics certification such as the ANCC Board Certified Informatics Credential, AHIMA Certified Healthcare Technology Specialist (CHTS), and HIMSS Certified Professional in Healthcare Information and Management Systems (CPHIMS). One participant reported having three informatics certifications, three participants reported having two certifications, and one participant reported currently working on an informatics certification (see Table 10).

Table 10

Summary of Expert Champion Informatics Certifications

Participants with an informatics certifications	17
Participants with 1 informatics certification	13
Participants with 2 informatics certification	3
Participants with 3 informatics certifications	1
Participants pursuing an informatics certification	1

Participants reported non-formal education in the use of clinical information systems, vendor EHR training and certification, Office of the National Coordinator of Health IT programs, the Nursing Informatics Boot Camp, the HIMSS Nursing

Informatics Institute, Meaningful Use Seminars, and in-house education from health IT subject-matter experts. Expert validator criteria required participants to have published at least one study in nursing, nursing informatics, healthcare, or IT. Although expert champion criteria did not include the requirement to have published a study, nine expert champions published at least one study in nursing informatics.

Expert champions reported remaining current in nursing and patient care trends. Expert champions reported actively attending conferences and symposiums. Thirty-one participants (86.1%) attended conferences in healthcare, policy, nursing and informatics within the past year. Expert validators and expert champions were expert IT users holding multiple degrees and certifications in informatics. Expert validators and expert champions used their knowledge and expertise to validate and rate competencies important for the NPD Specialist role.

Essential IT Competencies for NPD Specialists in Healthcare Settings

Research Objective 2: Determine IT competencies essential for NPD Specialists practicing in healthcare settings.

Delphi Round 0

Delphi Round 0 was the pre-Delphi and verification phase. Expert Validators updated and verified IT competencies for NPD Specialists practicing in healthcare settings using Armstrong's (1986) list of 107 computer competencies as a baseline. See Appendix B for a full listing of Armstrong's Computer Competencies. After careful review, none of the original 107 competencies from Armstrong's (1986) list remained in the final list of validated competencies. All 107 of Armstrong's original competencies were either omitted or updated. Due to the drastic changes in the last three decades in

technology, expert validators considered 53 of Armstrong's original competencies obsolete. Armstrong's remaining 54 competencies were updated and combined. Competencies were added, combined, and updated using the American Nurses Credentialing Center (ANCC) 2010 Role Delineation Study and expert validator expertise. Expert validators added 28 competencies (ANCC, 2010). Expert validators produced a list of 53 validated IT competencies for NPD Specialists in healthcare settings. Figure 11 displays the process and transition from Armstrong's original 107 computer competencies to a validated list of 53 competencies. Expert validators reviewed Armstrong's 107 original competencies. Fifty-three of the competencies were deemed obsolete and omitted. The remaining fifty-four of Armstrong's original competencies were revised and combined with other up-to-date competencies to count 25 statements. Expert validators added 28 new competencies. Expert validators produced a final list of 53 validated IT competencies for NPD Specialists in healthcare settings.

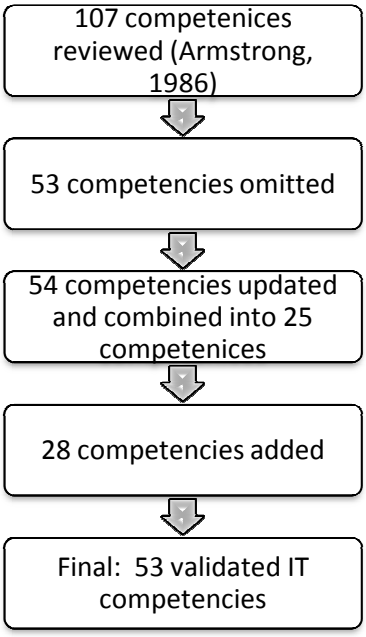

Figure 11. Delphi Round 0 Competency Validation Process.

Competency statements were updated and validated in the pre-Delphi phase. The researcher categorized each validated competency statement by roles NPD Specialists serve in healthcare settings: Change Agent/Consultant, Leader, Educator/Facilitator, and Researcher (Bastable, 2008). Table 11 lists the validated IT competencies derived from Delphi Round 0 were categorized into major roles NPD Specialists play in healthcare settings.

Table 11

Delphi Round 0: Validated IT Competencies for NPD Specialists in Healthcare Settings

NPD Role	Competency
Change Agent/Consultant Role	
	1. Discuss managing electronic information to establish evidence-based practice.
	2. Observes and documents process flows analyzing existing system problems which impact nursing workflow.
	3. Executes testing scripts.
	4. Promotes adherence to privacy, confidentiality, patient rights, and HIPAA Privacy in the organization, health exchanges, or state/national registries.
	5. Promotes the inclusion of nursing process workflow into the development of the system.
	6. Discuss the impact of managing electronic information on all nursing roles.
	7. Describe the importance of nursing representation and support in institution's Information Systems department.
	8. Understand the value of healthcare information systems.
	9. Ability of nurse leaders to be skilled in analytics to make real-time decisions.
	10. Uses applications to analyze data for forecasting and accreditation.
	11. Ability of nurse leaders to be skilled in the use of business intelligence tools such as real-time dashboards, report interpretation and decision support tools.
	12. Ability to serve on a Go Live implementation team.
	13. Ability to serve on a project team and/or clinical committees.
	14. Ability to serve as technical resource.
	15. Ability to determine role-based access.
	16. Ability to serve as liaison between clinical, administrative, educational, and IT groups within the organization.

Table 11 (continued).

NPD Role	Competency
Leader Role	
	17. Emphasize nursing process with electronic charting and care plans.
	18. Reviews documentation and work processes for adherence to national accreditation standards such as The Joint Commission.
	19. Models ethical behavior in the use of systems and data.
	20. Describe the use of informatics in nursing practice
	21. Join nursing organizations that foster the development of informatics skills.
	22. Determine nursing responses after analysis of monitoring electronic data.
	23. Explain nursing process/diagnosis proficiency using Information Systems.
	24. Discuss closed loop medication administration process.
	25. Describe the term Meaningful Use.
	26. Project healthcare technology trends in nursing.
	27. Discuss nurses' involvement in the implementation of electronic health records.
	28. Grant access to patients to view their individual personal health record.
	29. Discuss impact of legislation, research, and economics on nursing informatics.
	30. Discuss the nurse's role in Evidence Based Practice (EBP)
	31. Provides remote end-user support.
Educator/Facilitator Role	
	32. Discuss web-based learning and learning management systems-related material with lecture, clinicals, and skills labs.
	33. Explain electronic data to analyze and assist with delivery of care.
	34. Describe the Systems Life Cycle.
	35. Explain an electronic health record system.
	36. Builds system data elements and applications using vendor build tools.
	37. Determine levels of IT/informatics knowledge and skills needed by nurses.
	38. Identify learner needs and monitor learner progress using learning management systems.
	39. Communicate resources in web-based learning and learning management systems.
	40. Establish individual NPD Specialists development time to explore information technology capabilities and informatics proficiency.
	41. Discuss information technology as a tool of instruction and an instructional medium for problem solving.

Table 11 (continued).

NPD Role	Competency
Educator/Facilitator Role	
	42. Analyze software documentation.
	43. Designs tools for delivering instruction such as handouts, web-based training, lectures, and over-the-shoulder support.
	44. Foster the initiation of individualized plans of care with services and treatments to meet patient's needs and achieve positive outcomes through the use of EHRs
	45. Identify online healthcare and informatics continuing education programs.
	46. Identify national registries to access health, medical, and drug data.
	47. Access and use learning repositories to facilitate learning. Example: MERLOT.org
Researcher Role	
	48. Manipulate data using statistical analysis software.
	49. Analyze research on impact of informatics on nursing practice.
	50. Use online nursing databases to facilitate research.
	51. Encourage participation in healthcare and IT vendor users' group
	52. Support efforts and use of a unified nursing language.
	53. Provides for efficient data collection utilizing Information Systems.

In the pre-Delphi phase, expert validators validated competencies for the NPD Specialist role. The list of validated competencies produced from Delphi Round 0 was then used in Delphi Round 1. In Delphi Round 1 validated competencies were rated by importance.

Delphi Round 1

In Delphi Round 1, expert champions examined the validated list of IT competencies derived from Delphi Round 0 and rated the competencies by importance to the NPD Specialist role. Competencies were rated on a 5-point Likert scale from 1 (of no importance) to 5 (of extreme importance). The median, measurement of central

tendency, was calculated for each competency to determine group consensus on the importance of each competency to the role NPD Specialists serve in healthcare settings today.

Competencies rated 4.0 and above with a minimum of 80% panel consensus were considered high in importance and were included in the final list of competencies. Competencies rated high and extreme importance are included in final study results. Competencies with median ratings of 4.0 were deemed high importance. Competencies with median ratings of 3.00-3.99 were deemed of medium importance; competencies with median ratings of 2.00-2.99 were deemed of low importance; and competencies below 2.00 were deemed of no importance. Zero competencies were rated no importance. One competency was rated of low importance. Eleven competencies were rated medium importance. Twenty-two competencies were rated high importance, and nineteen competencies were rated extreme importance. See Appendix I for *Competency Median Ratings*. Table 12 lists competencies rated high and of extreme importance.

Table 12

Competencies with High and Extreme Importance Median Ratings

Competency	Median
Discuss managing electronic information to establish evidence-based practice.	5.0
Observes and documents process flows analyzing existing system problems which impact nursing workflow.	5.0
Promotes adherence to privacy, confidentiality, patient rights, and HIPAA Privacy in the organization, health exchanges, or state/national registries.	5.0
Promotes the inclusion of nursing process workflow into the development of the system.	5.0
Discuss the impact of managing electronic information on all nursing roles.	5.0
Describe the importance of nursing representation and support in institution's Information Systems department.	5.0
Understand the value of healthcare information systems.	5.0
Ability of nurse leaders to be skilled in analytics to make real-time decisions.	5.0
Ability to serve on a Go Live implementation team.	5.0
Discuss managing electronic information to establish evidence-based practice.	5.0
Ability of nurse leaders to be skilled in the use of business intelligence tools such as real-time dashboards, report interpretation and decision support tools.	5.0
Ability to serve on a project team and/or clinical committees.	5.0
Ability to serve as liaison between clinical, administrative, educational and IT groups within the organization.	5.0
Emphasize nursing process with electronic charting and care plans.	5.0
Models ethical behavior in the use of systems and data.	5.0

Table 12 (continued).

Competency	Median
Models ethical behavior in the use of systems and data.	5.0
Reviews documentation and work processes for adherence to national accreditation standards such as The Joint Commission.	4.0
Describe the use of informatics in nursing practice	4.0
Join nursing organizations that foster the development of informatics skills.	4.0
Determine nursing responses after analysis of monitoring electronic data.	4.0
Explain nursing process/diagnosis proficiency using Information Systems.	4.0
Discuss closed loop medication administration process.	4.0
Describe the term Meaningful Use.	4.0
Discuss nurses' involvement in the implementation of electronic health records.	5.0
Discuss impact of legislation, research, and economics on nursing informatics.	4.0
Discuss the nurse's role in Evidence Based Practice (EBP)	5.0
Discuss web-based learning and learning management systems-related material with lecture, clinicals, and skills labs.	5.0
Explain electronic data to analyze and assist with delivery of care.	4.0
Explain an electronic health record system.	4.0
Determine levels of IT/informatics knowledge and skills needed by nurses.	4.0
Identify learner needs and monitor learner progress using learning management systems.	5.0
Communicate resources in web-based learning and learning management systems.	4.0

Table 12 (continued).

Competency	Median
Foster the initiation of individualized plans of care with services and treatments to meet patient's needs and achieve positive outcomes through the use of EHRs	4.0
Identify online healthcare and informatics continuing education programs.	4.0
Identify national registries to access health, medical, and drug data.	4.0
Access and use learning repositories to facilitate learning. Example: MERLOT.org	4.0
Use online nursing databases to facilitate research.	4.0
Support efforts and use of a unified nursing language.	4.0
Provides for efficient data collection utilizing Information Systems.	4.0
Analyze research on impact of informatics on nursing practice.	4.0

This study validated competencies important for NPD Specialists in healthcare settings. Forty-two competencies rated high and of extreme importance and are included in the final study results and deemed "essential" for NPD Specialists. Table 13 lists essential IT competencies for NPD Specialists in healthcare settings by role.

Table 13

Delphi Round 1: Essential IT Competencies for NPD Specialists in Healthcare Settings Settings

NPD Role	Competency
Change Agent/ Consultant	1. Discuss managing electronic information to establish evidence-based practice. 2. Observes and documents process flows analyzing existing system problems which impact nursing workflow. 3. Promotes adherence to privacy, confidentiality, patient rights, and HIPAA Privacy in the organization, health exchanges, or state/national registries. 4. Promotes the inclusion of nursing process workflow into the development of the system. 5. Discuss the impact of managing electronic information on all nursing roles. 6. Describe the importance of nursing representation and support in institution's Information Systems department. 7. Understand the value of healthcare information systems. 8. Ability of nurse leaders to be skilled in analytics to make real-time decisions. 9. Ability of nurse leaders to be skilled in the use of business intelligence tools such as real-time dashboards, report interpretation and decision support tools. 10. Ability to serve on a Go Live implementation team. 11. Ability to serve on a project team and/or clinical committees. 12. Ability to serve as liaison between clinical, administrative, educational, and IT groups within the organization.

Table 13 (continued).

NPD Role	Competency
Leader	13. Emphasize nursing process with electronic charting and care plans. 14. Reviews documentation and work processes for adherence to national accreditation standards such as The Joint Commission. 15. Models ethical behavior in the use of systems and data. 16. Describe the use of informatics in nursing practice 17. Join nursing organizations that foster the development of informatics skills. 18. Determine nursing responses after analysis of monitoring electronic data. 19. Explain nursing process/diagnosis proficiency using Information Systems. 20. Discuss closed loop medication administration process. 21. Describe the term Meaningful Use. 22. Discuss nurses' involvement in the implementation of electronic health records. 23. Discuss impact of legislation, research, and economics on nursing informatics. 24. Discuss the nurse's role in Evidence Based Practice (EBP)
Educator/ Facilitator	25. Discuss web-based learning and learning management systems-related material with lecture, clinicals, and skills labs. 26. Explain electronic data to analyze and assist with delivery of care. 27. Explain an electronic health record system. 28. Determine levels of IT/informatics knowledge and skills needed by nurses. 29. Identify learner needs and monitor learner progress using learning management systems. 30. Communicate resources in web-based learning and learning management systems.

Table 13 (continued).

NPD Role	Competency
Educator/ Facilitator	31. Establish individual NPD Specialists development time to explore information technology capabilities and informatics proficiency. 32. Discuss information technology as a tool of instruction and an instructional medium for problem solving. 33. Designs tools for delivering instruction such as handouts, web-based training, lectures, and over-the-shoulder support. 34. Foster the initiation of individualized plans of care with services and treatments to meet patient's needs and achieve positive outcomes through the use of EHRs 35. Identify online healthcare and informatics continuing education programs. 36. Identify national registries to access health, medical, and drug data. 37. Access and use learning repositories to facilitate learning. Example: MERLOT.org
Researcher	38. Analyze research on impact of informatics on nursing practice. 39. Use online nursing databases to facilitate research. 40. Support efforts and use of a unified nursing language. 41. Provides for efficient data collection utilizing Information Systems.

Expert Champions determined the importance of each competency to the role NPD Specialists serve in healthcare settings. Competencies with median ratings of high importance and extreme importance were added to the final list of competencies marked "essential" for NPD Specialists in healthcare settings. In the following section, participants identify strategies for developing each essential IT competency.

Strategies for Developing IT Competencies

Research Objective 3: Determine self-directed, informal learning strategies for developing essential IT competencies in NPD Specialists practicing in healthcare settings.

Strategies in this study are approaches, tactics, and resources used to develop IT competency. In Delphi Round 0, expert validators provided unsolicited input on strategies and resources to develop IT competency. In Delphi Round 1, expert champions provided a plethora of strategies to develop IT competency. In Delphi Rounds 2 and 3, expert champions identified strategies to develop each competency marked high or extreme importance.

Delphi Round 0

The researcher developed the Codebook of Strategies in Table 14. The Codebook was developed in a pre-Delphi phase with a preliminary list developed from an extensive review of the literature. The Codebook was further refined as new codes emerged, and was finalized in Delphi Round 1. The researcher used a codebook to assign words and phrases to a specific coding classification. Data was reviewed in a systematic way to fit each strategy collected into a specific category. The Codebook of Strategies was used as a guide to sort and group strategies collected from the literature review and study participants.

Table 14

Codebook of Strategies

Code	Category
EDWEB	Educational websites
INFOWEB	Informational Website
ORG	Organization Affiliations
VEN	Vendor groups
BOOK	Books/manuals
CRS	Courses
JOUR	Journals, magazines
EXC	Exercises
WEBR	Webinars
WKSHP	Workshops, boot camps, Conferences
SIMS	Simulations, Exercises
SME	Working with SMEs such as a Clinical Informaticist, IT systems analyst, Nurse Informaticist

Delphi Round 0 was the pre-Delphi phase used to validate IT competencies important for the role NPD Specialists are serving in healthcare settings today. The three expert validators were provided the opportunity to comment and elaborate on any aspect of the study, but were not asked to provide strategies for developing IT competency. Although strategies were not asked for in the pre-Delphi phase, expert validators did suggest strategies and resources for developing IT competency within individual remarks. The researcher thoroughly examined each participant's comments to report any relevant feedback that the expert validators provided to the study. Strategies (or resources) collected from participant comments in Delphi Round 0 are organized by categories listed

in the Codebook. Strategies collected in the pre-Delphi phase include reading the TIGER Leadership Report (2014), examining Rogers' Theory of Diffusion and Englebardt and Nelsons's Conceptual Framework, Nursing Informatics: Scope and Standards of Practice (ANA, 2008), TIGER Competency Study (2007), and ANCC Role Delineation Study (ANCC, 2010).

Delphi Round 1

The researcher used Delphi Round 1 to establish a baseline set of strategies to use in subsequent Delphi rounds. In Delphi Round 1, strategies for developing IT competency were collected (from an open-ended qualitative question). Participants were asked to list specific self-directed, informal learning strategies used to develop IT and informatics competency in themselves or others. Twenty-seven expert champions (out of 36) provided strategies and resources for developing IT competency. Specific strategies were coded under explicit coding categories and non-specific strategies were coded under the General strategies category. Some of the strategies participants provided in Delphi Round 1 are, attend HIMSS conferences and workshops, attend Weekend Immersion in Nursing Informatics (WINI) conference, join ANA and HIMSS organizations, utilize HealthIT.gov website, read Handbook of Informatics for Nurses & Healthcare Professionals (Hebda & Czar, 2012), shadow healthcare technology SMEs, and work closely with hospital IT departments. Strategies collected in pre-Delphi and Delphi Round 1 (Appendix L) are categorized based on strategy groups listed in the Codebook of Strategies (Table 14).

Delphi Round 2

In Delphi Round 1, expert champions rated competencies by importance to the role NPD Specialists serve in healthcare settings today. The purpose of Delphi Round 2 was to collect strategies for competencies rated high in importance in Delphi Round 1. In Delphi Round 2, expert champions listed strategies (Appendix L) for developing each competency rated high in importance in Delphi Round 1.

Delphi Round 3

In Delphi Round 3, additional strategies (Appendix L) were collected for each competency rated high in importance. Although Round 3 was the final round, data collection of strategies could be terminated when each competency rated high in importance and had at least two development strategies. Tables 15-18 list competencies rated high in importance (from Round 1) and corresponding strategies for developing each competency collected in Delphi Rounds 2 and 3. Items added in Round 3 are denoted by an asterisk (*).

Each of the essential competencies (rated high in importance) are grouped in one of four NPD role categories: a) change agent/consultant, b) educator/facilitator, c) leader, and d) researcher. Strategies and resources collected in Delphi Rounds 2 and 3 are organized based on the roles NPD Specialists play in healthcare settings: educator/facilitator, change agent/consultant, leader, and researcher. The role of change agent embraces change initiatives within healthcare organization while the role of consultant serves as a resource for education opportunities and feedback. Strategies to develop the change agent/consultant (Table 15) role competencies include attending the Nursing Informatics Boot Camp, joining the HIMSS organization and utilizing its online

educational resources, endorsing the TIGER executive reports, shadowing health IT SMEs, and employing AHIMA workflow resources.

Table 15

Strategies Collected in Delphi Rounds 2 and 3: Change Agent/Consultant Role Competencies

Competency	Strategy
Discuss managing electronic information to establish evidence-based practice.	• Attend conferences, workshops, Nursing Informatics Boot Camp* • Join the HIMSS organization • Study the TIGER executive reports to better understand information management • Network with nursing informatics SMEs • Take advantage of in house programs and training • Encourage healthcare organizations to utilize clinical educators with HIT certifications and experience
Observes and documents process flows analyzing existing system problems which impact nursing workflow.	• Shadow regular IT system users, super users, and SMEs • Attend health IT workshops and conferences • Employ HIMSS and AHIMA workflow and process documentation resources • Network with health IT vendors and organizations • Strive to develop clinical experience and analytic abilities • Understand workflow analysis • Learn how to use software to document workflow*
Discuss the impact of managing electronic information on all nursing roles.	• Attend HIMSS conferences • Endorse and take action on the information provided in TIGER executive reports • Observe health IT SMEs • Support programs developed in house • Recommend healthcare organizations utilize clinical educators with health IT certifications and experience • Attend Nursing Informatics Boot Camp

Table 15 (continued).

Competency	Strategy
Promotes adherence to privacy, confidentiality, patient rights, and HIPAA Privacy in the organization, health exchanges, or state/national registries.	• Educate self on patient rights, privacy, and HIPAA • Attend patient rights, privacy, and HIPAA conferences and webinars • Identify national nursing organizations that educate on HIPAA Privacy • Learn and promote the privacy education on the Health Information Management and Systems Society (HIMSS) website (www.himss.org), Office of the National Coordinator website (healthIT.gov), HIPAA website (http://www.hhs.gov/ocr/privacy/hipaa/understanding/) • Ensure staff know social media policies* • Teach staff the meaning and differences between confidentiality and privacy*
Describe the importance of nursing representation and support in institution's Information Systems department.	• Network with IT organizations and change readiness experts • Peruse change management literature • Recommend health IT technical build teams and clinical staff to collaborate in the change process • Recommend health IT technical build teams and clinical staff to collaborate in the development of EHRs • Assimilate the HIMSS Future of Nursing position statement (http://www.himss.org/library/nursing-informatics/position-statement) *
Ability to serve on a Go Live implementation team.	• Attend conferences, super user meetings, webinars, web-based training • Seek mentorships with health IT system experts • Shadow health IT system experts for gaining hands on experience, participating in site visits, and observing the use of EHRs in various patient care settings • Join health IT organizations and vendor workgroups • Develop project management and change management skills • Pursue a health IT vendor software credential or certification

Table 15 (continued).

Competency	Strategy
Ability of nurse leaders to be skilled in analytics to make real-time decisions.	• Utilize real time dashboards to demonstrate live data journals • Select memberships in quality forums • Search for web-based training with intent to • Research the analytic abilities of EHRs to promote patient safety and increased health outcomes • Evaluate resources offered by health IT vendors • Learn from SMEs with technical reporting, programming, and analytic expertise • Become knowledgeable with how to assess multiple types of healthcare data (clinical quality, finance, productivity)* • Grow knowledge in multiple types of business intelligence systems and tools* • Develop knowledge in evaluating the quality of data and interpreting the significance of data reporting*
Ability of nurse leaders to be skilled in the use of business intelligence tools such as real-time dashboards, report interpretation and decision support tools.	• Attend conferences, webinars, workshops, in-house programs, and classes on interactive dashboards and reporting • Employ advance training beyond basic system go live training • Employ HIMSS online resources on business intelligence tools • Recommend healthcare organization leaders have full understanding of dashboard functionality and benefits • Research and examine business intelligence tools and their benefits to patients • Research using business intelligence tools to fully utilize alerts • Urge staff to avoid ignoring clinical alerts • Develop knowledge in system usability, data inputs, evaluating the quality of data and interpreting the significance of data reporting*

Table 15 (continued).

Competency	Strategy
Ability to serve on a project team and/or clinical committees.	• Develop project management skills • Utilize HIMSS online education resources • Work directly with health IT system clinical informatics experts • Peruse health IT and informatics journals • Get involved with health IT committees • Become focused and detailed to draw stakeholder participation • Seek interprofessional training
Ability to serve as liaison between clinical, administrative, educational, and IT groups within the organization.	• Study clinical informatics and workflow • Seek a mentor skilled in clinical, workflow, administrative, education, and IT • Shadow SMEs skilled in clinical, workflow, administrative, education, and IT • Employ HIMSS online educational resources on informatics • Attend web-based training, webinars, conferences • Obtain a health IT credential or certification • Research change management and other theories of organizational change

The leader role supports organizational efforts and structure to improve and manage human capital. The leader role promotes lifelong learning, education, and mentorship. Strategies to develop the leader role (Table 16) include endorsing The Joint Commission elements of participation, examining resources from the Agency for Healthcare Research and Quality (AHRQ), National Institute of Nursing Research (NINR), American Nurses Informatics Association (ANIA), reviewing compliance with Bar Code Medication Administration (BCMA), working directly with informatics scholars, super users, and trainers, and employing online resources from the HIMSS Nursing Informatics task force.

Table 16

Strategies Collected in Delphi Round 2 and 3: Leader Role Competencies

Competency	Strategy
Emphasize nursing process with electronic charting and care plans.	• Network with vendor software user groups • Volunteer for a nurse IT super user role • Take a web-based training course on electronic charting and care plans • Attend webinars, conferences, in house programs, workshops, and workplace training on electronic charting • Join the American Nurses Association (ANA) • Volunteer to create and test templates for charting and care plans*
Reviews documentation and work processes for adherence to national accreditation standards such as The Joint Commission.	• Participate in conferences, workshops, programs in house, tracers • Develop staff education related to where to locate certain items or documentation • event analysis, workflow analysis, • Employ event analysis and workflow analysis resource on HIMSS website • Endorse The Joint Commission elements of participation (http://www.jointcommission.org/assets/1/18/wp_leadership_standards.pdf), HealthIT.gov, and Agency for Healthcare Research and Quality (AHRQ).
Models ethical behavior in the use of systems and data.	• Employ HIMSS online learning resources on ethics • Examine National Institute of Nursing Research (NINR) (ninr.nih.gov); • Attend webinars, conferences, workshops, workplace training, self-study, and mentoring, • Participate in root cause analysis and event analysis groups • Study the ANA Code of Ethics* • Lead by example* • Stay informed and current with HIPAA Privacy rules*.

Table 16 (continued).

Competency	Strategy
Promotes the inclusion of nursing process workflow into the development of the system.	• Purse an informatics or health IT certification • Employ the workflow analysis resources from the American Nurses Informatics Association (ANIA) • Partner with IT colleagues* • Recommend healthcare organization education departments participate in vendor user groups • Examine online resources available through HIMSS Nursing Informatics task force* • Volunteer as a stakeholder* • Be an active participant at the facility level* • Attend workshops, conferences, self-study, Nursing Informatics Boot Camp* • Shadow and network with internal and external workflow experts • Study workflow mapping and systems thinking • Include staff in the building and testing process of IT systems to build an interdisciplinary team • Include nursing leaders in the systems implementation process to build an interdisciplinary team*
Describe the use of informatics in nursing practice.	• Purse an informatics IT certification • Employ the online educational resources from the American Nurses Informatics Association (ANIA) and HIMSS Nursing Informatics task force • Partner with IT colleagues • Recommend healthcare organization education departments participate in nursing informatics user groups and forums • Volunteer as a stakeholder and participate at the facility level • Attend Nursing Informatics Boot Camp • Include staff in the building and testing process of IT systems to build an interdisciplinary team
Join nursing organizations that foster the development of informatics skills.	• Attend informatics conferences, workshops, webinars • Participate in ANIA, AHIMA, AMIA, and HIMSS • Pursue an informatics certification

Table 16 (continued).

Competency	Strategy
Determine nursing responses after analysis of monitoring electronic data.	• Participate in data analysis web-based training and workshops • Conduct surveys on nursing responses with pre and post results • Employ data analysis resources on HIMSS website
Explain nursing process/diagnosis proficiency using Information Systems.	• Attend workshops, conferences, and webinars to develop proficiency in information systems • Take a class to develop proficiency in information systems • Participate in workplace training and in house programs that develop information system proficiency and its application to the nursing process • Assess skills of self and staff prior to training on an EHR • Conduct repeat and post skill assessments • Join organizations and vendor user groups that facilitate learning information systems
Discuss closed loop medication administration process.	• Examine compliance with Bar Code Medication Administration (BCMA) results • Explore Medication Reconciliation compliance training • Volunteer for a super user/trainer role in medication safety training • Explore HIMSS and vendor resources on the closed loop medication process • Attend webinars and workshops on medication reconciliation • Work closely with pharmacy department to learn the workflow and medication administration process*

Table 16 (continued).

Competency	Strategy
Describe the term Meaningful Use.	• Attend educational offerings for nursing staff to help them understand Meaningful Use • Explore healthcare policy • Adjust educational offerings to aid staff in understanding current healthcare policy • Adapt to new CISs deployed in patient care settings • Determine how to meet meaningful use in CISs and EHRs by utilizing software vendor resources • Study the Meaningful Use online resources on HIMSS website • Master the Meaningful Use guidelines • Employ the Office of the National Coordinator (healthit.gov site) and the CMS EHR Incentive Programs websites • Attend QualityNet training webinars • Learn to differentiate Meaningful Use from IQR • Leverage the Meaningful Use Whiteboard from the Advisory Board
Discuss nurses' involvement in the implementation of electronic health records.	• Develop an active super user program • network with EHR user groups • Explore the EHR materials on the HIMSS website • Attend HIMSS conferences and webinars, Nursing Informatics Boot Camp • Examine information on the Office of the National Coordinator website (HealthIT.gov) • Peruse clinical informatics journals
Discuss impact of legislation, research, and economics on nursing informatics.	• Centers for Disease Control and Prevention website article entitled Electronic Health Records: What's in it for Everyone? (http://www.cdc.gov/cdcgrandrounds/archives/2011/july2011.htm) • Peruse the Online Journal of Nursing Informatics (HIMSS), Health Affairs, Nursing Economics.*** • Participate in public comment on legislation and policy through HIMSS Nursing Informatics Workgroup • Attend Nursing Informatics Boot Camp*

Table 16 (continued).

Competency	Strategy
Discuss the nurse's role in Evidence Based Practice (EBP).	• Utilize organizations conferences workshops workplace training self-study • Learn how to run and evaluate reports • Attend HIMSS and other professional practice workshops on evidence-based practice • Examine the Doctor's Office Quality Information Technology EHR Adoption tools (http://www.ddcmultimedia.com/doqit/roadmap.html)

The educator role teaches and fosters learning. The role of the facilitator accelerates the learner in applying competency. Strategies provided to develop educator/facilitator (Table 17) competencies include examining and employing the online resources and initiative of AMIA, QSEN, TIGER, ANA, HIMSS.

Table 17

Strategies Collected in Delphi Round 2 and 3: Educator/Facilitator Role Competencies

Competency	Strategy
Discuss web-based learning and learning management systems-related material with lecture, clinicals, and skills labs.	• Locate web-based learning opportunities at conferences, workshops, workplace training, and self-study • Promote eLearning for staff educational classes on ELM • Attend HIMSS conferences on web-based learning implementation and strategies • Attend multiple conferences with different input on effectively using web-based learning and helpful strategies • Evaluate the results of web-based training on annual surveys

Table 17 (continued).

Competency	Strategy
Explain electronic data to analyze and assist with delivery of care.	• Participate in chart review lectures • Peruse nursing informatics journals such as JAMIA* • Conduct research in how nursing informatics impacts patient care delivery • Attend HIMSS conferences and workshops that focus on EHRs and their impacto n patient care
Explain an electronic health record system.	• Search for continuing education related to the EHR and reporting • Research how clinicans impacts accuracy of the electronic health record • Network with EHR vendor user groups • Join HIMSS and AMIA organizations • Leverage the Office of the National Coordinator's Health IT workforce training resources available through www.healthit.gov and AMIA*
Determine levels of IT/informatics knowledge and skills needed by nurses.	• Apply adult learning principles • Attend HIMSS educational classes on ELM development • Attend workshops and educational classes on survey development • Develop a nursing informatics council within your organization • Create a strategy for staff education • Identify information technology, informatics, technical, and information management learning needs on a regular basis* • Practice creating a mock survey using Survey Monkey* • Examine the competencies required for baccalaureate and masters prepared nurses* • Leverage sample materials on nurse competency provided on Quality and Safety Education for Nurses (QSEN) and TIGER*

Table 17 (continued).

Competency	Strategy
Identify learner needs and monitor learner progress using learning management systems.	• Attend conferences, workshops, workplace training, self-study, and educational classes on ELM development • Research maximizing the use of LMSs on the HIMSS website • Observe staff workflow and document in LMS • Conduct observation and chart review of EHRs to determine skills improvement needs • Conduct an annual survey or assessment*
Communicate resources in web-based learning and learning management systems.	• Take advantage of programs developed in-house • Peruse the HIMSS website for communication resources • Attend conferences and workshops on effectively communicating new technologies and processes
Establish individual NPD Specialists development time to explore information technology capabilities and informatics proficiency.	• Apply adult learning principles • Explore online HIMSS educational content • Develop and support in-house Nursing Informatics council to create strategy for education staff • Assess nurse competency using QSEN/TIGER competencies for baccalaureate and masters prepared nurses • Evaluate IT/informatics competencies in self and others to identify learning needs • Leverage sample materials provided on Quality and Safety Education for Nurses (QSEN) • Attain a certification in IT, HIM, or nursing informatics*
Discuss information technology as a tool of instruction and an instructional medium for problem solving.	• Attend conferences, workshops, and webinars on using IT for instruction and problem solving • Endorse workplace training that emphasizes increasing the use of IT for completing projects and solving problems • Take an IT course • Seek IT resources available on HIMSS website • Attend Nursing Informatics Boot Camp*

Table 17 (continued).

Competency	Strategy
Designs tools for delivering instruction such as handouts, web-based training, lectures, and over-the-shoulder support.	• Leverage workplace training and web-based training on designing learning tools • Shadow informatics savvy educators and super users • Network with HIMSS members and software vendor user group • Observe staff workflow to help with developing education materials • Leverage resource books, articles, and websites • Learn Adobe (Captivate) and Microsoft (Word, PowerPoint, Publisher, Project) software* • Apply adult learning theory*
Foster the initiation of individualized plans of care with services and treatments to meet patient's needs and achieve positive outcomes through the use of EHRs.	• Collaborate with clinical and informatics staff in developing care plans • Leverage online resources for individualized care plans • Attend conferences, workshops, workplace training, self-study • Involve staff nurses in development of care plans • Research how in house CISs (EHR) can better meet patient's needs and have increased positive outcomes • Develop in-house programs and tools to develop care plan to achieve positive health outcomes • Locate online education for using care plans (HIMSS)
Identify online healthcare and informatics continuing education programs.	• Research healthcare and informatics organizations (ANIA, ANA, HIMSS) educational offerings • Add credible educational offerings to organization (education) website • Research healthcare, nursing, and informatics journals • Research local educational programs in healthcare and IT (community college, university, technical schools) • Search for webinars and web-based training on healthcare, informatics, IT, etc. and provide these resources to staff • Attend healthcare, IT and informatics conferences with staff

Table 17 (continued).

Competency	Strategy
Identify national registries to access health, medical, and drug data.	• Attend medical and pharmaceutical conferences and workshops • Research medical and pharmaceutical online resources • Self-study on searching national registry websites (www.clinicaltrials.gov; www.fda.gov; www.nlm.nih.gov; www.fmsca.dot.gov; www.nremt.org) • Search HIMSS online resources for health, medical, and drug data
Access and use learning repositories to facilitate learning. Example: MERLOT.org	• Take tutorials on web-based training and learning repositories (merlot.org) • Research published resources for effectively using learning repositories • Network with SMEs with experience designing online courses • Research a learning repository for storing, managing, and sharing learning resources within your organization • Massive Open Online Courses (MOOCs)* • Examples: UCI, LCO, WFP, IMS, RMIT

The researcher role actively designs and applies research into practice. Although only four competencies from the original list were deemed of high importance, these competencies are critical to the NPD Specialist role and being able to apply new knowledge into practice. Strategies to develop researcher (Table 18) role competencies include perusing articles from JAMIA, Health Affairs, JONA, Applied Clinical Informatics; networking with health IT scholars, researching in Cumulative Index to Nursing and Allied Health (CINAHL), and learning standard vocabularies such as Systemized Nomenclature of Medicine – Clinical Terms (SNOMED CT) and Logical Observation Identifiers Names and Codes (LOINC).

Table 18

Strategies Collected in Delphi Round 2 and 3: Educator/Facilitator Role Competencies

Competency	Strategy
Analyze research on impact of informatics on nursing practice.	• Be active in informatics organizations such as ANIA and HIMSS • Peruse the Clinical Informatics Nursing (CIN), JAMIA, Health Affairs, Applied Clinical Informatics, JAMA, BMJ, JONA Journal • Participate in hospital informatics research committee
Use online nursing databases to facilitate research.	• Conferences workshops workplace training self-study • Learn about EBSCO host Cumulative Index to Nursing Allied Health (CINAHL) • Take tutorials and webinars on online research databases • Work directly with nursing, informatics, and IT researchers and scholars • Work with a librarian and researcher to learn literature search techniques • Develop competency with reference management tools
Support efforts and use of a unified nursing language.	• Attend ANA's annual Nursing Big Data conference • Develop skills with standard vocabularies (SNOMEDCT and LOINC) • Articulate the role in structuring nursing assessments and interventions • Participate in research trials evaluating mapping of nursing documentation to standard vocabularies • Attend conferences and workshops on nursing language • Examine Dr. Virginia Saba Model for Care Plan • Network with IT workgroups and HIMSS members
Provides for efficient data collection utilizing Information Systems.	• Learn how to write SQL code • Learn enhanced report development • Take a course, tutorial or webinar on report-writing tutorial Enterprise Data Warehouse (EDW) • Leverage HIMSS online resources on designing reports

The roles educator (teach and foster learning), facilitator (assist the learner in applying competency), consultant (resource for internal and external education opportunities and experiences), change agent (embrace and guide change), leader (support organizational structure and manages human capital), and researcher (active in designing, creating, and applying research and outcomes into practice) all play a critical part to the success of professional development within healthcare organizations (ANA, 2010; Brunt, 2007; O'Shea, 2002).

Strategies and resources for developing IT competency were collected during all four phases of the study. Strategies were collected during the literature review (Appendix A), pre-Delphi phase (Appendix K), Delphi Round 1 (Appendix K), Delphi Round 2 (Tables 14-17), and Delphi Round 3 (Tables 14-17). Participant comments and remarks added value as to why participants listed certain strategies for developing IT competency.

Participant Remarks

Participants were asked to provide feedback regarding the study. The researcher asked detailed questions to gain insight into the participants' thoughts and opinions about the study purpose and design and to consider any questions or concerns of participants. Participants were given the opportunity to provide comments and feedback on the Validation Form and on Delphi Questionnaires 1-3. Expert validators expressed appreciation for being part of the study. In the pre-Delphi phase, expert validators questioned the use of Armstrong's 1986 competencies due to the fact that technology has rapidly changed in the last three decades. One expert validator stated, "What was cutting edge 25 years ago is obsolete and has since been replaced." Expert validators suggested other resources for the researcher to review such as the Nursing Informatics: Scope and

Standards of Practice (2008). One expert validator declared many individuals are not aware of the term informatics or have limited understanding of the term—stressing the appropriateness of focusing on informatics competencies. Expert validators suggested the use of competencies from the ANCC Role Delineation Study (2010), Nursing Informatics: Scope and Standards of Practiced (2008), TIGER (2007), and the QSEN Institute informatics resources.

In Delphi Round 1, expert champions reported concern that individuals teaching EHR applications within patient care settings are not nurses. Multiple participants commented that individuals teaching EHRs in healthcare institutions should have patient care experience (i.e., clinical nurse specialist). Participants stated healthcare institutions are not utilizing nurses with informatics backgrounds. Educators and staff developers, as well as others within healthcare settings, are not familiar with what the term informatics signifies. One participant commented on the educator being effective in training clinicians and also taking into consideration Adult Learning theories. Another participant encouraged using an individualized approach that focuses on taking care of the patient. Nurse educators should work closely with nurse informaticists to grow staff in technology. Another participant mentioned the need for nursing schools to include nursing informatics education in curriculums. One participant did not fully understand some of the competencies listed. In Delphi Round 2, a participant was not aware of what "NPD" meant, noting that "NPD" was not a common term, and specified "NPD" was not spelled out in the study's email or questionnaire.

Summary

In conclusion, Chapter Four detailed the researcher's process for achieving study objectives: participant demographics, important competencies, and development strategies. The researcher verified the data was accurately displayed and reported findings for each research objective. Three expert validators and thirty-six expert champions were experts in informatics—demonstrated through their multiple degrees and certifications in nursing and informatics, years of experience teaching, supporting, and using informatics, and supplementary activities and affiliations. Participants used their knowledge and experience to validate, update and rate IT competencies by their importance to the NPD Specialist role in healthcare settings today. Expert champions rated 53 competencies by importance, but only 42 were rated high and extreme importance. Participants determined strategies and resources (joining the HIMSS organization, attending the WIN Conference, reading the Nursing Informatics Scope and Standards of Practice (ANA, 2008), and working with hospital IT departments) for developing each competency rated high in importance. Study findings are further discussed and synthesized for practicality and theoretical implications.

CHAPTER V

FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

The HITECH Act (ARRA, 2009; Blumenthal, 2009; HHS, 2009), technology-rich healthcare settings (ANA, 2008; NLN, 2009), and the nursing informatics agenda (NLN, 2009; TIGER, 2007) force NPD Specialists to be expert users of health information systems to retain Medicare funding and preserve patient care quality (Blumenthal, 2010; State Alliance for E-Health, 2009). The NPD Specialist serves multiple roles (educator, facilitator, consultant, change agent, leader, and researcher) within healthcare settings and is key in meeting the federal mandate (HITECH Act) by preparing others for using IT to improve patient care quality. The NPD Specialist must first achieve IT proficiency before aiding and mentoring others. Role-specific IT competencies for NPD Specialists serving in healthcare settings (hospital staff development educators) have been minimally addressed since Armstrong's 1986 seminal study. The purpose of this study was to verify IT competencies important for NPD Specialists serving in healthcare settings and to identify strategies for developing the competencies deemed important.

The objectives of this study were accomplished using qualitative inquiry. This study was accomplished in four phases. Expert validators updated Armstrong's (1986) competencies and verified competencies for NPD Specialists. Expert champions verified and rated competencies and identified strategies for developing IT competency for NPD Specialists. This chapter is organized based on study findings:

- Validated Essential IT Competencies for NPD Specialists in Healthcare Settings
- IT Fluency for NPD Specialists in Healthcare Settings
- Development Strategies for NPD Specialists in Healthcare Settings

Validated Essential IT Competencies for NPD Specialists in Healthcare Settings

The researcher modified the design from Armstrong's (1986) study that identified computer competencies for all nurse educator groups to concentrating solely on educators (NPD Specialists) in healthcare settings. Armstrong's study was used because its competencies focused on identifying competencies solely for the nurse educator role. The current study utilized NPD Specialists who were IT experts with experience serving in patient care settings to validate and determine IT competencies essential for educators (NPD Specialists) in healthcare settings.

Finding One

Three expert validators verified IT competencies for the NPD Specialist role in healthcare settings. The results of the pre-Delphi Validation Form included demographics of expert validators, comments from open-ended questions regarding each competency resulting in a final list of updated, added, and validated competencies, and feedback from an open-ended question where expert validators offered feedback regarding the study. Expert validators reviewed Armstrong's 107 competencies (53 were omitted, 26 were modified and updated, and 28 new competencies were added). Fifty-three IT competencies were validated for NPD Specialists serving in healthcare settings. Competencies omitted consisted of out of date technologies such as computers, computer disks, Computer Aided Instruction (CAI), telematics, artificial intelligence, provider order systems, and learner tracking systems. Competencies were updated using advanced terminology beyond computers and computer disks, multiple forms of computer aided instruction, telehealth to care for patients remotely and provide patient education, avoid

limited use provider order systems, and utilize Learning Management Systems (LMSs) to track learner skill levels and activities.

Conclusion. The confirmed list of competencies for NPD Specialists provides focus on the role nurses in hospital staff development play in healthcare settings. Leaders in healthcare organizations and educational institutions require informatics competencies identified and validated for nursing specialty roles (NPD Specialists) (ANA, 2010). New competencies incorporate current technology, healthcare policy, evidence-based practice, practice-based evidence, HIPAA privacy and confidentiality, interdisciplinary Plans of Care, EHRs, informatics, and technology that supports the nurse-patient relationship.

The validated IT competencies of the current study reveal information technology has surpassed Armstrong's study competencies and reveal the changing roles of NPD Specialists in healthcare settings. Most of the computer competencies identified in Armstrong's (1989) study final list of competencies were from the educator role, but the current study's competencies rated of extreme importance are from the change agent and consultant roles of the NPD Specialists. In a follow-up article to her 1986 study, Armstrong (1989) concentrated on the NPD Specialist in healthcare settings role (then called, nursing staff development educators). Around 1985-1989 NPD Specialists in healthcare settings role involved having computer competencies in the four major practice areas of nursing: clinical practice, administration, education, and research (Armstrong, 1986). Today's NPD Specialist role serving in healthcare settings has transformed and requires IT competencies for the educator, facilitator, consultant, change agent, leader, and researcher roles.

Recommendation. The NPD Specialist in healthcare settings can use the list of validated competencies as a benchmark in assessing her own skills. The validated list of competencies is a master list of competencies all NPD Specialists should possess. The validated list defines the baseline skillset to remain up-to-date with healthcare policy and IT systems.

This validated list should be compared to the TIGER (2007) study, the ANCC (2008) study, and the Chang (2007) study. Expert validators used several nursing, IT, and informatics resources to determine the final validated list of competencies selected. Comparisons and correlations can be made to the three studies to determine whether additional competencies need to be added.

Finding Two

The validated list of competencies was rated by importance for the NPD Specialist role in healthcare settings to form a list of *essential* (important) competencies. Forty-one competencies were deemed of high (n = 22) or extreme importance (n = 19) to the NPD Specialist role in healthcare settings. Some of the competencies rated high in importance are listed here: reviewing documentation and work processes for The Joint Commission, partnering with organizations that foster informatics skills, meaningful use and health IT policy, electronic data in the delivery of patient care, web-based learning, development time to explore IT and informatics proficiency, online nursing databases for research, and data collection using information systems. Some of the competencies rated extreme in importance are listed here: managing electronic information to establish evidence-based practice, establishing roles in evidence-based practice, documenting and promoting inclusion of process flows, adhering to HIPAA privacy, understanding the

value of health information systems, being skilled in analytics, serving on a go live implementation, clinical committee, serving as a liaison between IT and clinical groups, and project teams, electronic charting, involvement in the implementation of EHRs, and using ethics with systems and data.

Conclusion. Successful healthcare organizations identify and validate the necessary competencies for the professional development workforce in deploying technology (Davis, Stullenbarger, Dearman, & Kelley, 2005). Healthcare organization success in meeting federal policy greatly depends on the IT competency of its nursing workforce (NLN, 2009), and NPD Specialists are key in mentoring nursing staffs and implementing change (change agent role). The NPD Specialist serving in healthcare settings must be cognizant of healthcare trends (McCormick, 1983) to make informed decisions to effectively lead others.

Technology-rich healthcare settings, health IT policy, and the nursing informatics agenda increase the need for NPD Specialists to obtain essential competencies to work with EHRs and other health IT systems (NLN, 2009). The NPD Specialist serves a complex role within healthcare settings. *Essential IT competencies* are organized based on the roles (educator/facilitator, change agent/consultant, leader, and researcher). NPD Specialists serve within healthcare settings today (Brunt, 2007). The list of *essential* competencies comprises major topics in healthcare technology policy, nursing informatics, nursing professional development, and patient care as related to the role NPD Specialists currently serve within healthcare settings.

Recommendation. The validated essential IT competencies are guidelines for NPD Specialists currently serving in healthcare settings (Hart, 2008; Staggers et al.,

2002). The NPD Specialist can use the list of *essential IT competencies* as a standard for judging performance in the role. After judging performance (or assessing IT skills), the NPD Specialist can use the defined competencies to have a positive effect on self-learning. The NPD Specialist can design an applicable educational program as competency needs and weaknesses are identified. This will provide educational opportunities for the individual NPD Specialist and others she is responsible for developing (Armstrong, 1989).

Finding Three

It is important for NPD Specialists to be fluent in IT (Nelson & Staggers, 2008)—this means having the contemporary skills (device-specific), foundational concepts (digital information presentation), and intellectual abilities (information structure in problem solving) in IT (Glister, 1997; Goad 2002). Competencies were placed in categories of fluency and no competencies were marked in the contemporary skills category. Essential competencies fell in the foundational concepts and intellectual abilities categories. Foundational concepts and intellectual capabilities are longer lasting skills in terms of the NPD Specialist role (Nelson & Staggers, 2008; Saranto & Leono-Kilpi, 1997). Competencies of the foundational concepts category incorporates the impact of managing electronic information, modeling ethical behavior, describing health IT policy terms, identifying online learning repositories to facilitate learning, providing for efficient data collection using an information system, and promoting adherence to HIPAA privacy, confidentiality and patient rights. Competencies of the intellectual capabilities category incorporates designing tools for delivering instruction, analyzing research on the impact of informatics on nursing practice, determining nursing responses

after analysis of monitoring electronic data, explaining nursing process and diagnosis using information systems, ability to serve as a liaison, and ability to serve on a Go Live implementation team, project team, and clinical committee.

Conclusion. Staggers et al. (2002) identifies informatics competencies for experienced nurses, Curran (2003) identifies informatics competencies for nurse practitioners, Hart (2010) identifies core competencies for nurse managers, Armstrong (1986) identifies competencies for nurse educators, and Grobe (1989) identifies competencies for nurse administrators, practicing nurses, nurse educators, and researchers. The current study follows the recommendations of Staggers et al. (2002), Curran (2003), Hart (2010) and Fetter (2009) by validating essential IT competencies for the NPD Specialist role. The results of the research suggest crucial IT competencies for NPD Specialists serving in healthcare settings. These crucial competencies are in sync with Nelson & Staggers's (2008) emphasis on the need for educators (NPD Specialists) having foundational concepts and intellectual abilities for fluency in various forms of IT.

Recommendation. The NPD Specialist serving in healthcare settings must verify that she possesses the necessary foundational concepts and intellectual abilities outlined in this study. The NPD Specialist must be IT fluent as these skillsets are lasting and will aid in adapting to new technologies. The foundational concepts and intellectual abilities (essential IT competencies) outlined in this study should not only be used by NPD Specialists in healthcare settings but also by faculty educators to prepare future nurses for practicing "in the modern world of informatics-infused health care delivery" (Nelson & Staggers, 2008, p. 94).

Development Strategies

Healthcare institutions recognize infusion (effective use) and routinization (efficient use) requires an IT proficient workforce, thus requiring organizations to invest in developing their human capital (Becker, 1962; Sundaram et al., 2007). Hebda & Calderone (2010) report multiple types of healthcare technology exist in healthcare organizations and NPD Specialists need to effectively and efficiently use multiple types of IT. The infusion of IT in healthcare settings requires NPD Specialists to quickly develop informatics skills; however, learning to effectively use IT systems are time consuming (Gloe, 2010; Turner, 2010) limited budgets for formal education sometimes prohibit development (Cornell, Riodan, & Herrin-Griffith, 2010; Stepankova & Engova, 2006). Practical learning strategies to equip and guide NPD Specialists for "the high-touch, high-technology patient-centered care of the 21st century" (Hebda & Calderone, 2010, p. 56; TIGER, n.d.) were determined in this study.

Finding Four

Strategies collected for developing IT competency include reading the Online Journal of Nursing Informatics, joining a taskforce such as the Educational Technology Information Management Advisory Council (ETIMAC), using the HIMSS Nursing Informatics Tooklit, taking The Nursing Informatics Competencies Self-Assessment, using the online resources from TIGER, and networking with informatics user groups. Strategies collected in the pre-Delphi phase include reading and utilizing the 2014 TIGER Initiative Leadership Report, Nursing Informatics: Scope and Standards of Practice (ANA, 2008), ANCC Role Delineation Study (2010), and perusing the QSEN Institute for informatics research. Additional strategies collected for developing IT

competency include working with hospital IS departments, visiting the Office of the National Coordinator of Health IT, Meaningful Use, and Centers for Medicare and Medicaid Services websites, seeking a health IT certification, reading the Role of Nursing Informatics on the HIMSS online resources, utilizing vendor EHR learning resources, attending Nursing Informatics Boot Camp, seeking membership in ANCC content expert panel, Read Hebda & Czar (2012), and attending HIMSS, ANA, and ANIA webinars. Strategies for developing specific competencies include memberships with ANIA and HIMSS, joining vendor workgroups, building project management skills, using HIMSS online resources, reading current health IT policy from CDC.gov, seek the ANCC nursing informatics certification, leveraging the ONC's health IT workforce training materials available through AMIA and the ONC websites, and utilizing Dr. Virginia Saba as model for Care Plan project.

Conclusion. Consensuses of the IT development strategies gathered from this study indicate the utilization of HIMSS and TIGER resources. The TIGER initiative transitioned to the HIMSS organization in September 2014. The joint partnership touts goals to reform clinician education through the integration of IT, information literacy, and informatics, developing and implementing learning innovations, fostering faculty development, implementing collaborative partnerships, and understanding health IT through education and training (TIGER, 2015).

Strategies gathered in this study included more specific ways to develop IT competency. Strategies collected could be applied to developing essential NPD Specialist competencies. Although participants were given a baseline list of strategies and were asked to list specific strategies for developing each essential competency, some

expert champions listed general strategies such as conferences, self-study, tutorials, workshops, workplace training, webinars, and workgroups. Practical learning strategies to equip the NPD Specialist for "the high-touch, high-technology patient-centered care of the 21st century" (Hebda & Calderone, 2010, p. 56; TIGER, n.d.) were determined in this study.

Recommendation. Hebda and Calderone's (2010) suggestion to a) form partnerships with key nursing organizations, vendors, and healthcare institutions; b) adopt the TIGER vision and utilizing its available resources; and 3) remain current on health IT policy utilizing the Office of the National Coordinator of Health IT, Meaningful Use, and Centers for Medicare and Medicaid Services websites are in line with strategies expert validators and expert champions listed in this study. Expert validators and expert champions also suggest staying abreast of technology and nursing literature, participating in activities of professional organizations, attending conferences, networking, working with a mentor, and using technology as strategies for developing IT competency just as Mateo and Fahje (1998) suggest. Strategies identified in this study are a beginning or foundation for delivering safer quality patient care. The strategies serve as a guide in how to use IT systems—focusing on bridging the technology-learning gap to enhance patient care quality.

Sensmeier (2007) encouraged creating "competency-based, cost-effective staff development and continuing education programs and training strategies specifically for informatics knowledge, skill, and ability" (p. 5). This study provides a research-based list of competencies validated by expert NPD Specialists and determines strategies and resources for training the NPD Specialists in building informatics competency, thus

improving competency of the NPD Specialist workforce (Becker, 1962). There is no need for a comparison or correlation of the current study's essential competencies to Armstrong's final list of competencies since the majority of competency statements were deemed outdated by expert validators due to changes in IT and healthcare policy. Instead the essential competencies in this study should be placed in a workable format such as a competency model.

The research-based list of validated competencies and development strategies can be integrated into a competency model for NPD Specialists. This competency model can serve as a tool in healthcare settings to aid NPD Specialists in developing IT competency. The competency model should consist of competencies important for the NPD Specialist role, example behaviors and actions to successfully achieving the competency, and strategies and resources for developing the competency. The NPD Specialist can use the competency model to identify existing competency skills versus competency skills deficiency. The competency model can serve as a working tool that provides essential IT competencies and practical learning strategies for developing each crucial competency.

The competency model can serve as a working staff development tool within healthcare organizations to develop performance checklists. The competency model can also be utilized by NPD Specialists serving in academic settings to build individual skillsets and verify skillsets correlate with what is required for NPD Specialists serving in healthcare settings. The NPD Specialists in the academic setting can then better prepare future nurses for technology-rich healthcare settings and provide input on the necessary curricula that should be taught within educational institutions.

Table 19

Template for A Competency Model for NPD Specialists Learning Essential IT Competencies

Competencies	Examples, Behaviors, and Actions "What Success Looks Like"	Strategies and Resources for Development
NPD Role: Change Agent/Consultant		
Discuss managing electronic information to establish evidence-based practice.	• Actively network with SMEs • Assist healthcare organizations in utilizing the skills of informatics specialists • Develop in house programs focusing on evidence-based practice.	• HIMSS online educational resources • TIGER reports on workforce and informatics • Nursing Informatics Boot Camp
Describe the importance of nursing representation and support in institution's Information Systems department	• Recommend health IT technical build teams and clinical staff collaborate in the change process • Network with IT organizations and change readiness experts • Peruse change management literature	• HIMSS Future of Nursing position statement (http://www.himss.org/ library/ nursing-informatics/position-statement) • Conferences and Webinars: HIMSS, ANIA, ANCC, AHIMA, AMIA, ANA
Observes and documents process flows analyzing existing system problems which impact nursing workflow.	• Learn how to use software to document workflow, • Build on analytic abilities • Understand workflow with using IT systems	• AHIMA has free online training materials on workflow/process documentation • Shadow regular users, super users and SMEs • HIMSS, networking, vendors, organizations, work to develop clinical experience

Table 19 displays an example framework for the suggested competency model:

Limitations

As with any study, parameters existed in the current study that weakened the generalizability of results (competencies and strategies). Self-reported nature of participant expertise in responses existed as known limitations at the outset of the study. However, several unexpected limitations emerged during the implementation of the study. Although Armstrong's (1986) computer competencies were used as a baseline for this study, expert validators in the pre-Delphi phase questioned the use of Armstrong's study and considered it "outdated". One participant suggested the use of the ANCC Role Delineation Study: Informatics Nurse (2010) instead of using Armstrong's study. No bias was introduced as the ANCC is the crediting body for nursing professionals. As a result, the researcher re-worded suggested competency statements using the ANCC Role Delineation Study. The researcher collaborated with this expert validator to replace and combine some of Armstrong's competencies with those from the ANCC Role Delineation study. Permission (See Appendix M) was granted by the ANCC to use the competency statements listed in the Role Delineation study. Although the updated IT competencies in this study were determined for NPD Specialists in healthcare settings, the results can be generalized for the NPD professional workforce within educational institutions.

Recommendations for Future Research

Although this study validated IT competencies, the need exists for greater understanding of the precise *informatics* (nursing science, computer science, and information science) skillset vital for NPD Specialists practicing in technology-rich

health settings (Hart, 2008; 2010) as 'informatics is not using IT in patient care' (Nelson & Staggers, 2008, p. 94). This study is only a start to defining competencies. Further research needs to be conducted on creating tools to measure and evaluate these competencies in NPD Specialists in healthcare settings. Tools also need to be created to assist in developing the defined competencies in NPD Specialists in healthcare settings.

Future research should go more in-depth on expert participants' motivational factors. Motivation is at the core of why people (NPD Specialists) behave the way they do. The main influence on learning and motivation is the individual herself. The NPD Specialists should be intrinsically motivated to continue to learn and stay abreast of healthcare policy, nursing practice, patient care, informatics, and information technology. It should be determined what motivates the NPD Specialists to continue to learn and remain current in her role.

The validated list of IT competencies from the pre-Delphi phase of this study should be revisited and competencies should be identified for the NPD Specialist at various IT skill levels (novice, advanced beginner, competent, proficient, expert) (Benner, 1982; Turner, 2010). This will guide the novice IT user to becoming an expert IT user. Researchers should seek more comprehensive information about how NPD Specialists who are IT experts learn to become an informatics expert. This will add to the body of knowledge of the lived experiences of the NPD Specialists as informatics experts.

Confusion still remains as to which informatics competencies the NPD Specialist should possess and which informatics competencies the informatics specialist should possess. The answer could emerge through examination of the ANCC Nursing Informatics Certification exam and nurse informatics degree programs. Future research

should include strategies focused on how to use IT systems to deliver safer, quality healthcare. Perhaps the answer will be determined as the use of evidence-base practice increases.

Conclusion

Healthcare organizations have used IT since the early 1970s (IOM, 2001) and the nursing informatics field was formed over 20 years ago (Staggers & Thompson, 2001; TIGER, 2007). This study uncovered that many healthcare professionals remain unaware of *nursing informatics* and how it impacts patient care. Nursing informatics pioneers such as Susan Grobe (1988, 1989), Myrna Armstrong (1986, 1989), Nancy Staggers (2001, 2002), and Christine Curran (2003) aided in establishing a foundation for the informatics competencies vital for nursing professionals.

It is imperative NPD Specialists can proficiently use multiple technology systems to translate knowledge into nursing practice and apply new technology appropriately while increasing evidence-based practice (Ludwick & Doucette, 2009; TIGER, 2009). The goal of using IT in patient care is to improve healthcare quality (Ludwick & Doucette, 2009) by creating a safer, more efficient healthcare delivery system (Hebda & Calderone, 2010; MedPAC, 2004). The IOM (2001; 2002) aims for healthcare delivery to be safe, effective, patient-centered, timely, efficient, and equal for all through the use of IT. Meeting Meaningful Use requires the use of an EHR to improve patient care quality. Essential competencies include verifying the NPD Specialist understands meeting meaningful use and remains current with nursing, technology, and healthcare policy. At the same time, NPD Specialists must understand ethics and ensure the privacy and security of patient health information.

Although the ANA first mentions the NPD Specialist role in 2000, many nursing professionals are not aware of the term. Bruce (2009) and Avillion (2008) outline the complex roles NPD specialists serve within healthcare and academic settings. The ANPD has progressively attempted to steer away from the "educator" term and uses Nursing Professional Development Specialist to describe nurses responsible for the professional development of others within healthcare and academic settings. It remains unclear whether or not individual NPD Specialists are aware of the ANPD, a powerful force in advancing the NPD specialty to improve healthcare outcomes. Organizations are relying on external consultants to provide system training to the healthcare workforce, and much of the education provided does not focus on how to use the system to increase patient care quality (TIGER, 2009; Turner, 2010). The NPD Specialist serves in change agent, consultant, educator, facilitator, leader, and researcher roles within healthcare settings. The NPD Specialist should implement healthcare policy change initiatives, inform on EHR applications, and educate on how to use IT systems to increase patient care quality.

Healthcare settings are technology-rich due to healthcare policy and the nursing informatics agenda. Hebda and Calderone (2010) describe technology-rich healthcare settings as those that use electronic documentation, bedside monitoring, communication and tracking devices, remote and telehealth technologies, patient education applications, and other types of interactive technologies (p. 58). The goal is to use the available technology to improve patient care quality. As new technologies continue to emerge, NPD Specialists in healthcare settings must continue to address the IT professional development of other nursing caregivers. Findings in competencies and strategies are

captured in a framework to develop the IT competency skills of novice or less experienced IT users. This study determined essential IT competencies for NPD Specialists in healthcare settings and strategies for developing the essential competencies. Few studies have addressed the IT competency levels of NPD Specialists serving in healthcare settings due to the population lack of access. This study sought to gain consensus from the most experienced NPD Specialists with IT expertise to determine necessary skillsets and approaches to addressing the IT professional development of NPD Specialists within healthcare settings. As the transition to increased use of health IT gains momentum and meaningful use deadlines approach, healthcare organizations must invest even more in the human capital of its NPD Specialist workforce to aid in change initiatives, mentoring, and informatics skill development. This study allows NPD Specialists to compare their present knowledge in technology to the essential competencies rated by peers. The list of essential IT competencies and learning strategies for developing IT competency among NPD Specialists is crucial for healthcare settings. Ultimately, the results of the current study provide NPD leadership within healthcare organizations the ability to quickly adapt to changing technology systems and meaningfully use various types of IT systems to achieve the goal of increasing patient care quality.

APPENDIX A

BASELINE IT DEVELOPMENT STRATEGIES AND RESOURCES

FROM LITERATURE REVIEW

Baseline IT Development Strategies Collected	
Literature Review	
Codebook Category	Strategy
JOUR	The Journal of Continuing Education in Nursing
JOUR	The Journal of Nursing Education
JOUR	The Journal of Nursing Staff Development
JOUR	The Journal for Nurses in Staff Development – author: NNSDO
JOUR	Nurse Educator
JOUR	The Journal of Nursing Administration
JOUR	Nursing Management
JOUR	Nursing Outlook
JOUR	Nursing & Healthcare
JOUR	The Journal of Continuing Education in the Health Professions
JOUR	Studies in continuing Education
JOUR	Online Journal of Nursing Informatics
ORG	Association for Nursing Professional Development (ANPD), formerly National Nursing Staff Development Organization (NNSDO)
ORG	American Society for Training and Development (ASTD)
ORG	International Association for Continuing Education and Training (IACET)
ORG	American Nurses Associations (ANA)
ORG	UMMC School of Nursing Continuing Education
ORG	American Nurses Credentialing Center (ANCC) Continuing Nursing Education (CNE)
ORG	American Academy of Nursing (AAN)
ORG	American Association of Colleges of Nursing (AACN)
ORG	American Nurses Association (ANA)
ORG	Technology Informatics Guiding Education Reform (TIGER)
ORG	Commission on Collegiate Nursing Education (CCNE)
ORG	National Council of State Boards of Nursing (NCSBN)
ORG	National League for Nursing (NLN)
ORG	NLN Accreditation Commission (NLNAC)
ORG	NLN Continuing Education Provider Program
ORG	Technology Informatics Guiding Education Reform (TIGER)
ORG	Health Information Technology Scholars (HITS) program
ORG	Educational Technology Information Management Advisory Council (ETIMAC)
ORG	National Student Nurses Association (NSNA)
ORG	American Nurses Credentialing Center (ANCC)
ORG	Healthcare Education Association (HCEA)
ORG	Professional Nurse Educator Group (PNEG)
ORES	HIMSS Nursing Informatics Tooklit (http://www.himss.org/ResourceLibrary/genResourceDetailWebinar.aspx?ItemNumber=29772)
GEN	Libraries - Online libraries
GEN	Computer dealers
GEN	Adult education programs
GEN	read technical books and journals
GEN	Videos and CD-ROMs
GEN	Online help and manuals
SME	hire a formal tutor
SME	Others at work
SME	Looking over the shoulder of people who are doing different types of IT work
VEN	user groups
GEN	conferences and workshops
WKSHP	summer institutes
WKSHP	internships/apprenticeships
GEN	on-the-job training
GEN	self-taught
SME	professional visits and networking
GEN	literature
GEN	research
SME	networking with other professionals
ORG	professional organizations
WEBTRN	The Nursing Informatics Competencies Self-Assessment (http://nursing-informatics.com/niassess/competencies.html)
INFOWEB	The TIGER Initiative website (http://www.thetigerinitiative.org/)
SME	make friends with IT department and staff that are technical and willing to share knowledge
CRS	take technology courses (credit courses)
EXC	create a website
EXC	build a PC
OTIP	embrace a variety of software programs
EXC	write a computer program
QUAL	be inquisitive
QUAL	be an avid reader
OTIP	apply the Big6 Approach to learn information and technology literacy (http://big6.com/media/freestuff/LMC_Big6-ICT_Curriculum_LMC_MayJune2010.pdf)

APPENDIX B

ARMSTONG'S (1986) COMPUTER COMPETENCIES

Armstrong Computer Competencies for Nurses in Basic and Continuing Education			
Present | Future	**Category**	**Sub-category**	**Competency**
Present (1985)	Clinical Practice	Documentation	Discuss the problem of confidentiality (privacy & security) when using computer information systems.
Present (1985)	Clinical Practice	Documentation	Emphasize continuous use of the nursing process as computers assist the nurse in development of care plans & charting.
Present (1985)	Clinical Practice	Documentation	Describe the use of a computer-based information system to input and retrieve patient data.
Present (1985)	Clinical Practice	Documentation	Be able to demonstrate the use of an information system, providing examples of processing patient data.
Present (1985)	Clinical Practice	Documentation	Explain a computer medical record system, using a scientifically based model such as POMR.
Present (1985)	Clinical Practice	Documentation	Distinguish between traditional and computerized medication-administration procedures.
Present (1985)	Clinical Practice	Documentation	Emphasize computer usage as an adjunct to efficient record keeping that will not replace one-to-one client communication.
Present (1985)	Clinical Practice	Patient Monitoring	Explain how the nurse can determine appropriate nursing responses from examples of computerized monitoring systems that collect and calculate patient data.
Present (1985)	Clinical Practice	Patient Monitoring	Differentiate between digital and analog computers, describing their application in nursing.
Present (1985)	Clinical Practice	Patient Monitoring	Alter the care plan based on data received from the computerized monitoring system
Present (1985)	Clinical Practice	Patient Monitoring	Evaluate the reliability of the data obtained.
Present (1985)	Clinical Practice	Patient Monitoring	Differentiate and compare physiologic norms between electronically and manually

			acquired data.
Present (1985)	Clinical Practice	Patient Education	Evaluate usefulness of the computer to teach patients in areas of health assessment and client education.
Present (1985)	Clinical Practice	Patient Education	Address use of the computer in a multidisciplinary discharge-planning process.
Present (1985)	Clinical Practice	Patient Education	Design modules that can be computerized for patient education
Present (1985)	Clinical Practice	Patient Education	Utilize computers for patient education.
Present (1985)	Clinical Practice	Nursing Role/Issues	Analyze benefits and limitations of computer technology for the consumer of health care.
Present (1985)	Clinical Practice	Nursing Role/Issues	Compare and contrast the various computer applications in the health-care setting.
Present (1985)	Clinical Practice	Nursing Role/Issues	Identify training needs of learners entering the nursing job market.
Present (1985)	Clinical Practice	Nursing Role/Issues	Discuss the need for involvement in design, implementation, selection, and evaluation of information systems which facilitate delivery of patient care
Present (1985)	Clinical Practice	Nursing Role/Issues	Seek ways to increase satisfaction of nursing personnel while using computerized information systems.
Present (1985)	Clinical Practice	Nursing Role/Issues	Assess the nurse's role when using computer technology.
Present (1985)	Clinical Practice	Nursing Role/Issues	Discuss positive and negative consequences of computers in health as related to: machine dependence versus independence.
Present (1985)	Clinical Practice	Nursing Role/Issues	Discuss positive and negative consequences of computers in health as related to: dehumanization versus personalization.
Present (1985)	Clinical Practice	Nursing Role/Issues	Discuss positive and negative consequences of computers in health as related to: increase versus decrease in job availability.
Present (1985)	Clinical Practice	Nursing Role/Issues	Evaluate the impact of change, noting positive and negative forces when considering computer technology in any area of nursing.

Present (1985)	Clinical Practice	Nursing Role/Issues	Describe ways to protect patient rights when using computerized systems.
Present (1985)	Clinical Practice	Nursing Role/Issues	Project future trends in healthcare computer as they relate to nursing.
Present (1985)	Clinical Practice	Nursing Role/Issues	Identify the state-of-the-art of computer technology in their (educators') clinical specialty.
Present (1985)	Clinical Practice	Nursing Role/Issues	Discuss legal implications of use of computer information systems in terms of violation of criminal law and defense against malpractice suits.
Present (1985)	Nursing Education	Instruction by Computer	Monitor progress of learners using CAI.
Present (1985)	Nursing Education	Instruction by Computer	Describe unique assistance which can be given to meet specific learning needs while using the computer in education.
Present (1985)	Nursing Education	Instruction by Computer	Encourages those interested in the development of CAI by assisting with: release time for faculty.
Present (1985)	Nursing Education	Instruction by Computer	Encourages those interested in the development of CAI by assisting with: content expertise.
Present (1985)	Nursing Education	Instruction by Computer	Encourages those interested in the development of CAI by assisting with: instructional design.
Present (1985)	Nursing Education	Instruction by Computer	Encourages those interested in the development of CAI by assisting with: determination of learner characteristics.
Present (1985)	Nursing Education	Instruction by Computer	Encourages those interested in the development of CAI by assisting with: integration of material into curriculum.
Present (1985)	Nursing Education	Instruction by Computer	Encourages those interested in the development of CAI by assisting with: rewards for scholarly pursuit.
Present (1985)	Nursing Education	Instruction by Computer	Assess the objectives of CAI programs to determine how well the learner's needs will be met.
Present (1985)	Nursing Education	Instruction by Computer	Differentiate between CAI applications such as drill & practice, tutorial, simulations, and testing in assisting the learner to meet instructional objectives.

Present (1985)	Nursing Education	Instruction by Computer	Discuss ways to integrate the use of computer-related instructional materials with non-computer instructional modalities such as lecture, clinical experience, and skills labs.
Present (1985)	Nursing Education	Instruction by Computer	Communicate a variety of resources available in educational computing.
Present (1985)	Nursing Education	Instruction by Computer	Determine beginning, intermediate, and advanced "levels" of computer education needed by nurses.
Present (1985)	Nursing Education	Instruction by Computer	Establish ways to integrate information about computer applications into the curriculum
Present (1985)	Nursing Education	Instruction by Computer	Evaluate the facilitator, consultant role of the educator when CAI is used.
Present (1985)	Nursing Education	Instruction by Computer	Explore the use of other creative methodologies that combine with the computer to assist in the delivery of nursing content.
Present (1985)	Nursing Education	Instruction by Computer	Substantiate software for cost effectiveness and usefulness in the nursing program.
Present (1985)	Nursing Education	Instruction by Computer	Evaluate software for cost effectiveness and usefulness in the nursing program.
Present (1985)	Nursing Education	Instruction by Computer	Assess own learning needs in computer technology.
Present (1985)	Nursing Education	Instruction by Computer	Identify techniques for maintaining human interaction when using CAI.
Present (1985)	Nursing Education	Instruction by Computer	Evaluate learning effectiveness of instructional uses of computers in nursing education.
Present (1985)	Nursing Education	Instruction by Computer	Demonstrate proper care of computer equipment and software--e.g., handling floppy disks.
Present (1985)	Nursing Education	Instruction by Computer	Recognize desirable programming characteristics of instructional programs--e.g., lack of programming errors, learner involvement, feedback, user-friendly.
Present (1985)	Nursing Education	Computer Instruction	Identify, describe, and demonstrate the function and operation of various components of computers and related peripheral devices.

Present (1985)	Nursing Education	Computer Instruction	Use a high level language such as BASIC, Pascal, Logo, or PILOT to develop CAI.
Present (1985)	Nursing Education	Computer Instruction	Operate an authorizing system which guides the educator through the programming process for development of CAI.
Present (1985)	Nursing Education	Computer Instruction	Organize content, develop flow charts, design individual frames, and create branching sequences for production of CAI material.
Present (1985)	Nursing Education	Computer Instruction	Evaluate courseware for delivery of interactive, self-paced instruction.
Present (1985)	Nursing Education	Computer Instruction	Analyze software documentation for clarity and comprehensiveness of directions/information and minimal use of jargon.
Present (1985)	Nursing Education	Computer Instruction	Investigate CAI software for effects of screen display, color, graphics, sound, animation, learner control, response handling, prompt/error messages, branching structure, and program level of objectives.
Present (1985)	Nursing Education	Computer Instruction	Use a computer terminal and menu-driven programs to perform instructional responsibilities and generate reports.
Present (1985)	Nursing Education	Computer Instruction	Design computer-based instructional experiences, taking into account "high tech/high touch" aspects such as ergonomics (human factors) and environmental concerns.
Present (1985)	Nursing Education	Computer Instruction	Use various brands of computer hardware.
Present (1985)	Nursing Education	Computer Instruction	Communicate, using general computer terminology with learners, programmers, and health professionals.
Present (1985)	Nursing Education	Computer Instruction	Load and run a variety of software packages.
Present (1985)	Nursing Education	Computer Instruction	Discuss copyright laws as they apply to educational computing.
Present (1985)	Nursing Education	Computer Instruction	Recognize input, processing, and output components of computer technology.
Present (1985)	Nursing Education	Computer Instruction	Explain use of modem/communication software to search and gather data from networks and bulletin boards.

Present (1985)	Nursing Education	Computer Instruction	Discuss the use of the computer as an object of instruction, as an instructional medium, and as a problem-solving tool.
Present (1985)	Nursing Education	Computer Instruction	Establish faculty development time to explore the computer's capabilities.
Present (1985)	Nursing Education	Computer Instruction	Evaluate software for quality of content and instructional design.
Present (1985)	Nursing Education	Computer Instruction	Establish opportunity for faculty development to explore computer capabilities.
Present (1985)	Nursing Education	Computer Instruction	Promote the use of a team for development of CAI--e.g., can specify output needs in concise manner that is understood by programmers.
Present (1985)	Nursing Education	Instructional Support	Produce computer graphics to convey information in terms of relationships and patterns.
Present (1985)	Nursing Education	Instructional Support	Use a computerized record-keeping system to track learners for attendance, course work, and evaluation data.
Present (1985)	Nursing Education	Instructional Support	Describe use of a spreadsheet program for budgeting, inventory, and record keeping.
Present (1985)	Nursing Education	Instructional Support	Operate a word-processing program to manipulate text, correct spelling errors, and generate reports.
Present (1985)	Nursing Education	Instructional Support	Use an integrated software system with "window" capabilities to transfer data from one program to another.
Present (1985)	Nursing Education	Instructional Support	Identify learner needs and plan programs, using computer-generated needs-assessment tools.
Present (1985)	Nursing Education	Instructional Support	Produce computer graphics to convey information in terms of relationships and patterns in research courses.
Present (1985)	Nursing Education	Instructional Support	Use the computer to generate and score objective tests.
Present (1985)	Nursing Administration	-	Describe use of an information system to enter MD orders and develop acuity/care plans, patient outcomes, and discharge plans.

Present (1985)	Nursing Administration	-	Discuss computer programs which assist with staffing projections, budget determinations, patient-need identification, and nursing-care documentation.
Present (1985)	Nursing Administration	-	Explain methods of coding nursing diagnosis, nursing-care goals, and potential patient outcomes for analysis and delivery of patient care.
Present (1985)	Nursing Administration	-	Discuss the impact of computerization on the role of the nurse administrator.
Present (1985)	Nursing Administration	-	Describe a computerized credentialing system as a valuable tool in maintaining quality care and meeting requirements of external regulatory bodies--e.g., JCAH
Present (1985)	Nursing Administration	-	Utilize computers to cost out nursing care based on nursing classification systems.
Present (1985)	Nursing Administration	-	Demonstrate nurses' role/contribution with participation on health institution's computer committee.
Present (1985)	Nursing Research	-	Manipulate data, using statistical analysis software.
Present (1985)	Nursing Research	-	Support and, if possible, participate in nursing research studies to examine the impact of computer technology.
Present (1985)	Nursing Research	-	Use computer systems to conduct literature review and search.
Present (1985)	Nursing Research	-	Select appropriate software and hardware for statistical analysis/cost effectiveness.
Present (1985)	Nursing Research	-	Use text editor programs for entering statistical data.
Present (1985)	Nursing Research	-	Prepare data for computer mainframe or microcomputer manipulation.
Present (1985)	Nursing Research	-	Know limitations and advantages of different statistical packages for computers--e.g., can interpret data generated in terms of limitations of the program.
Future (1990)	Clinical Practice	Documentation	Describe computerized robot systems for delivering supplies in hospital and ambulatory-patient areas.

Future (1990)	Clinical Practice	Documentation	Explain client-medication monitoring devices used to track pharmaceutical supplies.
Future (1990)	Clinical Practice	Documentation	Discuss problems of confidentiality (privacy & security) while using voice synthesis terminals for input of patient data.
Future (1990)	Clinical Practice	Documentation	Analyze use of an artificial-intelligence program, such as "Expert Systems," to obtain consultation on nursing diagnosis, treatment plans, and patient-care activities.
Future (1990)	Clinical Practice	Documentation	Demonstrate use of pocket-size computers to record assessments, assess nursing intervention data banks, and enter individualized nursing-care plan information.
Future (1990)	Clinical Practice	Documentation	Evaluate the health-team plan as integrated information systems provide more access to on-line patient data with greater speed and conciseness.
Future (1990)	Clinical Practice	Documentation	Discuss changes that will occur as the MD enters his/her own orders into the information system, channeled directly to the various departments for implementation.
Future (1990)	Clinical Practice	Documentation	Explain the proficiency that will be needed with Nursing Process/Diagnosis to enter and extract patient data as information systems are developed around them.
Future (1990)	Clinical Practice	Documentation	Provide examples of computerized voice-activated systems designed for the rehab. Client, such as environmental control for ADL and wheelchair transportation.
Future (1990)	Clinical Practice	Documentation	Use a variety of methods of electronic charting.
Future (1990)	Clinical Practice	Documentation	Evaluate the reliability of computerized data.
Future (1990)	Clinical Practice	Patient Monitoring	Discuss external and internal closed-loop infusion systems that will monitor body functions and deliver meds in response to dysfunctions, such as arrhythmias.
Future (1990)	Clinical Practice	Patient Monitoring	Identify client data that can be transmitted from home or work, using infusion devices with modem-connect ports.

Future (1990)	Clinical Practice	Patient Monitoring	Describe bedside computer systems that perform physiological monitoring, data collection, and central-chart accessibility--e.g., X-ray, OR, ICU, or MD office.
Future (1990)	Clinical Practice	Patient Monitoring	Discuss the use of touch-screens for rapidity of entering/extracting data.
Future (1990)	Clinical Practice	Patient Monitoring	Use computer-based monitoring systems to formulate nursing care plans.
Future (1990)	Clinical Practice	Patient Monitoring	Use patient monitoring systems in clinical areas.
Future (1990)	Clinical Practice	Patient Education	Design client teaching plans about infusion pumps perfusing insulin, electrolyte, anticoagulant, pain, tranquilizer, hormone, and antibiotic therapy administration.
Future (1990)	Clinical Practice	Patient Education	Identify concerns of the client experiencing CAT scan imaging to visualize internal organs--e.g., brain for reduction of risk with exploratory surgery.
Future (1990)	Clinical Practice	Patient Education	Encourage clients use of CAI to learn about their illness--e.g., diabetes, with nutritional analysis,; simulations re. ketoacidosis; and "gaming" to emphasize other highlights.
Future (1990)	Clinical Practice	Patient Education	Instruct clients in the use of the credit-card or ID-band-sized "mini-chart" that contains pertinent medical data.
Future (1990)	Clinical Practice	Patient Education	Describe sonar detector terminals that activate when the client arrives at a location--e.g., pharmacy, providing, general/specialized information for self-care.
Future (1990)	Clinical Practice	Patient Education	Collaborate with developers of CAI to produce patient-education modules.
Future (1990)	Clinical Practice	Patient Education	Identify strategies for dealing with client resistance to computer technology.
Future (1990)	Clinical Practice	Nursing Role/Issues	Join national, state, and local nursing-association computer networks for education and information exchange.

Future (1990)	Clinical Practice	Nursing Role/Issues	Analyze the nursing role, when the "stark" reality of nursing actions and the actions of other departments and disciplines are separated out by an information system.
Future (1990)	Clinical Practice	Nursing Role/Issues	Project future jobs or nursing--e.g., entering programs to monitor and retrieve acutely ill persons from space.
Future (1990)	Clinical Practice	Nursing Role/Issues	Discuss impact of legislation (DRG's), medical research, and economics on demand, supply, and the variety of health-care and technological products.
Future (1990)	Clinical Practice	Nursing Role/Issues	Evaluate the reality of third-party payment for general and specialized nursing services as a result of computerized documentation.
Future (1990)	Clinical Practice	Nursing Role/Issues	Discuss use of a computerized diagnostic/repair system to evaluate first-level troubleshooting with bedside monitors.
Future (1990)	Clinical Practice	Nursing Role/Issues	Emphasize the practice nursing role that will be needed, especially in specialty units, anticipating new parameters of client data.
Future (1990)	Nursing Education	Instruction by Computer	Prepare all nurses at the basic level of "Information Specialist," to have general knowledge of computer applications & trends.
Future (1990)	Nursing Education	Instruction by Computer	Discuss preparation of the "Systems Specialist," a graduate level nurse who is knowledgeable in theory, information-systems research, and computer applications.
Future (1990)	Nursing Education	Instruction by Computer	Implement computer/interactive video systems for provision of educational experiences.
Future (1990)	Nursing Education	Instruction by Computer	Employ an authoring language to design specific CAI simulations for learners.
Future (1990)	Nursing Education	Instruction by Computer	Assist learners as they access lessons using a portable computer.
Future (1990)	Nursing Education	Instruction by Computer	Identify appropriate directories when searching a network and database.
Future (1990)	Nursing Education	Instruction by Computer	Share guidelines for learners in purchase/rental of health-related

			CAI software.
Future (1990)	Nursing Education	Instruction by Computer	Describe criteria in software evaluation as related to: programs targeted for continuing education.
Future (1990)	Nursing Education	Instruction by Computer	Describe criteria in software evaluation as related to: good instructional-design principles.
Future (1990)	Nursing Education	Instruction by Computer	Describe criteria in software evaluation as related to: CAI with other instructional methodologies.
Future (1990)	Nursing Education	Instruction by Computer	Describe criteria in software evaluation as related to: knowledge of Informatics (linguistics, sociology, computer science, and nursing).
Future (1990)	Nursing Education	Instruction by Computer	Describe criteria in software evaluation as related to: appropriate screen-text design.
Future (1990)	Nursing Education	Instruction by Computer	Use computerized multidisciplinary self-assessment centers to identify deficiencies in practice and to obtain resources for lifelong learning projects.
Future (1990)	Nursing Education	Instruction by Computer	Include the computerized Nursing Care Plan Data Base, a required "disk," as an integral part of the learner's theoretical applications and simulated clinical experiences.
Future (1990)	Nursing Education	Instruction by Computer	Integrate computer-managed instruction into traditional curricula.
Future (1990)	Nursing Education	Computer Instruction	Explain the quad-level network that uses the main, mini-, micro-, and portable computer to access and manage patient data.
Future (1990)	Nursing Education	Computer Instruction	Identify bar-coding devices used to inventory and monitor medical and client supplies.
Future (1990)	Nursing Education	Computer Instruction	Discuss new codes of ethics that refine security, licensing, & accessibility when reviewing or buying commercial software.
Future (1990)	Nursing Education	Computer Instruction	Differentiate between CAI and CAIV capabilities to assist the learner to meet instructional objectives.
Future (1990)	Nursing Education	Computer Instruction	Describe a high-level, human-like language that can be used to develop CAI.

Future (1990)	Nursing Education	Computer Instruction	Encourage further problem-solving applications and logic exercises into the nursing curriculum.
Future (1990)	Nursing Education	Computer Instruction	Implement a high level of ergonomic (human factors) in use of CAI.
Future (1990)	Nursing Education	Instructional Support	Be proficient in use of integrated software systems with "window" capabilities to transfer data from one program to another.
Future (1990)	Nursing Education	Instructional Support	Produce color computer graphics to convey data in terms of relationships and patterns.
Future (1990)	Nursing Education	Instructional Support	Identify major health-care publishers that provide CAI continuing-education software.
Future (1990)	Nursing Education	Instructional Support	Access large information data bases and software libraries to "store for use" material in preparation for future classes.
Future (1990)	Nursing Education	Instructional Support	Describe use of the learner's airmail-stamp-size computerized lifelong education record.
Future (1990)	Nursing Education	Instructional Support	Discuss the concept of telematics, further interaction of technology/communication systems--e.g., video, computers, satellite--made possible by laser/optical fiber advances.
Future (1990)	Nursing Education	Instructional Support	Identify national registries that will enable linkage to epidemiological, environmental, and pharmacological data.
Future (1990)	Nursing Administration	-	Discuss the increased time lapse needed for data collection/analysis in response to changing demands of health-care management.
Future (1990)	Nursing Administration	-	Project the proactive role that is needed by the nurse manager/administrator as part of the health-facility management team.
Future (1990)	Nursing Administration	-	Describe ongoing evaluation and revision that are necessary with information systems as changes occur in nursing practice.
Future (1990)	Nursing Administration	-	Explain use of an information system for nursing-home administrators.
Future (1990)	Nursing Administration	-	Describe use of an information system in any healthcare facility.

Future (1990)	Nursing Administration	-	Collaborate in the use of computerized nursing credentialing systems.
Future (1990)	Nursing Administration	-	Discuss need for more information, collected quickly, for making nursing decisions.
Future (1990)	Nursing Research	-	Analyze research investigating the impact of computerization on nursing practice.
Future (1990)	Nursing Research	-	Use minimum-core nursing data bases to facilitate clinical-care research.
Future (1990)	Nursing Research	-	Support research to study the effects of computerization in nursing education as related to: adult-education principles.
Future (1990)	Nursing Research	-	Support research to study the effects of computerization in nursing education as related to: learner self-esteem levels with CAI.
Future (1990)	Nursing Research	-	Support research to study the effects of computerization in nursing education as related to: need for sophisticated CAI branching.
Future (1990)	Nursing Research	-	Support research to study the effects of computerization in nursing education as related to: learners' reading skills with CAI.
Future (1990)	Nursing Research	-	Support research to study the effects of computerization in nursing education as related to: need for learner tracking systems.
Future (1990)	Nursing Research	-	Encourage participation in a manufacturer users' group for submission of ideas to their research and development department.
Future (1990)	Nursing Research	-	Discuss clinical research studies investigating the effects on health when humans interact with machines more than with people.
Future (1990)	Nursing Research	-	Evaluate learning achieved from computer-based instruction.

APPENDIX C

INVITATION TO PARTICIPATE

EMAILED BY HIMSS TO STUDY PROSPECTS

THE UNIVERSITY OF SOUTHERN MISSISSIPPI.

April 11, 2014

HIMSS Nursing Informatics Taskforce

Dear Fellow HIMSS Member,

My name is Tammy Baker and I am currently a student at the University of Southern Mississippi completing a dissertation study on validating informatics competencies for hospital nurse educators and identifying strategies for developing informatics competency. I am reaching out to you because you possess expert knowledge and skills in both nursing and information technology. If you are a Registered Nurse currently serving or have served in a nursing professional development role and have experience teaching or supporting any form of informatics/information technology, this letter is to your participation.

Your expert opinion is requested! As a HIMSS member and expert in both information technology and nursing education, you are invited to participate in a study to validate information technology competencies and development strategies for hospital nurse educators [as referenced by the Association for Nursing Professional Development (ANPD), Nursing Professional Development (NPD) Specialists].

As you are aware, healthcare settings are increasingly "technology-rich" and require informatics-prepared NPD Specialists as they are responsible for the clinical and professional development of all caregivers (ANA, 2009; NLN, 2008). This study will capture informatics competencies for NPD Specialists serving in healthcare settings and strategies for developing the competencies. Maintaining personal competence and preparing the learner for clinical competence are major challenges for the NPD specialist. One method of meeting the challenge is by determining guidelines for performance in meeting professional role expectations.

This study involves 3 iterations of questionnaires with the purpose of rating competencies for NPD Specialists and identifying strategies for developing IT competency in NPD Specialists.

Iteration	Questionnaire	Purpose	Duration
Delphi Round One	Questionnaire 1 – Rating Competencies Questionnaire	Rate competencies by importance to NPD Specialist role	30 minutes or less
Delphi Round Two	Questionnaire 2 – List Strategies	List informal learning strategies for developing competency	20 minutes or less
Delphi Round Three	Questionnaire 3 – List Additional Strategies	Opportunity to list additional informal learning strategies after viewing the responses of other participants	10 minutes or less

Individuals that complete all three questionnaires will receive a copy of the final study results to share with their organizations for talent management and individual knowledge and skill development. You will find a link to Questionnaire 1- Rating Competencies Questionnaire at the end of this letter. **Questionnaire 1 is due April 25, 2014.**

Participation in this study will create a set of essential competencies for NPD Specialists in healthcare settings as well as a list of strategies for developing the competencies. Your response will be crucial and valuable to this study. Thank you for your consideration. For further information regarding this study, please feel free to contact the researcher, Tammy Means, via email tammy.baker@eagles.usm.edu or phone at (601) 434-3457.

Click this link to get started on the Rate Competencies Questionnaire 1!
https://www.surveymonkey.com/s/NPDITComp

Sincerely,

Tammy L. Means, MS, PhD Candidate
Department of Human Capital Development
The University of Southern Mississippi
Hattiesburg, MS
Email: tammy.baker@eagles.usm.edu
Phone: 601-434-3457

APPENDIX D

INVITATION TO PARTICIPATE

EMAILED TO STUDY REFERRALS

Hello, <referral_prospect_name>:

I received your contact information from <participant_name>, a participant of my hospital nurse educator competency study. My name is Tammy Means and I am currently a student at the University of Southern Mississippi completing a dissertation study on validating informatics competencies for hospital nurse educators and identifying strategies for developing informatics competency. I am reaching out to you because you possess expert knowledge and skills in both nursing and information technology. If you are a Registered Nurse currently serving or have served in a nursing professional development role and have experience teaching or supporting any form of informatics/information technology, this letter is to your participation.

Your expert opinion is requested! You are invited to participate in a study to validate information technology competencies and development strategies for hospital nurse educators [as referenced by the Association for Nursing Professional Development (ANPD), Nursing Professional Development (NPD) Specialists].

As you are aware, healthcare settings are increasingly "technology-rich" and require informatics-prepared NPD Specialists as they are responsible for the clinical and professional development of all caregivers (ANA, 2009; NLN, 2008). This study will capture informatics competencies for NPD Specialists serving in healthcare settings and strategies for developing the competencies. Maintaining personal competence and preparing the learner for clinical competence are major challenges for the NPD specialist. One method of meeting the challenge is by determining guidelines for performance in meeting professional role expectations.

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Individuals that complete all three questionnaires will receive a copy of the final study results to share with their organizations for talent management and individual knowledge and skill development. You will find a link to Questionnaire 1- Rating Competencies Questionnaire at the end of this letter. **Questionnaire 1 is due April 25, 2014.**

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Click this link to get started on the Rate Competencies Questionnaire 1!
https://www.surveymonkey.com/s/NPDITComp

Sincerely,

Tammy L. Means, MS, PhD Candidate
Department of Human Capital Development
The University of Southern Mississippi
Hattiesburg, MS
Email: tammy.baker@eagles.usm.edu
Phone: 601-434-3457

APPENDIX E

PERMISSION TO USE ARMSTRONG STUDY

EAGLE APPS

Tammy Baker <tammy.baker@eagles.usm.edu>

RE: permission to use study

Armstrong, Myrna <myrna.armstrong@ttuhsc.edu> Tue, Jan 6, 2015 at 10:27 PM
To: Tammy Means <tammy.baker@eagles.usm.edu>

You have my permission to use the competencies and instruments from my study. For any questions, please call me at 512 699-9150, this message was sent on 1-6-15 @ 10:27p

Myrna L. Armstrong Ed.D., RN, ANEF, FAAN
Professor Emerita,Texas Tech University Health Sciences Center
Colonel, USA (Ret)
39 Augusta Drive, Marble Falls, TX 78654
512 699-9150

-–-Original Message-–--
From: Tammy Means [mailto:tlbmeans@gmail.com]
Sent: Tuesday, January 06, 2015 9:37 PM
To: Armstrong, Myrna
Subject: permission to use study

Hi Dr. Armstrong, I am making a few final finishes to my dissertation chapters 4 and 5 and realized that I did not get written permission to use the competencies and instruments from your study. A simple reply (granting permission) to this email will suffice for my committee.

Stay tuned for the finalization of my dissertation study. Thanks, Tammy Means

APPENDIX F

LETTER OF INTRODUCTION, CONSENT FORM, AND VALIDATION FORM

March 17, 2014

Dear <insert participant name>:

As an expert in information technology and nursing education, you have been chosen to participate in a study to evaluate and validate information technology competencies essential for Nursing Professional Development (NPD) specialists practicing in healthcare settings. Nursing Professional Development Specialists are crucial in healthcare settings because they are responsible for the professional development of nurses and caregivers. This study is part of my doctoral dissertation at The University of Southern Mississippi.

The seminal study of Myrna Armstrong (1986) entitled *Present and Future Computer Competencies for Nurse Educators in Basic and Continuing Education* will be used to establish a current list of IT competencies exclusively for NPD Specialists practicing in healthcare settings. You will be asked to review each competency and determine its relevance to today's NPD Specialist role in healthcare settings. Your review is a valuable aspect to the foundation of my study. Preceding this phase, a select group of HIMSS members will rate competencies and determine strategies for developing competencies.

Your participation in the study is greatly appreciated. At the end of the study, you will receive a copy of the final study results May 2014. Please email signed Consent Form and completed Validation Form via scanned document to tammy.baker@eagles.usm.edu by Thursday, March 20, 2014. For further information regarding this study, please feel free to contact me via email tammy.baker@eagles.usm.edu or phone at (601) 434-3457.

Sincerely,

/s/

Tammy L. Means, MS
Doctoral Candidate
Department of Human Capital Development
The University of Southern Mississippi

Attached: Consent Form

Validation Form

CONSENT FORM

THE UNIVERSITY OF SOUTHERN MISSISSIPPI AUTHORIZATION TO

PARTICIPATE IN RESEARCH PROJECT

Consent is hereby given to participate in the study titled:
A Study Identifying Information Technology Development Strategies for Nursing Professional Development Specialists Practicing in Healthcare Settings

1. **Purpose:** The purpose of this study is to identify information technology competencies for Nursing Professional Development (NPD) Specialists in healthcare settings and identify strategies for developing competencies. The results of this study will serve as a research-based tool in developing IT competency among NPD Specialists. Nursing Professional Development Specialists will be able to use this tool to determine individual skill levels and set individual goals in learning to use IT.

2. **Description of Study**: Expert nursing informatics professionals will review, validate and rank IT competencies for today's NPD Specialists practicing in healthcare settings. This study will be conducted with a preliminary review of competencies using 2-4 experts. A second group of experts from the HIMSS organization will participate in a three round Delphi methodology rating competencies and identifying strategies for developing competencies. The outcome of the this study will serve as a talent management tool for organizations and serve instrument for developing IT competency for the individual.

3. **Benefits:** Participants will be provided copies of the final results of the study to share with their organizations in developing talent.

4. **Risks:** There are no known physical, psychological, social, or financial research-related risks associated with participation in this study.

5. **Confidentiality:** Data will be kept confidential. Microsoft Word and Survey Monkey will be used to create questionnaires. Survey Monkey hold electronic data on a secure database and server and other data will be maintained in a Microsoft Excel spreadsheet. Each individual will be assigned a random coded number upon completion of Delphi Round 1 Questionnaire. The only data that will be reported in this dissertation will be an individual's age, state of residence, type of healthcare facility, state healthcare facility is located, IT experience, teaching experience, education and certifications. Individuals' referrals (snowball technique) will be displayed using assigned coded numbers. The researcher will export electronic data into a Microsoft Excel spreadsheet that will be password-protected. All data will be kept on a laptop owned by the researcher with password protection that only the researcher will know.

6. **Alternative Procedures:** Individuals participating can choose to only complete portions of the questionnaire.

7. **Participant's Assurance:** Whereas no assurance can be made concerning results that may be obtained, the researcher will take every precaution consistent with the best scientific practice. Participation in this project is completely voluntary, and participants may withdraw from this study at any time without penalty. Questions concerning the research should be directed to Tammy Means at (601) 434-3457. This project and this consent form have been reviewed by the Institutional Review Board, which ensures that research projects involving human subjects follow federal regulations. Any questions or concerns about rights as a research participant should be directed to the Chair of the Institutional Review Board, The University of Southern Mississippi, 118 College Drive #5147, Hattiesburg, MS 39406-0001, (601) 266-6820. A copy of this form will be given to the participant.

8. **Signatures:** The University of Southern Mississippi requires the date and signature of the participant and person explaining the study to the subject appear on the consent form.

_____ _____

Signature of the Research Participant Date

_____ _____

Signature of the Person Explaining the Study Date

VALIDATION FORM

In this form you will be asked to I) complete demographical information, II) evaluate IT competencies for NPD Specialists in healthcare settings, III) add any additional competencies, and IV) add comments.

1. DEMOGRAPHICS:

Please complete the following demographic information.

I. Are you currently serving in a role directly or indirectly responsible for the professional development of nurses and/or patient caregivers? _____

II. How many years have you served in a role directly or indirectly responsible for the professional development of nurses and/or patient caregivers?_____

III. How many years IT experience do you possess?_____

IV. Describe your IT experience (teaching, supporting, usage, etc.).

_____

_____

V. Which healthcare setting best describes where you obtained your IT experience? Check all that apply.

_____ Hospital
_____ Home-care
_____ Ambulatory care
_____ Other (please explain):
_____

VI. Please list your degree(s) and levels below:

List degree name: _____
List degree name: _____
List degree name: _____

VII. Please list your (current and past) certification(s) below:

List certification name: _____
List certification name: _____
List certification name: _____

VIII. Please list any additional education that you may have as it relates to IT.

_____

_____

IX. Please list any healthcare IT applications that you are fluent in.

_____

_____

X. Please list any studies you have published (related to healthcare, nursing, or technology).

_____

_____

XI. Please list any conferences that you have attended in the past 2 years (related to healthcare, nursing, or technology).

_____

_____

II. EVALUATE AND VALIDATE COMPETENCIES

The following pages contain IT competency statements (validated in a Myrna Armstrong's 1986 study) for your evaluation. The competencies are categorized based on the four areas of nursing: Administration, Research, Clinical Practice, and Education. Please evaluate these competencies and their adequacy for the role NPD Specialists play in healthcare settings.

Please evaluate each competency statement and determine whether the statement is satisfactory for NPD Specialists in healthcare settings today. Any questionable statements or additional discussion related to a specific competency statement should be stated in the Comments text box below each competency category. Printing out this document and writing comments directly will also be accepted as long as you are able to scan in and email the document.

Nursing Research

1. Support research to examine the impact of computer technology in nursing.
2. Manipulate data using statistical analysis software.
3. Analyze research on impact of computerization on nursing practice.
4. Discuss research of humans interacting with machines more than people.
5. Support research regarding computerizing, nursing education, and adult education principles.
6. Support research to explore learner self-esteem levels while using CAI.
7. Use minimum core nursing databases to facilitate nursing research.
8. Support research to explore need of sophisticated branching in CAI.
9. Support research to investigate need for learner tracking systems in CAI.
10. Encourage participation in a manufacturer users' group

Comments on Nursing Research Competencies:

Nursing Administration

1. Discuss the impact of the computer on the manager's role.
2. Describe an Information System to enter MD orders and develop acuity/care plans.
3. Explain computerized data to analyze and assist with delivery of care.
4. Discuss programs with staffing, budget, and patient need identification.
5. Describe on-going evaluation/revision regarding Information Systems.
6. Project proactive role needed by nurse manger as part of health team.

Comments on Nursing Administration Competencies:

Clinical Practice (Documentation)

1. Emphasize nursing process with computerized charting and care plans.
2. Discuss problems of confidentiality with Information Systems
3. Describe use of Information Systems.
4. Explain a computer medical record system, using a scientifically based model such as problem-oriented medical record (POMR).
5. Distinguish between traditional and computerized medication-administration procedures.
6. Discuss confidentiality while using voice synthesis terminals.
7. Explain nursing process/diagnosis proficiency using Information Systems.
8. Demonstrate pocket-size computers.
9. Evaluate on-line computer systems that provide greater speed and conciseness.
10. Analyze use of artificial intelligence programs for patient care activities.
11. Discuss changes when MD enters own orders.
12. Explain medication monitoring systems to track pharmaceutical supplies.

Comments on Clinical Practice - Documentation Competencies:

Clinical Practice (Patient Monitoring)

1. Determine nursing responses after analysis of monitoring data.
2. Discuss closed loop infusion systems to monitor/diffuse meds.
3. Describe bedside computer systems.
4. Identify client data transmitted from infusion devices with modem ports.

Comments on Clinical Practice – Patient Monitoring Competencies:

Clinical Practice (Patient Education)

1. Address computerized multidisciplinary discharge planning.
2. Encourage client use of AI for health education.
3. Identify client concerns experiencing CAT scan imagery.
4. Design teaching plans for clients using infusion pumps.
5. Instruct clients to their "mini-chart" containing pertinent medical data.
6. Describe sonar detector terminals that contain client education on health.

Comments on Clinical Practice – Patient Education Competencies:

Clinical Practice (Nursing Role/Issues)

1. Describe protection of patient rights when using computerized systems.
2. Identify computer training needs of nurses.
3. Discuss nursing involvement with implementation of Information Systems.
4. Evaluate impact of change when considering computer technology computer technology in nursing.
5. Assess nurses role when using computers.
6. Discuss dehumanization vs personalization aspects when using computers in nursing.
7. Project healthcare computing trends in nursing.
8. Discuss machine dependence vs independence.
9. Discuss increase vs decrease job availability using computers in health care.
10. Analyze consumer benefits/limitations of computer technology.
11. Join nursing association computer networks.
12. Discuss impact of legislation, research and economics on healthcare/technology.
13. Analyze nursing when actions of each health discipline are documented.
14. Evaluate reality of third-party payment as a result of computerized documentation.
15. Project future jobs for nursing, i.e. space program.

Comments on Clinical Practice – Nursing Role/Issues Competencies:

Nursing Education (Computer Instruction)

1. Establish faculty development time to explore computer capabilities.
2. Evaluate courseware for interactive, self-paced instruction.
3. Discuss copyright laws related to computing.
4. Discuss the computer as an object of instruction, an instructional medium, and a problem-solving tool.
5. Analyze software documentation.
6. Communicate, using computer terminology.
7. Load and run a variety of software.
8. Use terminal and menu-driven programs for instruction and reports.
9. Investigate computer assisted instruction (CAI) for instructional design principles.
10. Explain modern/communication software.
11. Identify, describe, and demonstrate components of computer and peripherals.
12. Encourage problem-solving and logic exercises in curriculum.
13. Discuss the new code of ethics for CAI security.
14. Differentiate between CAI and CAIV capabilities to meet objectives.
15. Describe a high-level, human like computer language.

Comments on Nursing Education – Computer Instruction Competencies:

Nursing Education (Instruction by Computer)

1. Assess computer assisted instruction (CAI) objectives for learners needs.
2. Discuss CAI-related material with lecture, clinicals, and skills labs.
3. Explore CAI and other creative methods to deliver nursing content.
4. Encourage development of CAI for integration into curriculum.
5. Substantiate cost effectiveness and usefulness of software.
6. Encourage CAI development with faculty rewards for scholarly pursuit.
7. Encourage CAI development with release time for faculty.
8. Differentiate various CAI formats to meet instructional objectives.
9. Establish information about computer applications in curriculum.
10. Encourage CAI development with content expertise.
11. Encourage CAI development by determining learner characteristics
12. Determine levels of computer education needed by nurses.
13. Encourage CAI development using instructional design principles.
14. Monitor progress of learners using CAI.
15. Evaluate facilitator, consultant role of the educator when using CAI.
16. Describe assistance to meet learning needs when using computers in education.
17. Communicate resources in educational computing.
18. Describe criteria for software evaluation and instructional design principles.
19. Describe criteria for software evaluation and continuing education programs.
20. Prepare all nurses at basic level of "Information Specialists."
21. Discuss preparation of the graduate level "Systems specialists."
22. Include computerized Nursing Care Plans disk as part of learning activities.
23. Describe criteria for software evaluation with other instructional methodologies.
24. Assist learners with their portable computers.
25. Implement CAI (computer assisted instruction) /CAIV (computer assisted interactive video) systems for educational experiences.
26. Identify directories when using networks.
27. Use computerized multidisciplinary self-assessment/learning centers.
28. Share guidelines with learners for rental and/or purchase of CAI.
29. Employ an authoring language to develop CAI.
30. Describe criteria for software evaluation and informatics.

Comments on Nursing Education –Instruction by Computer Competencies:

Nursing Education (Instructional Support)

1. Operate a word processing program.
2. Identify learner needs by means of a computerized assessment system.
3. Describe use of a spreadsheet program.
4. Produce color computer graphics.
5. Identify healthcare of CAI continuing education programs.
6. Access databases and software libraries for "store for use" material for class.
7. Describe a learner's life-long educational record, airmail-stamp-size.
8. Discuss the telematics, made possible by laser/optical fiber advances.

9. Identify national registries to access health/medical/drug data.

Comments on Nursing Education – Instructional Support Competencies:

III. ADDITIONAL COMPETENCIES

Please list any additional IT competencies that should be added to this list.

_____

_____

IV. COMMENTS

Please state any additional comments below.

_____

_____

A sincere Thank You for your time and participation in Phase One of my study.

APPENDIX G

DELPHI ROUND 1 WELCOME, CONSENT FORM, AND QUESTIONNAIRE 1

1. Welcome to Questionnaire 1 - The Rating Competencies Questionnaire

A sincere thanks for participating in this study. Your feedback is valuable to the entire healthcare and nursing informatics community.

The following pages contain 1) a consent form to sign, date, and agree 2) demographic questions to answer 3) competencies to rate 4) a request for strategies, comments, and referrals.

Questions with asterisks require a response.

As you navigate this questionnaire, remember to Save (by clicking **Next**) your responses in the event that you need to return at a later time to finish. Please complete by Friday, April 25, 2014.

If you would rather complete this questionnaire using paper method (Adobe Acrobat form) and do not wish to complete via online Survey Monkey, email the researcher at tammy.baker@eagles.usm.edu requesting a copy to be emailed to you.

2. Consent Form

Please review the Consent Form below and electronically sign and date.

THE UNIVERSITY OF SOUTHERN MISSISSIPPI AUTHORIZATION TO PARTICIPATE IN RESEARCH PROJECT

Consent is hereby given to participate in the study titled:

A Study Identifying Information Technology Development Strategies for Nursing Professional Development Specialists Practicing in Healthcare Settings

1. Purpose: The purpose of this study is to identify information technology competencies for Nursing Professional Development (NPD) Specialists in healthcare settings and identify strategies for developing competencies. The results of this study will serve as a research-based tool in developing IT competency among NPD Specialists. Nursing Professional Development Specialists will be able to use this tool to determine individual skill levels and set individual goals in learning to use IT.

2. Description of Study: Expert nursing informatics professionals will review, validate and rank IT competencies for today's NPD Specialists practicing in healthcare settings. This study will be conducted with a preliminary review of competencies using 2-4 experts. A second group of experts from the HIMSS organization will participate in a three round Delphi methodology rating competencies and identifying strategies for developing competencies. The outcome of the this study will serve as a talent management tool for organizations and serve instrument for developing IT competency for the individual.

3. Benefits: Participants will be provided copies of the final results of the study to share with their organizations in developing talent.

4. Risks: There are no known physical, psychological, social, or financial research-related risks associated with participation in this study.

5. Confidentiality: Data will be kept confidential. Microsoft Word and Survey Monkey will be used to create questionnaires. Survey Monkey hold electronic data on a secure database and server and other data will be maintained in a Microsoft Excel spreadsheet. Each individual will be assigned a random coded number upon completion of Delphi Round 1 Questionnaire. The only data that will be reported in this dissertation will be an individual's age, state of residence, type of healthcare facility, state healthcare facility is located, IT experience, teaching experience, education and certifications. Individuals' referrals (snowball technique) will be displayed using assigned coded numbers. The researcher will export electronic data into a Microsoft Excel spreadsheet that will be password-protected. All data will be kept on a laptop owned by the researcher with password protection that only the researcher will know.

6. Alternative Procedures: Individuals participating can choose to only complete portions of the questionnaire.

7. Participant's Assurance: Whereas no assurance can be made concerning results that may be obtained, the researcher will take every precaution consistent with the best scientific practice. Participation in this project is completely voluntary, and participants may withdraw from this study at any time without penalty. Questions concerning the research should be directed to Tammy Means at (601) 434-3457. This project and this consent form have been reviewed by the Institutional Review Board, which ensures that research projects involving human subjects follow federal regulations. Any questions or concerns about rights as a research participant should be directed to the Chair of the

Institutional Review Board, The University of Southern Mississippi, 118 College Drive #5147, Hattiesburg, MS 39406-0001, (601) 266-6820. A copy of this form will be given to the participant.

8. Signatures: The University of Southern Mississippi requires the date and signature of the participant and person explaining the study to the subject appear on the consent form.

***1. Date (mm/dd/yyyy)**

***2. Signature (Full Name)**

***3. ELECTRONIC CONSENT: Please select your choice below.**

Clicking on the "agree" button below indicates that:

- **you have read the above information**
- **you voluntarily agree to participate**
- **you are at least 18 years of age**

If you do not wish to participate in the research study, please decline participation by clicking on the "disagree" button.

◯ Agree ◯ Disagree

3. Demographics

***1. About You**

First Name

Last Name

Role or Title

State of Residence

Email Address

Phone Number

***2. Are you currently serving in a role directly/indirectly responsible for the professional development of nurses?**

***3. How many years have you served in a role directly/indirectly responsible for the professional development of nurses/caregivers?**

***4. How many years IT experience (teaching, supporting, and/or usage) do you have?**

***5. Describe your IT experience**

Teaching:

Supporting:

Using:

Other:

6. Which healthcare setting(s) have you worked? Check all that apply.

- [ ] Hospital
- [ ] Home-care
- [ ] Ambulatory care
- [ ] Other (please specify)

7. Do you have a degree in any field of IT or informatics?

- [ ] No
- [ ] Yes

If Yes, list degree name

8. Please list your degree(s) and levels below:

Degree 1

Degree 2

Degree 3

9. Do you have or once held a certificate or certification in any field of IT or informatics?

◯ No

◯ Yes

If Yes, (please specify)

10. Please list any software applications that you are fluent in.

Software (general IT)

Industry specific

Healthcare Information Technology

Other

11. Please list any additional education that you may have as it relates to healthcare information technology.

12. Please list any studies you have written or published (related to healthcare, nursing, or technology).

13. Please list any conferences you have attended in the past 2 years (related to healthcare, nursing, or technology).

4. Competencies

The following pages contain a list of information technology (IT) and informatics competencies for hospital nurse educators, now called Nursing Professional Development (NPD) Specialists, name coined by the Association for Nursing Professional Development (ANPD). These competency statements are categorized based on the six roles NPD Specialists serve in healthcare settings: 1) Educator, 2) Facilicator, 3) Consultant, 4) Change Agent, 5) Leader, and 6) Researcher (Bastable, 2008).

Please evaluate each competency statement. Rate the importance of each competency to the present role NPD Specialists serve in healthcare settings. Please indicate the importance level you attach to each competency by selecting the appropriate number in the radio button beside each statement, using the following scale:

1 = of no importance to the current role NPD Specialists serve in healthcare settings

2 = of low importance to the current role NPD Specialists serve in healthcare settings

3 = of medium importance to the current role NPD Specialists serve in healthcare settings

4 = of high importance to the current role NPD Specialists serve in healthcare settings

5 = of extreme importance to the current role NPD Specialists serve in healthcare settings

5. Competencies: Change Agent/Consultant Role

1. Please rate the importance of each competency below to the current role of hospital nurse educators.

	1 = of no importance	2 = of low importance	3 = of medium importance	4 = of high importance	5 = of extreme importance
Discuss managing electronic information to establish evidence-based practice.	◯	◯	◯	◯	◯
Observes and documents process flows analyzing existing system problems which impact nursing workflow.	◯	◯	◯	◯	◯
Executes testing scripts.	◯	◯	◯	◯	◯
Promotes adherence to privacy, confidentiality, patient rights, and HIPAA Privacy in the organization, health exchanges, or state/national registries.	◯	◯	◯	◯	◯
Promotes the inclusion of nursing process workflow into the development of the system.	◯	◯	◯	◯	◯
Discuss the impact of managing electronic information on all nursing roles.	◯	◯	◯	◯	◯
Describe the importance of nursing representation and support in institution's Infiormation Systems department.	◯	◯	◯	◯	◯

Understand the value of healthcare information systems.	○	○	○	○	○
Ability of nurse leaders to be skilled in analytics to make real-time decisions.	○	○	○	○	○
Uses applications to analyze data for forecasting and accreditation.	○	○	○	○	○
Ability of nurse leaders to be skilled in the use of business intelligence tools such as real-time dashboards, report interpretation and decision support tools.	○	○	○	○	○
Ability to serve on a Go Live implementation team.	○	○	○	○	○
Ability to serve on a project team and/or clinical committees.	○	○	○	○	○
Ability to serve as technical resource.	○	○	○	○	○
Ability to determine role-based access.	○	○	○	○	○
Ability to serve as liaison between clinical, administrative, educational and IT groups within the organization.	○	○	○	○	○

6. Competencies: Leader Role

1. Please rate the importance of each competency below to the current role of hospital nurse educators.

	1 = of no importance	2 = of low importance	3 = of medium importance	4 = of high importance	5 = of extreme importance
Emphasize nursing process with electronic charting and care plans.	◯	◯	◯	◯	◯
Reviews documentation and work processes for adherence to national accreditation standards such as The Joint Commission.	◯	◯	◯	◯	◯
Models ethical behavior in the use of systems and data.	◯	◯	◯	◯	◯
Promotes the inclusion of nursing process workflow into the development of the system.	◯	◯	◯	◯	◯
Describe the use of informatics in nursing practice	◯	◯	◯	◯	◯
Join nursing organizations that foster the development of informatics skills.	◯	◯	◯	◯	◯
Determine nursing responses after analysis of monitoring electronic data.	◯	◯	◯	◯	◯
Explain nursing process/diagnosis proficiency using Information Systems.	◯	◯	◯	◯	◯
Discuss closed loop medication	◯	◯	◯	◯	◯

administration process.					
Describe the term Meaningful Use.	◯	◯	◯	◯	◯
Project healthcare technology trends in nursing.	◯	◯	◯	◯	◯
Discuss nurses involvement in the implementation of electronic health records.	◯	◯	◯	◯	◯
Grant access to patients to view their individual personal health record.	◯	◯	◯	◯	◯
Discuss impact of legislation, research, and economics on nursing informatics.	◯	◯	◯	◯	◯
Discuss the nurse's role in Evidence Based Practice (EBP)	◯	◯	◯	◯	◯
Provides remote end-user support.	◯	◯	◯	◯	◯

7. Competencies: Educator/Facilitator Role

1. Please rate the importance of each competency below to the current role of hospital nurse educators.

	1 = of no importance	2 = of low importance	3 = of medium importance	4 = of high importance	5 = of extreme importance
Discuss web-based learning and learning management systems-related material with lecture, clinicals, and skills labs.	◯	◯	◯	◯	◯
Explain electronic data to analyze and assist with delivery of care.	◯	◯	◯	◯	◯
Describe the Systems Life Cycle.	◯	◯	◯	◯	◯
Explain an electronic health record system.	◯	◯	◯	◯	◯
Builds system data elements and applications using vendor build tools.	◯	◯	◯	◯	◯
Determine levels of IT/informatics knowledge and skills needed by nurses.	◯	◯	◯	◯	◯
Identify learner needs and monitor learner progress using learning management systems.	◯	◯	◯	◯	◯
Communicate resources in web-based learning and learning management systems.	◯	◯	◯	◯	◯
Establish individual NPD Specialists development time to	◯	◯	◯	◯	◯

explore information technology capabilities and informatics proficiency.					
Discuss information technology as an tool of instruction and an instructional medium for problem solving.	◯	◯	◯	◯	◯
Analyze software documentation.	◯	◯	◯	◯	◯
Designs tools for delivering instruction such as handouts, web-based training, lectures, over-the-shoulder support.	◯	◯	◯	◯	◯
Foster the initiation of individualized plans of care with services and treatments to meet patient's needs and achieve positive outcomes through the use of EHRs	◯	◯	◯	◯	◯
Identify online healthcare and informatics continuing education programs.	◯	◯	◯	◯	◯
Identify national registries to access health, medical, and drug data.	◯	◯	◯	◯	◯
Access and use learning repositories to facilitate learning. Example: MERLOT.org	◯	◯	◯	◯	◯

8. Competencies: Researcher Role

1. Please rate the importance of each competency below to the current role of hospital nurse educators.

	1 = of no importance	2 = of low importance	3 = of medium importance	4 = of high importance	5 = of extreme importance
Manipulate data using statistical analysis software.	◯	◯	◯	◯	◯
Analyze research on impact of informatics on nursing practice.	◯	◯	◯	◯	◯
Use online nursing databases to facilitate research.	◯	◯	◯	◯	◯
Encourage participation in healthcare and IT vendor users' group	◯	◯	◯	◯	◯
Support efforts and use of a unified nursing language.	◯	◯	◯	◯	◯
Provides for efficient data collection utilizing Information Systems.	◯	◯	◯	◯	◯

9. Strategies, Comments, Referrals, and Closing

1. Strategies: This study places special emphasis on strategies for developing IT and informatics competency. Self-directed, informal learning strategies are practical (realistic, useful, and handy) ways for building competency and can be any activity involving the pursuit of knowledge or skill development occurring outside the curricula of educational institutions (Schugurensky, 2000). Examples of self-directed, informal learning stategies are: conferences (HIMSS), webinars (Cisco, Microsoft), manuals (The Manual for Becoming a Nursing Informatics Guru), building a pc, networking with the IT department, networking with other health informatics professionals, joining vendor meetings (Cerner, Epic), participating in user groups, participating in technology forums, and reading technical journals.

Please list in the space below self-directed, informal learning strategies you have used to develop IT and informatics competency in yourself or others. Feel free to list any person, website, document, manual, tool or anything you have utilized outside of formal education to develop your knowledge, skills, and abilities. Your personal learning experiences are welcomed. Please be specific.

2. Comments: Please list any comments, questions, concerns regarding this questionnaire or study.

3. Referrals: Please list any individuals that you would like to refer to participate in this study. Please include name and email address.

A sincere "Thank You" for your time and participation.

APPENDIX H

DELPHI ROUND 2 INTRODUCTION LETTER AND QUESTIONNAIRE 2

INTRODUCTION LETTER

<participant>: A sincere "Thank You" for participating in this study identifying competencies important for Nursing Professional Development (NPD) Specialists in healthcare settings and identifying strategies for developing competency.

Thank you for completing Questionnaire 1, where you rated the importance of each competency to the role NPD Specialists serve. In Questionnaire 2, you will be asked to list specific self-directed, informal learning strategies for developing each competency. Your feedback is valuable to the entire healthcare and nursing informatics community.

Remember to Save your responses in the event that you need to return at a later time to finish. You will be allowed to skip competencies that you may not have a strategy for. Please complete by May 20, 2014.

Click on to access the Listing Strategies Questionnaire 2:
https://www.surveymonkey.com/s/StrategiesB

Thank you for your time,

Tammy Means, MS, PhD Candidate
Department of Human Capital Development
The University of Southern Mississippi
Hattiesburg, MS
Email: tammy.baker@eagles.usm.edu
Phone: 601-434-3457

1. Welcome to Questionnaire 2 - The Collecting Strategies Questionnaire

Welcome to Delphi Round 2.

A sincere thanks for participating in this study.

The following pages contain a list of competencies rated high in importance for the present role NPD Specialists serve in healthcare settings. You will be asked to list specific self-directed, informal learning strategies for developing each competency. Your feedback is valuable to the entire healthcare and nursing informatics community.

As you navigate this questionnaire, remember to Save your responses in the event that you need to return at a later time to finish.
You are allowed to skip competencies that you may not have a strategy for.
Please complete by May 23, 2014.

If you would rather complete this questionnaire using paper method (Adobe Acrobat form) and do not wish to complete via online Survey Monkey, email the researcher at tammy.baker@eagles.usm.edu requesting a copy to be emailed to you.

***1. Full Name**

***2. Email Address**

2. Self-directed, Informal Learning Strategies

The following pages contains informatics competencies ranked high in importance for present day NPD Specialists from Delphi Round 1. You will be asked to list specific self-directed, informal learning strategies for developing the corresponding competency. You are allowed to skip competenicies that you may not have a strategy for.

Self-directed, informal learning strategies are practical (realistic, useful, and handy) ways for building competency and can be any activity involving the pursuit of knowledge or skill development (Schugurensky, 2000). Examples of self-directed, informal learning stategies are: conferences (HIMSS), webinars (Cisco, Microsoft), manuals (The Manual for Becoming a Nursing Informatics Guru), building a pc, networking with the IT department, networking with other health informatics professionals, joining vendor meetings (Cerner, Epic), participating in user groups, participating in technology forums, and reading technical journals.

Below lists an example.

EXAMPLE Competency Statement with Strategies categorized

1. **Emphasize nursing process with electronic charting and care plans.**

Bootcamps, Workshops, Conferences, Webinars:
The Nursing Informatics Bootcamp, HIMSS13 Conference, Nursing Informatics Pre-Conference 2013, SINI
Resource Books/Training Manuals:
books in the Ball Hannah series, Nursing Informatics Scope and Standards of Practice (Published by ANA), Informatics Nursing Exam Secrets (Published by Morrison Media)
Simulation, Technology, Exercises, Courses, Web-based Training:
HIMSS Nursing Informatics Toolkit
Programs/Tools Developed In-house:
The Clinical Informatics Program at Hospital X
Vendor Workgroups:
Cerner System Wide Workgroup, Allscripts Clinical Informatics Group, Epic Learner's Group
Working with SMEs (Clinical Informatics Spec., IT Experts):
shadow IT systems analyst, have regular meeting with hospital Nurse Informaticists
Journals/Magazines:
• The Journal of Continuing Education in Nursing • The Journal of Nursing Education • The Journal of Nursing Staff Development • The Journal for Nurses in Staff Development – author: NNSDO • Nurse Educator
Organizations (Nursing, Healthcare, IT, Other):
Association for Nursing Professional Development (ANPD) • American Society for Training and Development (ASTD) • International Association for Continuing Education and Training (IACET) • American Nurses Associations (ANA) • UMMC School of Nursing Continuing Education • American Nurses Credentialing Center (ANCC) Continuing Nursing Education (CNE) • American Academy of Nursing (AAN) • American Association of Colleges of Nursing (AACN) • American Nurses Association (ANA) • Technology Informatics Guiding Education

3. List Strategies for Change Agent/Consultant Role Competencies Ranked High I...

Please list ways to develop or achieve each competency ranked high in importance for the role NPD Specialists serve in healthcare settings. You can list a specific resource, person/role, document, manual, website, tool or anything that is handy and can be utilized to develop IT/informatics knowledge, skills, and abilities. Please be Specific.

1. Discuss managing electronic information to establish evidence-based practice.

List ways to develop or achieve the above competency.

2. Promotes adherence to privacy, confidentiality, patient rights, and HIPAA Privacy in the organization, health exchanges, or state/national registries.

List ways to develop or achieve the above competency.

3. Observes and documents process flows analyzing existing system problems which impact nursing workflow.

List ways to develop or achieve the above competency.

4. Promotes the inclusion of nursing process workflow into the development of the system.

List ways to develop or achieve the above competency.

5. Understand the value of Healthcare Information Systems.

List ways to develop or achieve the above competency.

6. Discuss the impact of managing electronic information on all nursing roles.

List ways to develop or achieve the above competency.

7. Describe the importance of nursing representation and support in institution's Infiormation Systems department.

List ways to develop or achieve the above competency.

8. Ability of nurse leaders to be skilled in analytics to make real-time decisions.

List ways to develop or achieve the above competency.

9. Ability to serve on a go live implementation team.

List ways to develop or achieve the above competency.

10. Ability of nurse leaders to be skilled in the use of business intelligence tools such as real-time dashboards, report interpretation and decision support tools.

List ways to develop or achieve the above competency.

11. Ability to serve on a project team and/or clinical committees.

List ways to develop or achieve the above competency.

12. Ability to serve as liaison between clinical, administrative, educational and IT groups within the organization.

List ways to develop or achieve the above competency.

4. List Strategies for Leader Role Competencies Ranked High Importance

Please list specific ways to develop or achieve each competency ranked high in importance for the role NPD Specialists serve in healthcare settings. You can list a specific resource, person/role, document, manual, website, tool or anything that is handy and can be utilized to develop IT/informatics knowledge, skills, and abilities. Please be Specific.

1. Emphasize nursing process with electronic charting and care plans.

List ways to develop or achieve the above competency.

2. Models ethical behavior in the use of systems and data.

List ways to develop or achieve the above competency.

3. Promotes the inclusion of nursing process workflow into the development of the system.

List ways to develop or achieve the above competency.

4. Discuss nurses involvement in the implementation of electronic health records.

List ways to develop or achieve the above competency.

5. Discuss the nurse's role in Evidence Based Practice (EBP).

List ways to develop or achieve the above competency.

6. Reviews documentation and work processes for adherence to national accreditation standards such as The Joint Commission.

List ways to develop or achieve the above competency.

7. Join nursing organizations that foster the development of informatics skills.

List ways to develop or achieve the above competency.

8. Determine nursing responses after analysis of monitoring electronic data.

List ways to develop or achieve the above competency.

9. Explain nursing process/diagnosis proficiency using Information Systems.

List ways to develop or achieve the above competency.

10. Discuss closed loop medication administration process.

List ways to develop or achieve the above competency.

11. Describe the term *Meaningful Use*.

List ways to develop or achieve the above competency.

12. Discuss impact of legislation, research, and economics on nursing informatics.

List ways to develop or achieve the above competency.

5. List Strategies for Educator/Facilitator Role Competencies Ranked High Impo...

Please list specific self-directed, informal learning strategies to develop each competency ranked high in importance for the role NPD Specialists serve in healthcare settings. You can list a specific resource, person/role, document, manual, website, tool or anything that is handy and can be utilized to develop IT/informatics knowledge, skills, and abilities. Please be Specific.

1. Discuss web-based learning and learning management systems-related material with lecture, clinicals, and skills labs.

List ways to develop or achieve the above competency.

2. Identify learner needs and monitor learner progress using learning management systems.

List ways to develop or achieve the above competency.

3. Designs tools for delivering instruction such as handouts, web-based training, lectures, over-the-shoulder support.

List ways to develop or achieve the above competency.

4. Explain electronic data to analyze and assist with delivery of care.

List ways to develop or achieve the above competency.

5. Determine levels of IT/informatics knowledge and skills needed by nurses.

List ways to develop or achieve the above competency.

6. Explain an electronic health record system.

List ways to develop or achieve the above competency.

7. Communicate resources in web-based learning and learning management systems.

List ways to develop or achieve the above competency.

8. Access and use learning repositories to facilitate learning. Example: MERLOT.org

List ways to develop or achieve the above competency.

9. Foster the initiation of individualized plans of care with services and treatments to meet patient's needs and achieve positive outcomes through the use of EHRs.

List ways to develop or achieve the above competency.

10. Discuss information technology as an tool of instruction and an instructional medium for problem solving.

List ways to develop or achieve the above competency.

11. Establish individual NPD Specialists development time to explore information technology capabilities and informatics proficiency.

List ways to develop or achieve the above competency.

12. Identify online healthcare and informatics continuing education programs.

List ways to develop or achieve the above competency.

13. Identify national registries to access health, medical, and drug data.

List ways to develop or achieve the above competency.

6. List Strategies for Researcher Role Competencies Ranked High Importance

Please list specific ways to develop or achieve each competency ranked high in importance for the role NPD Specialists serve in healthcare settings. You can list a specific resource, person/role, document, manual, website, tool or anything that is handy and can be utilized to develop IT/informatics knowledge, skills, and abilities. Please be Specific.

1. Analyze research on impact of informatics on nursing practice.

List ways to develop or achieve the above competency.

2. Use online nursing databases to facilitate research.

List ways to develop or achieve the above competency.

3. Support efforts and use of a unified nursing language.

List ways to develop or achieve the above competency.

4. Provides for efficient data collection utilizing Information Systems.

List ways to develop or achieve the above competency.

5. Comments: Please list any comments, questions, concerns regarding this questionnaire or study.

********** *You have successfully completed Delphi Round 2.* **********

A sincere "Thank You" for your time and participation.

APPENDIX I

DELPHI ROUND 3 INTRODUCTION LETTER AND QUESTIONNAIRE 3

INTRODUCTION LETTER

"*Thank You*" for participating in this study rating informatics competencies important for Nursing Professional Development (NPD) Specialists (Hospital Nurse Educators) and identifying strategies for developing informatics competency.

As a final request, please review the strategies previously collected and *list additional strategies* for developing each competency. You may skip competencies you do not wish to add additional strategies.

Your expert review and additional strategies are crucial to this study.

Click on the link below to access *The Collecting Additional Strategies Questionnaire*:
https://www.surveymonkey.com/s/AddStrategiesR3

Please Submit by July 28, 2014.

Thanks,
Tammy Means, MS, PhD Candidate
Department of Human Capital Development
The University of Southern Mississippi
Hattiesburg, MS
Email: tammy.baker@eagles.usm.edu
Phone: 601-434-3457

1. Welcome to Delphi Round 3 - The Collecting Additional Strategies Questionna...

A sincere "Thank You" for participating in this study identifying competencies important for Nursing Professional Development (NPD) Specialists (Hospital Nurse Educators) in healthcare settings and identifying strategies for developing

In Round 1, you rated competencies by their importance to the current role NPD Specialists (Hospital Nurse Educators) serve in healthcare settings.

In Round 2, you listed strategies for developing each competency rated high importance.

In Round 3, you will be asked to list additional strategies for developing each competency. Review the strategies listed on the succeeding four pages listing additional strategies where appropriate and skipping competencies where you do not wish to list additional strategies.

Save your responses in the event that you need to return at a later time to finish.

Please Submit by July 28, 2014.

Any questions or concerns, email the researcher at tammy.baker@eagles.usm.edu.

Please enter your full name plus credentials in the space below.

*1. ***Enter your FULL NAME + Credentials below:***

2. Strategies for Change Agent and Consultant Role Competencies

The following pages contain IT/informatics competencies rated high in importance for present day NPD Specialists (Hospital Nurse Educators) and strategies for developing each competency collected previously.

Directions: Review the list of strategies for developing each competency. Some strategies listed are very general such as "conferences" or "webinars". Add additional strategies in the open text box where necessary, but please be specific.

1. Promotes adherence to privacy, confidentiality, patient rights, and HIPAA Privacy in the organization, health exchanges, or state/national registries.

- **utilize informational websites, webinars, web-based training, required e-Learning Modules (ELMs)**
- **resource books**
- **Health Information Management and Systems Society (HIMSS)**
- **Office of the National Coordinator site, HIPAA site**
- **familiarize staff with social media policies and the meaning and differences between confidentiality and privacy**
- **conferences, self-study, workplace training**

List additional strategies

2. Identify learner needs and monitor learner progress using learning management systems.

- **conferences**
- **workshops**
- **workplace training**
- **self-study**
- **educational classes on ELM development**
- **HIMSS**
- **workflow observation**
- **observation and chart review**

List additional strategies

3. Promotes the inclusion of nursing process workflow into the development of the system.

- **Certified Commission for Healthcare Information Technology (CCHIT)**
- **American Nurses Informatics Association (ANIA)**
- **IT workgroups**
- **organizations particpate in vendor user groups**
- **validate workflow analysis**
- **attend conferences**
- **workshops**
- **workplace training**
- **self-study**

List additional strategies

4. Observes and documents process flows analyzing existing system problems which impact nursing workflow.

- **shadow superusers/SMEs**
- **attend workshops/conferences**
- **utilize online resources**
- **HIMSS, networking**
- **vendors**
- **organizations**
- **work to develop clinical experience**
- **analytic abilities**
- **understand workflow.**

List additonal strategies

5. Promotes the inclusion of nursing process workflow into the development of the system.

- **utilize online resources**
- **HIMSS**
- **workshops/conferences**
- **self-study**
- **shadow and network with superusers/SMEs from vendor groups**
- **understand workflow mapping and systems thinking; include staff in the building and testing process**
- **include nursing leaders in the implementation process**

List additonal strategies

6. Understand the value of Healthcare Information Systems (HISs).

- **utilize HIS webinars**
- **conferences**
- **workshops**
- **journals**
- **web-based training**
- **self-study**
- **interdisciplinary care team education available on Canvas site (e-Learning portal)**
- **ELMs**
- **inclusion in house-wide HIT groups**
- **HIMSS**
- **literature**
- **work with SMEs**

List additional strategies

7. Discuss the impact of managing electronic information on all nursing roles.

- **utilize conferences**
- **workshops**
- **workplace training**
- **HIMSS**
- **TIGER report**
- **networking and observing SMEs**
- **programs developed in house**
- **organizations**
- **utilzing clinical educators with HIT certifications**

List additional strategies

8. Describe the importance of nursing representation and support in institution's Information Systems department.

- **utilize IT organizations**
- **change readiness experts**
- **work with SMEs**
- **change management literature**
- **include clinical staff in the change process**
- **encourage health IT build teams to include clinical staff in the development of EHRs.**

List additional strategies

9. Ability of nurse leaders to be skilled in analytics to make real-time decisions.

- **utilize real time dashboards to demonstrate live data**
- **journals**
- **memberships in quality forums**
- **webinars/conferences/workshops**
- **web-based training**
- **utilize analytic abilities of an EHR to promote patient safety and outcome**
- **utilize web resources offerred by the vendor**
- **network with SMEs with anlaytic expertise.**

List additional strategies

10. Ability of nurse leaders to be skilled in the use of business intelligence tools such as real-time dashboards, report interpretation and decision support tools.

- **attend conferences**
- **webinars**
- **workshops**
- **can utilize inhouse programs**
- **advance training is needed in addition to the basic go live training for leaders to really benefit and understand dashboards functionality and benefits.**
- **Provide concrete example based on studies on how utilizing instead of ignoring alerts benefits the patient.**
- **workplace training**
- **self-study**
- **ELMs**
- **coursework**
- **interactive dashboard classes**
- **HIMSS**

List additional strategies

11. Ability to serve on a go live implementation team.

- **utilize conferences**
- **superuser meetings**
- **mentorships**
- **shadowing**
- **vendor workgroups**
- **project management skills**
- **networking with SMEs**
- **hands-on classroom**
- **organizations**
- **webinars**
- **in-house programs**
- **web-based training**
- **getting credentialed in several of the paths the system offers**
- **site visits and observation of EHRs in facilities.**

List additional strategies

12. Ability to serve on a project team and/or clinical committees.

- **utilize HIMSS, project management skills**
- **experience**
- **web-based training**
- **working with SMEs**
- **journals**
- **individuals should be encouraged to serve**
- **learn to be a focused and detailed project leader is a great asset to stakeholders participation.**

List additional strategies

13. Ability to serve as liaison between clinical, administrative, educational and IT groups within the organization.

- **study clinical informatics**
- **mentoring**
- **shadowing SMEs**
- **HIMSS**
- **classroom instruction**
- **workflow observation**
- **web-based training**
- **webinars**
- **conferences**
- **obtaining a HIT certification.**

List additional strategies

3. Strategies for Leader Role Competencies

Directions: Review the list of strategies for developing each competency. Some strategies listed are very general such as "conferences" or "webinars". Add additional strategies in the open text box where necessary, but please be specific.

1. Emphasize nursing process with electronic charting and care plans.

- **utilize vendor user groups**
- **superuser role**
- **classroom instruction**
- **webinar**
- **conferences**
- **programs in house**
- **web-based training**
- **workshops**
- **work-place training**
- **American Nurses Association (ANA).**

List additional strategies

2. Models ethical behavior in the use of systems and data.

- **utilize HIMSS**
- **National Institute of Nursing Research (NINR)**
- **webinars**
- **conferences**
- **workshops**
- **workplace training**
- **self-study**
- **mentoring**
- **participation in root cause and event analysis groups**

List additional strategies

3.

Promotes the inclusion of nursing process workflow into the development of the system.

- **utilize Certified Commission for Healthcare Information Technology (CCHIT)**
- **American Nurses Informatics Association (ANIA)**
- **join IT workgroups**
- **organizations participate in vendor user groups,**
- **validate workflow analysis**
- **attend conferences**
- **workshops**
- **utilize workplace training**
- **self-study.**

List additional strategies

4. Discuss nurses involvement in the implementation of electronic health records.

- **develop an active superuser program**
- **network with EHR user groups**
- **HIMSS site**
- **HealthIT.gov site**
- **attend conferences**
- **workshops**
- **workplace training**
- **webinars**
- **journals**
- **organizations**

List additional strategies

5. Discuss the nurse's role in Evidence Based Practice (EBP).

- **utilize organizations**
- **conferences**
- **workshops**
- **workplace training**
- **self-study**
- **teach how to run/review reports**
- **professional practice workshops**
- **HIMSS**
- **Doctor's Office Quality Information Technology EHR Adoption tools (http://www.ddcmultimedia.com/doqit/roadmap.html).**

List additional strategies

6. Reviews documentation and work processes for adherence to national accreditation standards such as The Joint Commission.

- **participate in conferences**
- **workshops**
- **programs in house**
- **tracers**
- **develop staff education related to where to find certain items/documenations**
- **event analysis**
- **workflow analysis**
- **HIMSS**
- **The Joint Commission elements of participation**
- **HealthIT.gov**
- **Agency for Healthcare Research and Quality (AHRQ).**

List additional strategies

7. Join nursing organizations that foster the development of informatics skills.

- **attend conferences**
- **workshops**
- **webinars**
- **participate in ANIA, AHIMA, and HIMSS**
- **seek certifications**

List additional strategies

8. Determine nursing responses after analysis of monitoring electronic data.

- **participate in self-study**
- **web-based training**
- **workplace training**
- **conferences and workshops**
- **utilize surveys with pre and post results**
- **HIMSS**
- **organizations**
- **programs in-house**

List additional strategies

9. Discuss closed loop medication administration process.

- **review compliance with Bar Code Medication Administration (BCMA) results**
- **Medication Reconciliation compliance**
- **superuser/trainer role**
- **particpation in medication safety training and groups**
- **HIMSS**
- **vendor user groups**
- **conferences**
- **networking**
- **programs in-house**
- **conferences**
- **webinars**
- **workshops**
- **workplace training**
- **self-study**
- **webinars**

List additional strategies

10. Explain nursing process/diagnosis proficiency using Information Systems.

- **workshops**
- **conferences**
- **webinars**
- **participate in workplace training**
- **web-based training**
- **coursework**
- **self-study**
- **assess staff prior totraining with EHR**
- **repeat post**
- **organizations**
- **vendor user groups**

List additional strategies

11. Describe the term Meaningful Use (MU).

- **utilize conferences**
- **workshops**
- **webinars**
- **workplace training**
- **develop educational offerrings for nursing staff to help them understand what MU is.**
- **develop educational offerrings for nursing staff to help them understand how they impact the success of the program.**
- **self-study**
- **network**
- **informational website**
- **HIMSS**
- **organizational projects**
- **MU guidelines**

List additional strategies

12. Discuss impact of legislation, research, and economics on nursing informatics.

- **Centers for Disease Control and Prevention website article entitled Electronic Health Records: What's in it for Everyone? (http://www.cdc.gov/cdcgrandrounds/archives/2011/july2011.htm)**
- **conferences**
- **workshops**
- **utilize workplace training**
- **organizations**
- **HIMSS**
- **self-study**
- **informatics journals**
- **nursing journals**

List additional strategies

4. Strategies for Educator/Facilitator Role Competencies

Directions: Review the list of strategies for developing each competency. Some strategies listed are very general such as "conferences" or "webinars". Add additional strategies in the open text box where necessary, but please be specific.

1. Discuss web-based learning and learning management systems-related material with lecture, clinicals, and skills labs.

- **conferences**
- **workshops**
- **workplace training**
- **self-study**
- **utilize eLearning for staff**
- **educational classes on ELM development**
- **HIMSS**
- **attend multiple conferences with different input**

List additional strategies

2. Identify learner needs and monitor learner progress using learning management systems.

- **conferences**
- **workshops**
- **workplace training**
- **self-study**
- **educational classes on ELM development**
- **HIMSS**
- **workflow observation**
- **observation**
- **chart review**

List additional strategies

3. Designs tools for delivering instruction such as handouts, web-based training, lectures, over-the-shoulder support.

- **conferences**
- **workshops**
- **workplace training**
- **self-study**
- **superuser/trainer role**
- **HIMSS**
- **networking**
- **vendor groups**
- **education classes**
- **observation of workflow**
- **resource books**

List additional strategies

4. Explain electronic data to analyze and assist with delivery of care.

- **chart review**
- **lectures**
- **journals**
- **NI Research Journal**
- **conferences**
- **workshops**
- **workplace training**
- **self-study**
- **HIMSS.**

List additional strategies

5. Determine levels of IT/informatics knowledge and skills needed by nurses.

- **adult learning principles**
- **HIMSS**
- **educational classes on ELM development**
- **educational classes on survey development**
- **develop Nursing Informatics council to create strategy for education staff**
- **identify learning needs**
- **conferences**
- **workshops**
- **workplacetraining**
- **self-study**

List additonal strategies

6. Explain an electronic health record (EHR) system.

- **ongoing education related to the EHR**
- **ongoing education on how staff impacts accuracy for the electronic health record**
- **coursework**
- **HIMSS**
- **vendor user groups**
- **organizations**
- **conferences**
- **workshops**
- **workplace training**
- **self-study**

List additional strategies

7. Communicate resources in web-based learning and learning management systems.

- **programs developed in-house**
- **HIMSS**
- **conferences**
- **workshops**
- **workplace training**
- **self-study**

List additional strategies

8. Access and use learning repositories to facilitate learning.

- **tutorials/web-based training**
- **Merlot.org**
- **HIMSS**
- **networking**
- **conferences**
- **published resources**
- **conferences**
- **workshops**
- **workplace training**
- **self-study**

List additional strategies

9. Foster the initiation of individualized plans of care with services and treatments to meet patient's needs and achieve positive outcomes through the use of EHRs.

- **conferences**
- **workshops**
- **workplace training**
- **self-study**
- **involve staff nurses in development of care plans**
- **HIMSS**
- **programs developed in-house**
- **tools developed in-house**

List additional strategies

10. Discuss information technology as an tool of instruction and an instructional medium for problem solving.

- **conferences**
- **workshops**
- **workplace training**
- **self-study**
- **coursework**
- **HIMSS**
- **web-based training**

List additional strategies

11. Establish individual NPD Specialists development time to explore information technology capabilities and informatics proficiency.

- **conferences**
- **workshops**
- **webinars**
- **workplace training**
- **self-study**
- **HIMSS**

List additional strategies

12. Identify online healthcare and informatics continuing education programs.

- **conferences**
- **workshops**
- **workplace training**
- **self-study**
- **provide links to ANIA, ANA, HIMSS educational offerrings on hospital nursing page**
- **websites**
- **journals**
- **HIMSS**
- **networking**
- **webinars**
- **web searches**
- **conferences**
- **web-based training**

List additional strategies

13. Identify national registries to access health, medical, and drug data.

- **conferences**
- **workshops**
- **workplace training**
- **self-study**
- **websites**
- **HIMSS**
- **organizations**

List additional strategies

5. Strategies for Researcher Role Competencies

Directions: Review the list of strategies for developing each competency. Some strategies listed are very general such as "conferences" or "webinars". Add additional strategies in the open text box where necessary, but please be specific.

1. Analyze research on impact of informatics on nursing practice.

- **conferences**
- **workshops**
- **workplace training**
- **self-study**
- **involvement in ANIA**
- **HIMSS**
- **coursework**
- **web-based training**

List additional strategies

2. Use online nursing databases to facilitate research.

- **conferences**
- **workshops**
- **workplace training**
- **self-study**
- **EBSCO host**
- **Cumulative Index to Nursing and Allied Health (CINAHL) available to staff**
- **tutorials**
- **working with SMEs**

List ways to develop or achieve the above competency.

3. Support efforts and use of a unified nursing language.

- **conferences**
- **workshops**
- **workplace training**
- **self-study**
- **utilizing Dr. Virginia Saba model for Care Plan project**
- **IT workgroups**
- **HIMSS**
- **organizations**

List additional strategies

4. Provides for efficient data collection utilizing Information Systems.

- **conferences**
- **workshops**
- **workplace training**
- **self-study**
- **enhanced report development**
- **coursework on report-writing**
- **tutorial on facilities Enterprise Data Warehouse (EDW)**
- **HIMSS**
- **working with SMEs**
- **conferences**
- **organizations**

List additional strategies

6. Closing, Your Signature

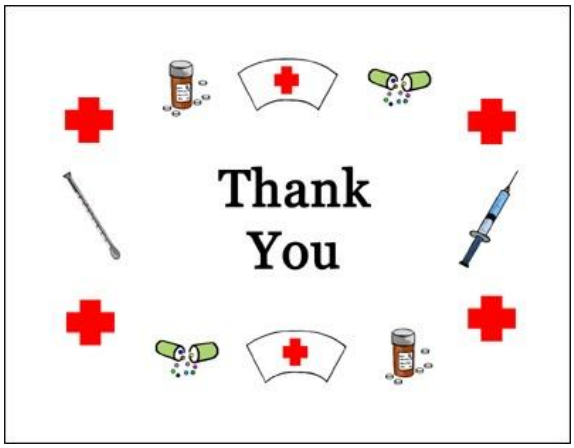
1. Email Address: Enter email address to receive a copy of study results.

2. Comments: Please list any comments, questions, concerns regarding this questionnaire or study.

This completes data collection for this study.

Data will be analyzed and results will be distributed Fall 2014.

A sincere"Thank You" for your time and sharing your expertise.



APPENDIX J

DELPHI ROUND 1: EXPERT CHAMPIONS DEMOGRAPHIC INVENTORY

Participant	Current Role	State of Res	NPD Experience - Years	Healthcare Setting Experience	IT Experience - Years	Degree(s) in IT Informatics	Degree(s)	Certification(s) in IT/Informatics
EC1	Manager, EHR Education	TX	13-16	Hospital, Home-care, Corporate	5 to 8		BSN, MBA	
EC2	Clinical Informatics Educator	NJ	5 to 8	Hospital, Ambulatory care	9 to 12	MSN - Nursing Informatics - currently pursuing DNP	RN Diploma, BA Nursing,MSN Nursing Informatics	ANCC - RN-C (Informatics)
EC4	Education Coordinator	MA	5 to 8	Hospital	5 to 8			
EC5	Clinical Educator	OH	17-20	Hospital	13-16		BSN, MSN	
EC6	Nurse Informaticist	CA	5 to 8	Hospital	9 to 12		ADN, BSN	
							BSN, MS, Instructional ADN Performance Technology (organizational performance	
EC7	Team Lead, Optimization Educatio	TX	5 to 8	Hospital	9 to 12		ADN workplace learning)	
								AHIMA Certified Healthcare Technology
PC4/CE8	nurse Clinical Educator	TX	5 to 8	Hospital, Home-care, Ambulator	9 to 12		RN	Specialist Clinician/Practitioner
EC9	RN	AZ	1 to 4	Hospital	1 to 4	AAS Computer Information Systems	ADN, BSN, Masters Nursing	Computer Information Systems
							AS Nursing, BSN Nursing, MSN Clinical	
EC10	Director of Clinical Informatics	FL	9 to 12	Hospital, Hospice	9 to 12	MSN Clinical Systems Management	Systems Management	ANCC certified Nursing Informatics
							ADN Nursing, BA Psychology, MS Nursing	
EC11	Hospital Operations Administrator, F	IN	1 to 4	Hospital, Home-care, Ambulator	1 to 4	MS in Nursing Informatics	Informatics	
						Walden, MSN - Informatics, graduate July	Bachelors in Exercise Science, Bachelor	
EC12	Clinical Systems Analyst RN	IN	1 to 4	Hospital, Home-care, MR/DD gr	1 to 4	2014	Nursing, Masters Nursing Informatics	
EC13	Clinical Analyst	FL	13-16	Hospital	13-16			
EC14	RN - Clinical Analyst	TX	9 to 12	Hospital	9 to 12	MSN with Nursing Informatics certificate	MSN, BSN, Nursing Diploma	CPHIMS, CHTS -CP
							Master of Science, Nursing: Health Systems	
EC15	Associate Project Director	IL	5 to 8	Hospital, Quality Improvement C	5 to 8		Management, MBA, Health Administration	ANCC
							Bachelor of Science, Nursing, Master of	
EC16	Nursing Informatics Specialist	NH	13-16	Hospital	13-16	Master of Science, Nursing Administration	Science, Nursing Administration focus on NI	ANCC Board Certification NI
							BSN, Masters of Nursing, Master of Science	
EC17	Professional Development Specialis	CA	9 to 12	Hospital, Home-care	9 to 12	Master of Science Health Informatics	Health Informatics	
							Master of Science in Nursing, Nursing	
							Informatics, Doctor of Nursing Practice,	ANCC Board Certification in Nu Certified
EC19	Education Coordinator	MS	13-16	Hospital	13-16	Master of Science in Nursing, Nursing Informatics.	Nursing Informatics (graduation planned Dec 2014)	Professional in Health Information Management Systems
EC20	MSN, Clinical Analyst	NC	5 to 8	Hospital	9 to 12	MSN-Informatics	MSN-Informatics	
							Masters of Science in Nursing Informatics,	
EC21	Surginet/ SAM Administrator	MI	1 to 4	Hospital	1 to 4	Master of Science in Nursing Informatics	BSN, ADN	ANCC Board Certified in Nursing Informatics
EC23	RN-Informaticist	KY	5 to 8	Hospital	1 to 4	MSN in informatics	ADN, MSN	(RN-BC)
								ANCC Nurse Informatics certification; AHIMA
CD24	Regional Clinical Informaticist	CA	9 to 12	Hospital, Ambulatory care	9 to 12		BSN	Certified Healthcare Technology Specialist
EC25	Informatics Nurse Educator	TX	1 to 4	Hospital	> 20		BSN	Clinician
							MS in Healthcare Informatics, MN in Nursing	
EC26	RN EHR Clinical Expert	OR	1 to 4	Hospital, Home-care, Ambulator	9 to 12	MS in Healthcare Informatics	Education with Emphasis in Public Health, BSN Nursing	In progress
EC27	Clinical Informatics Educator	CA	1 to 4	Hospital	1 to 4		BSN, MSN	
							BSN, MS in Management/ADN	
EC28	Director Clinical Informatics Suppor	OR	13-16	Hospital	13-16		Organizational Leadership	
								Board Certified in Nursing Informatics
EC30	Staff Development Coordinator	OH	1 to 4	Hospital	5 to 8		RN, BSN	(ANCC)
EC31	Clinical System Trainer	MS	1 to 4	Hospital, Ambulatory care	1 to 4		BSN, MSN, MHA	
EC32	Professional Development Educato	MS	> 20	Hospital, Home-care, Ambulator	9 to 12		BSN, AAN	
EC33	Clinicial Informaticist	MN	1 to 4	Hospital	1 to 4	But I am in scholl for my DNP in Informatics master of science nursing healthcare		
EC34	SCI telehealth nurse coodinator	MO	1 to 4	Hospital	9 to 12	informatics, AAS computer networking	MS in nursing, BSBA business, BSN nursing	Windows, Novell certification
EC35	Workforce Development Co-Lead	CA	1 to 4	Hospital, Government VA Syste	13-16	MSN in informatics and Education	ADN, BA, MSN	ANCC Informatics Nurse
EC37	CNIO	TX	9 to 12	Hospital, Ambulatory care	9 to 12		MSN, BSN, ADN	RN-BC
EC38	MSN, RN ICU Professional Develo	TN	1 to 4	Hospital, Home-care, Academia	9 to 12		Diploma in Professional Nursing, BSN, MSN	
EC39	Director	TN	> 20	Hospital, Academia	> 20	PhD Nursing Informatics	BSN, MS in Nursing, PhD	ANCC Nursing Informatics
EC40	Nursing Informatics Specialist	PA	> 20	Hospital	> 20		BSN, MSN	Informatics Nurse (ANCC), CPHIMS
EC41	Clinical Systems Analyst	FL	5 to 8	Hospital	5 to 8		BSN, MSN	ANCC Nursing Informatics

APPENDIX K

DELPHI ROUND 1: MEDIAN COMPETENCY RATINGS

Role	Competency	Median
Change Agent/ Consultant	Discuss managing electronic information to establish evidence-based practice.	5.0
Change Agent/ Consultant	Observes and documents process flows analyzing existing system problems which impact nursing workflow.	5.0
Change Agent/ Consultant	Promotes adherence to privacy, confidentiality, patient rights, and HIPAA Privacy in the organization, health exchanges, or state/national registries.	5.0
Change Agent/ Consultant	Promotes the inclusion of nursing process workflow into the development of the system.	5.0
Change Agent/ Consultant	Discuss the impact of managing electronic information on all nursing roles.	5.0
Change Agent/ Consultant	Describe the importance of nursing representation and support in institution's Information Systems department.	5.0
Change Agent/ Consultant	Understand the value of healthcare information systems.	5.0
Change Agent/ Consultant	Ability of nurse leaders to be skilled in analytics to make real-time decisions.	5.0
Change Agent/ Consultant	Ability of nurse leaders to be skilled in the use of business intelligence tools such as real-time dashboards, report interpretation and decision support tools.	5.0
Change Agent/ Consultant	Ability to serve on a Go Live implementation team.	5.0
Change Agent/ Consultant	Ability to serve on a project team and/or clinical committees.	5.0
Change Agent/ Consultant	Ability to serve as liaison between clinical, administrative, educational and IT groups within the organization.	5.0
Change Agent/ Consultant	Executes testing scripts.	3.0
Change Agent/ Consultant	Uses applications to analyze data for forecasting and accreditation.	3.0
Change Agent/ Consultant	Ability to serve as a technical resource.	3.0
Change Agent/ Consultant	Ability to determine role-based access.	3.0

Leader	Project healthcare technology trends in nursing.	3.0
Leader	Grant access to patients to view their individual personal health record.	3.0
Leader	Provides remote end-user support.	3.0
Leader	Emphasize nursing process with electronic charting and care plans.	5.0
Leader	Models ethical behavior in the use of systems and data.	5.0
Leader	Reviews documentation and work processes for adherence to national accreditation standards such as The Joint Commission.	4.0
Leader	Describe the use of informatics in nursing practice	4.0
Leader	Join nursing organizations that foster the development of informatics skills.	4.0
Leader	Determine nursing responses after analysis of monitoring electronic data.	4.0
Leader	Explain nursing process/diagnosis proficiency using Information Systems.	4.0
Leader	Discuss closed loop medication administration process.	4.0
Leader	Describe the term Meaningful Use.	4.0
Leader	Discuss nurses' involvement in the implementation of electronic health records.	5.0
Leader	Discuss impact of legislation, research, and economics on nursing informatics.	4.0
Leader	Discuss the nurse's role in Evidence Based Practice (EBP)	5.0
Educator/Facilitator	Describe the Systems Life Cycle.	3.0
Educator/Facilitator	Builds system data elements and applications using vendor build tools.	2.0
Educator/Facilitator	Analyze software documentation.	3.0
Educator/Facilitator	Discuss web-based learning and learning management systems-related material with lecture, clinicals, and skills labs.	5.0
Educator/Facilitator	Explain electronic data to analyze and assist with delivery of care.	4.0
Educator/Facilitator	Explain an electronic health record system.	4.0

Educator/Facilitator	Determine levels of IT/informatics knowledge and skills needed by nurses.	4.0
Educator/Facilitator	Identify learner needs and monitor learner progress using learning management systems.	5.0
Educator/Facilitator	Communicate resources in web-based learning and learning management systems.	4.0
Educator/Facilitator	Establish individual NPD Specialists development time to explore information technology capabilities and informatics proficiency.	4.0
Educator/Facilitator	Discuss information technology as a tool of instruction and an instructional medium for problem solving.	4.0
Educator/Facilitator	Foster the initiation of individualized plans of care with services and treatments to meet patient's needs and achieve positive outcomes through the use of EHRs	4.0
Educator/Facilitator	Identify online healthcare and informatics continuing education programs.	4.0
Educator/Facilitator	Identify national registries to access health, medical, and drug data.	4.0
Educator/Facilitator	Access and use learning repositories to facilitate learning. Example: MERLOT.org	4.0
Researcher	Use online nursing databases to facilitate research.	4.0
Researcher	Support efforts and use of a unified nursing language.	4.0
Researcher	Provides for efficient data collection utilizing Information Systems.	4.0
Researcher	Manipulate data using statistical analysis software.	3.0
Researcher	Encourage participation in healthcare and IT vendor users' group	3.0
Researcher	Analyze research on impact of informatics on nursing practice.	4.0

APPENDIX L

STRATEGIES COLLECTED IN PRE-DELPHI AND DELPHI ROUNDS 1-3

Phase Collected	Participant	Development Strategy or Resource
Literature Review	Researcher	The Journal of Continuing Education in Nursing
Literature Review	Researcher	The Journal of Nursing Education
Literature Review	Researcher	The Journal of Nursing Staff Development
Literature Review	Researcher	The Journal for Nurses in Staff Development – author: NNSDO
Literature Review	Researcher	Nurse Educator
Literature Review	Researcher	The Journal of Nursing Administration
Literature Review	Researcher	Nursing Management
Literature Review	Researcher	Nursing Outlook
Literature Review	Researcher	Nursing & Healthcare
Literature Review	Researcher	The Journal of Continuing Education in the Health Professions
Literature Review	Researcher	Studies in continuing Education
Literature Review	Researcher	Online Journal of Nursing Informatics
Literature Review	Researcher	Association for Nursing Professional Development (ANPD), formerly National Nursing Staff Development Organization (NNSDO)
Literature Review	Researcher	American Society for Training and Development (ASTD)
Literature Review	Researcher	International Association for Continuing Education and Training (IACET)
Literature Review	Researcher	American Nurses Associations (ANA)
Literature Review	Researcher	UMMC School of Nursing Continuing Education

Literature Review	Researcher	American Nurses Credentialing Center (ANCC) Continuing Nursing Education (CNE)
Literature Review	Researcher	American Academy of Nursing (AAN)
Literature Review	Researcher	American Association of Colleges of Nursing (AACN)
Literature Review	Researcher	American Nurses Association (ANA)
Literature Review	Researcher	Technology Informatics Guiding Education Reform (TIGER)
Literature Review	Researcher	Commission on Collegiate Nursing Education (CCNE)
Literature Review	Researcher	National Council of State Boards of Nursing (NCSBN)
Literature Review	Researcher	National League for Nursing (NLN)
Literature Review	Researcher	NLN Accreditation Commission (NLNAC)
Literature Review	Researcher	NLN Continuing Education Provider Program
Literature Review	Researcher	Technology Informatics Guiding Education Reform (TIGER)
Literature Review	Researcher	Health Information Technology Scholars (HITS) program
Literature Review	Researcher	Educational Technology Information Management Advisory Council (ETIMAC)
Literature Review	Researcher	National Student Nurses Association (NSNA)
Literature Review	Researcher	American Nurses Credentialing Center (ANCC)
Literature Review	Researcher	Healthcare Education Association (HCEA)
Literature Review	Researcher	Professional Nurse Educator Group (PNEG)
Literature Review	Researcher	HIMSS Nursing Informatics Toolkit (http://www.himss.org/ResourceLibrary/genResourceDetailWebinar.aspx?ItemNumber=29772)
Literature Review	Researcher	Libraries - Online libraries
Literature Review	Researcher	Computer dealers

Literature Review	Researcher	Adult education programs
Literature Review	Researcher	read technical books and journals
Literature Review	Researcher	Videos and CD-ROMs
Literature Review	Researcher	Online help and manuals
Literature Review	Researcher	hire a formal tutor
Literature Review	Researcher	Others at work
Literature Review	Researcher	Looking over the shoulder of people who are doing different types of IT work
Literature Review	Researcher	user groups
Literature Review	Researcher	conferences and workshops
Literature Review	Researcher	summer institutes
Literature Review	Researcher	internships/apprenticeships
Literature Review	Researcher	on-the-job training
Literature Review	Researcher	self-taught
Literature Review	Researcher	professional visits and networking
Literature Review	Researcher	literature
Literature Review	Researcher	research
Literature Review	Researcher	networking with other professionals
Literature Review	Researcher	professional organizations
Literature Review	Researcher	The Nursing Informatics Competencies Self-Assessment (http://nursing-informatics.com/niassess/competencies.html)
Literature Review	Researcher	The TIGER Initiative website (http://www.thetigerinitiative.org/)

Literature Review	Researcher	make friends with IT department and staff that are technical and willing to share knowledge
Literature Review	Researcher	take technology courses (credit courses)
Literature Review	Researcher	create a website
Literature Review	Researcher	build a PC
Literature Review	Researcher	embrace a variety of software programs
Literature Review	Researcher	write a computer program
Literature Review	Researcher	be inquisitive
Literature Review	Researcher	be an avid reader
Literature Review	Researcher	use Big6 Approach to learn information and technology literacy (http://big6.com/media/freestuff/LMC_Big6-ICT_Curriculum_LMC_MayJune2010.pdf)
Pre-Delphi	Expert Validator	2014 TIGER Initiative Leadership Report (http://www.thetigerinitiative.org/docs/tigerinitiatiavefoundationreporttheleadershipimperative.pdf)
Pre-Delphi	Expert Validator	Nursing Informatics: Scope and Standards of Practice (ANA, 2008)
Pre-Delphi	Expert Validator	TIGER Competency Study (2007)
Pre-Delphi	Expert Validator	ANCC Role Delineation Study (2010)
Pre-Delphi	Expert Validator	QSEN Institute informatics research (http://qsen.org/competencies/pre-licensure-ksas/#informatics), (www.aacn.nche.edu/faculty/qsen/competencies.pdf)
Delphi Round 1	Expert Champion	conferences
Delphi Round 1	Expert Champion	webinars
Delphi Round 1	Expert Champion	literature searches
Delphi Round 1	Expert Champion	networking
Delphi Round 1	Expert Champion	working closely with IT department

Delphi Round 1	Expert Champion	ANIA listserv
Delphi Round 1	Expert Champion	Cerner System wide workgroups to develop systems
Delphi Round 1	Expert Champion	networking with IT user group
Delphi Round 1	Expert Champion	skills labs with manuals
Delphi Round 1	Expert Champion	develop manuals and training guides for staff
Delphi Round 1	Expert Champion	Cerner uCern Connect (https://www.ucern.com/)
Delphi Round 1	Expert Champion	HIMSS Conferences
Delphi Round 1	Expert Champion	Weekend Immersion in Nursing Informatics (WINI) Conference (http://www.icce.us/)
Delphi Round 1	Expert Champion	Subscribe to and read Nursing Informatics Journal (CIN)
Delphi Round 1	Expert Champion	ANCC Nursing Informatics Review course (for Nursing Informatics certification exam)
Delphi Round 1	Expert Champion	membership with HIMSS
Delphi Round 1	Expert Champion	membership with ANIA
Delphi Round 1	Expert Champion	Office of the National Coordinator of Health IT website (http://www.healthit.gov/)
Delphi Round 1	Expert Champion	EMR vendor sites
Delphi Round 1	Expert Champion	HIT certification sites
Delphi Round 1	Expert Champion	W3 schools online web tutorials (http://www.w3schools.com/)
Delphi Round 1	Expert Champion	web-based searches for nursing related issues
Delphi Round 1	Expert Champion	review nurse informatics job descriptions
Delphi Round 1	Expert Champion	HIMSS webinars
Delphi Round 1	Expert Champion	ANIA webinars

Delphi Round 1	Expert Champion	ANIA conference
Delphi Round 1	Expert Champion	membership with committee to assist in TIGER educational website
Delphi Round 1	Expert Champion	membership with sub-committee to further informatics education
Delphi Round 1	Expert Champion	use of interactive PowerPoint presentations targeted to specialty areas
Delphi Round 1	Expert Champion	Walden University
Delphi Round 1	Expert Champion	medical library - peer reviewed abstracts
Delphi Round 1	Expert Champion	you tube - project management courses
Delphi Round 1	Expert Champion	vendor Cerner user groups
Delphi Round 1	Expert Champion	networking with other health informatics professionals met through professional organization
Delphi Round 1	Expert Champion	networking with other health informatics professionals within the local community
Delphi Round 1	Expert Champion	engage in a project intended to solve real-world problems - ex: Use employer-provided e-learning on database design and development as a foundation and supplement that with books and developer forms to solve specific programming problems
Delphi Round 1	Expert Champion	eLearning Guild conference (http://www.elearningguild.com/content.cfm?selection = doc.24)
Delphi Round 1	Expert Champion	research journals about Human Factors Engineering (ergonomics, human engineering) in healthcare
Delphi Round 1	Expert Champion	read journal articles from sources outside nursing to bring a different perspective to problem solving.
Delphi Round 1	Expert Champion	network with Human Factor engineers
Delphi Round 1	Expert Champion	Take a job in the IT department to learn more about how to support EHR systems from a technical analysis perspective
Delphi Round 1	Expert Champion	work with an IT builder to learn more health IT system design
Delphi Round 1	Expert Champion	Centers for Medicare and Medicaid Services website (http://www.cms.gov/)
Delphi Round 1	Expert Champion	Meaningful Use http://www.healthit.gov; http://www.sms.gov; https://www.himss.org/meaningfuluse

Delphi Round 1	Expert Champion	peer to peer resources
Delphi Round 1	Expert Champion	vendor supported list servs
Delphi Round 1	Expert Champion	the ANIA-Caring network
Delphi Round 1	Expert Champion	local IT professionals
Delphi Round 1	Expert Champion	mentoring for HIMSS conferences
Delphi Round 1	Expert Champion	serve on Meaningful Use workgroup
Delphi Round 1	Expert Champion	speech preparation for national conferences
Delphi Round 1	Expert Champion	Twitter @Farzad_MD
Delphi Round 1	Expert Champion	CEUs
Delphi Round 1	Expert Champion	certification preparation
Delphi Round 1	Expert Champion	networking with Nurse Informaticist
Delphi Round 1	Expert Champion	collaborative work with educational institutions and healthcare institutions regarding NI competency education
Delphi Round 1	Expert Champion	current publications and articles
Delphi Round 1	Expert Champion	university setting lecture series on informatics topics
Delphi Round 1	Expert Champion	develop PowerPoint presentation for web-based teaching on: Charting by exception
Delphi Round 1	Expert Champion	Role of Nursing Informatics (http://www.himss.org/ResourceLibrary/GenResourceDetail.aspx?ItemNumber=26511)
Delphi Round 1	Expert Champion	validating healthcare websites
Delphi Round 1	Expert Champion	present at conferences
Delphi Round 1	Expert Champion	seek to writing opportunities in informatics books and journals

Delphi Round 1	Expert Champion	mentor others (students, colleagues)
Delphi Round 1	Expert Champion	membership in ANCC Content Expert Panel
Delphi Round 1	Expert Champion	nursing informatics lists
Delphi Round 1	Expert Champion	encourage healthcare organizations to utilize nurses with informatics background
Delphi Round 1	Expert Champion	learn what nursing informatics is and how it relates to individual roles
Delphi Round 1	Expert Champion	learn from IT personnel new technology on the horizon
Delphi Round 1	Expert Champion	join national organizations that help keep abreast to healthcare technology
Delphi Round 1	Expert Champion	study for Nursing Informatics certification
Delphi Round 1	Expert Champion	attend multiple conferences annually
Delphi Round 1	Expert Champion	online blogs and information regarding informatics
Delphi Round 1	Expert Champion	participate in a HIMSS sub-committee
Delphi Round 1	Expert Champion	join HIMSS Emerging Professionals group for Healthcare Informatics
Delphi Round 1	Expert Champion	join Nursing Informatics list serv
Delphi Round 1	Expert Champion	read ANA Scope and Standard of Practice for Nursing Informatics
Delphi Round 1	Expert Champion	Read Hebda and Czar Nursing Informatics Handbook
Delphi Round 1	Expert Champion	join Project Management Institute
Delphi Round 1	Expert Champion	Read the PMBOK (Project Management Body of Knowledge
Delphi Round 1	Expert Champion	Read Healthcare Information Technology Digest, iHealthBeat
Delphi Round 1	Expert Champion	participate in vendor user groups for software used
Delphi Round 1	Expert Champion	attend HIMSS, ANA, ANIA, an other institutions webinars

Delphi Round 1	Expert Champion	Nursing Informatics Boot Camp
Delphi Round 1	Expert Champion	Read Handbook of Informatics for Nurses and Healthcare Professionals
Delphi Round 1	Expert Champion	Read monthly Healthcare IT news
Delphi Round 1	Expert Champion	Receive weekly HIMSS emails
Delphi Round 1	Expert Champion	Informatics Nursing Exam Secrets (published by Morrison Media)
Delphi Round 1	Expert Champion	use screenshots of steps for end-user that struggle because of being less tech savvy
Delphi Round 1	Expert Champion	format information communication in as SBAR to be clear in explaining or translating issues between IT and clinician perspectives and to maintain a nursing informatics subspeciality in healthcare
Delphi Round 1	Expert Champion	work with regional Alarm Fatigue group to help minimize noise on nursing units
Delphi Round 1	Expert Champion	work with technical groups to integrate software and hardware
Delphi Round 1	Expert Champion	books in the Ball Hannah series
Delphi Round 1	Expert Champion	take a technical role such as a network technician, webmaster, or support analyst
Delphi Round 1	Expert Champion	work with system developers, analysts and IT project managers
Delphi Round 1	Expert Champion	SINI conferences
Delphi Round 1	Expert Champion	ANIA conferences
Delphi Round 1	Expert Champion	network with those from the field
Delphi Round 1	Expert Champion	watch conference presentations
Delphi Round 1	Expert Champion	attend webinars on a regular basis
Delphi Round 1	Expert Champion	not only belong to professional organizations but take advantage of the many benefits that they bring to professional development
Delphi Round 1	Expert Champion	become certified in NI

Delphi Round 1	Expert Champion	network on social media tools
Delphi Round 1	Expert Champion	volunteer to work on health informatics projects is a way to gain experience
Delphi Round 1	Expert Champion	use online learning system, Moodle to develop and deliver health informatics courses
Delphi Round 1	Expert Champion	use the Office of the National coordinator's community college level health information technology curriculum
Delphi Round 1	Expert Champion	American Medical Informatics Association (AMIA) courses
Delphi Round 1	Expert Champion	Jive social business software as an online collaboration site to facilitate interprofessional communication
Delphi Round 1	Expert Champion	deliver live on demand broadcasts on health informatics content
Delphi Round 1	Expert Champion	deliver health informatics leadership development content in a face to face format and via web conferences
Delphi Round 1	Expert Champion	align nursing orientation case studies with EHR training for reinforcing both the clinical expectation, system functionality, and clinical workflow
Delphi Round 1	Expert Champion	require a professional develop needs decision point in EHR implementation and optimization projects
Delphi Round 1	Expert Champion	NPD should include informaticists in annual competency planning
Delphi Round 2	Expert Champion	Learn how evidence-based practice can be embedded in the use of EHRs (through order sets, structured documentation forms, and valid tools for risk assessments). Learn about electronic measures through self-study or attending conferences, and workshops.
Delphi Round 2	Expert Champion	Quality council review of outcomes, Nosing Informatics department analytics
Delphi Round 2	Expert Champion	Group work with IT, Professional Development Workshops
Delphi Round 2	Expert Champion	Networking with vendor user groups
Delphi Round 2	Expert Champion	nursing scope and standards of care
Delphi Round 2	Expert Champion	conferences, webinars, web based training, organizations
Delphi Round 2	Expert Champion	memberships with ANIA and HIMSS to access evidence based methods. TIGER site for project result reviews

Delphi Round 2	Expert Champion	self study, conferences, workplace training
Delphi Round 2	Expert Champion	Developed through a interdisciplinary group from legal, compliance, IT, nursing, HIM and registration team
Delphi Round 2	Expert Champion	Informational Websites, Required ELMs
Delphi Round 2	Expert Champion	HIMSS
Delphi Round 2	Expert Champion	conferences, webinars,
Delphi Round 2	Expert Champion	webinars, resource books, web based training
Delphi Round 2	Expert Champion	ONC site, HIPAA site, familiarize staff with social media policies and the meaning and differences between confidentiality and privacy
Delphi Round 2	Expert Champion	workshops, conference, self-study, online resources
Delphi Round 2	Expert Champion	super users/SMEs work with the build team to insure what is built meets the unit needs
Delphi Round 2	Expert Champion	shadowing
Delphi Round 2	Expert Champion	HIMSS
Delphi Round 2	Expert Champion	networking
Delphi Round 2	Expert Champion	working with SME, vendors, organizations
Delphi Round 2	Expert Champion	Clinical experience and understanding of workflow. Analytic abilities.
Delphi Round 2	Expert Champion	workshops, conferences, self-study, online resources
Delphi Round 2	Expert Champion	committee or workgroup membership
Delphi Round 2	Expert Champion	HIMSS
Delphi Round 2	Expert Champion	understand workflow mapping and systems thinking
Delphi Round 2	Expert Champion	networking, vendor groups, hands on instruction
Delphi Round 2	Expert Champion	conferences, webinars, resource books, organizations

Delphi Round 2	Expert Champion	include the staff in the building and testing process as well as nursing leaders in the implementation process
Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	ELMs, Inclusion in house wide HIT groups
Delphi Round 2	Expert Champion	HIMSS
Delphi Round 2	Expert Champion	Literature, HIMSS
Delphi Round 2	Expert Champion	conferences/seminars
Delphi Round 2	Expert Champion	journals, web based training, working with SME's
Delphi Round 2	Expert Champion	attend webinars on HIS. Interdisciplinary care team education, available on Canvas site
Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	conferences, house wide committees
Delphi Round 2	Expert Champion	HIMSS
Delphi Round 2	Expert Champion	TIGER report
Delphi Round 2	Expert Champion	observation, networking, conferences
Delphi Round 2	Expert Champion	conferences, programs developed in house, organizations, web based training
Delphi Round 2	Expert Champion	utilizing department clinical educator with certification in HIT
Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	build team includes clinical staff
Delphi Round 2	Expert Champion	coursework, journals, IT organizations
Delphi Round 2	Expert Champion	HIMSS
Delphi Round 2	Expert Champion	Change management literature Org readiness experts

Delphi Round 2	Expert Champion	networking
Delphi Round 2	Expert Champion	organizations, conferences, working with SME, programs developed in house
Delphi Round 2	Expert Champion	nursing staff must be included early on the in the change process in the development and implementation of the EHR
Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	developing real time dashboards to demonstrate live data
Delphi Round 2	Expert Champion	Classes, Journals, Memberships in quality forums
Delphi Round 2	Expert Champion	HIMSS
Delphi Round 2	Expert Champion	hands-on classroom
Delphi Round 2	Expert Champion	webinars, conferences, web based training
Delphi Round 2	Expert Champion	clinical trainers need to understand and share whom to utilize the analytic abilities of an EMR to promote patient safety and outcome. Utilize web resources offered by the vendor for networking with users with similar needs as well as for education about analytics benefits
Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	monthly super user meetings to demonstrate upcoming changes, volunteer to develop changes
Delphi Round 2	Expert Champion	mentorships, shadowing
Delphi Round 2	Expert Champion	Vendor workgroups
Delphi Round 2	Expert Champion	project management skills
Delphi Round 2	Expert Champion	networking, hands on classroom
Delphi Round 2	Expert Champion	organizations, webinars, programs in house, web based training
Delphi Round 2	Expert Champion	Getting credentialed in several of the paths the system offers. Site visits and observation of EHR utilization in other facilities.

Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	ELMs, coursework, workshops, interactive dashboard classes
Delphi Round 2	Expert Champion	HIMSS
Delphi Round 2	Expert Champion	training in tools
Delphi Round 2	Expert Champion	classroom instruction on webinar
Delphi Round 2	Expert Champion	webinars, programs i9n house, web based training
Delphi Round 2	Expert Champion	advance training is needed in addition to the basis go live training for leaders to really benefits and understand dashboards functionality and benefits. Provide concrete example based on studies on how utilizing instead of ignoring alerts benefits the patient
Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	Internships, member at large in house wide committees
Delphi Round 2	Expert Champion	HIMSS
Delphi Round 2	Expert Champion	Project management skills, experience
Delphi Round 2	Expert Champion	web based training, working with SME's, journals
Delphi Round 2	Expert Champion	Individuals should be encouraged to serve but should not be force to as this will not be beneficial to the project. A focused and detailed project leader is a great asset to stakeholders participation
Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	Coursework, mentoring, shadowing
Delphi Round 2	Expert Champion	HIMSS
Delphi Round 2	Expert Champion	Study Clinical Informatics
Delphi Round 2	Expert Champion	networking, classroom instruction, workflow observation
Delphi Round 2	Expert Champion	conferences, webinars, web based training, organizations

Delphi Round 2	Expert Champion	obtain a HIT certification i.e. CHTS-CP (AHIMA)
Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	coursework, super user role
Delphi Round 2	Expert Champion	Vendor user groups
Delphi Round 2	Expert Champion	classroom instruction, online learning, webinar
Delphi Round 2	Expert Champion	conferences, programs in house, web based training
Delphi Round 2	Expert Champion	ANA
Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	mentoring, participation in root cause and event analysis groups
Delphi Round 2	Expert Champion	HIMSS
Delphi Round 2	Expert Champion	webinars
Delphi Round 2	Expert Champion	National Institute of Nursing Research (www.ninr.nih.gov)
Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	validate workflow analysis
Delphi Round 2	Expert Champion	IT workgroup membership
Delphi Round 2	Expert Champion	Vendor user groups, HIMSS
Delphi Round 2	Expert Champion	workflow analysis, vendor groups, networking
Delphi Round 2	Expert Champion	conferences, webinars, organizations
Delphi Round 2	Expert Champion	CCHIT, ANIA
Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study

Delphi Round 2	Expert Champion	Develop active super user program
Delphi Round 2	Expert Champion	coursework, EMR user groups
Delphi Round 2	Expert Champion	HIMSS
Delphi Round 2	Expert Champion	networking, conferences,
Delphi Round 2	Expert Champion	conferences, webinars, organizations, journals
Delphi Round 2	Expert Champion	HealthIT.gov
Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	Teach how to run/review own reports
Delphi Round 2	Expert Champion	professional practice workshops
Delphi Round 2	Expert Champion	HIMSS
Delphi Round 2	Expert Champion	organizations, conferences, resource books
Delphi Round 2	Expert Champion	ddcmultimedia.com/doqit/EHR_Adoption
Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	Participate in tracers, develop staff education related to "where to find..."
Delphi Round 2	Expert Champion	participation in tracers, event analysis
Delphi Round 2	Expert Champion	HIMSS
Delphi Round 2	Expert Champion	TJC elements of participation, workflow analysis
Delphi Round 2	Expert Champion	working with SME, programs in house, organizations, webinars
Delphi Round 2	Expert Champion	TJC, Healthit.gov, AHRQ.gov
Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study

Delphi Round 2	Expert Champion	Encourage membership in NI organizations, ANIA, HIMSS,
Delphi Round 2	Expert Champion	incentives for organization participation and certification
Delphi Round 2	Expert Champion	HIMSS
Delphi Round 2	Expert Champion	conferences, webinars, web based training
Delphi Round 2	Expert Champion	ANIA, AHIMA, HIMSS
Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	Utilization of surveys with pre and post results
Delphi Round 2	Expert Champion	survey development groups, informal interviews with end-users
Delphi Round 2	Expert Champion	HIMSS
Delphi Round 2	Expert Champion	organizations, programs in house , web based training
Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	assessment of staff prior to training with EHR, repeat post
Delphi Round 2	Expert Champion	coursework
Delphi Round 2	Expert Champion	Vendor user groups
Delphi Round 2	Expert Champion	conference, webinars, web based training, organizations
Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	Review of compliance with BCMA results, Medication Reconciliation compliance
Delphi Round 2	Expert Champion	super user/trainer role, participation in medication safety training/groups
Delphi Round 2	Expert Champion	HIMSS, Vendor user groups
Delphi Round 2	Expert Champion	vendor groups, conferences, networking

Delphi Round 2	Expert Champion	programs in house, conferences, webinars
Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	Develop a series of educational offerings for nursing staff to help them understand what MU is and how they impact the success of the program
Delphi Round 2	Expert Champion	informational website, organizational projects
Delphi Round 2	Expert Champion	MU guidelines, webinars, networking
Delphi Round 2	Expert Champion	conferences, webinars
Delphi Round 2	Expert Champion	HIMMS
Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	informatics journals, nursing journals
Delphi Round 2	Expert Champion	HIMSS
Delphi Round 2	Expert Champion	conferences, organizations, web based training
Delphi Round 2	Expert Champion	CDC.gov: EHR: What's in it for Everyone
Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	Utilize eLearning for staff
Delphi Round 2	Expert Champion	educational classes on ELM development
Delphi Round 2	Expert Champion	HIMSS
Delphi Round 2	Expert Champion	attend multiple conferences with different input
Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	educational classes on ELM development
Delphi Round 2	Expert Champion	HIMSS

Delphi Round 2	Expert Champion	workflow observation,
Delphi Round 2	Expert Champion	observation and chart review
Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	super user/trainer role
Delphi Round 2	Expert Champion	HIMSS
Delphi Round 2	Expert Champion	networking, vendor groups, conferences, education classes
Delphi Round 2	Expert Champion	observation of work flow, conferences and resource books
Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	lectures, journals, esp. NI research
Delphi Round 2	Expert Champion	HIMSS
Delphi Round 2	Expert Champion	chart review, conferences
Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	Developed Nursing Informatics Council to create strategy for education staff and identifying learning needs
Delphi Round 2	Expert Champion	educational classes on ELM development and survey development
Delphi Round 2	Expert Champion	HIMSS
Delphi Round 2	Expert Champion	adult learning principles
Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	Ongoing education related to the EHR and how staff impacts accuracy for the record
Delphi Round 2	Expert Champion	coursework
Delphi Round 2	Expert Champion	HIMSS, vendor user groups

Delphi Round 2	Expert Champion	conferences, organizations
Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	HIMSS
Delphi Round 2	Expert Champion	programs developed in house
Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	tutorials (website)
Delphi Round 2	Expert Champion	HIMSS
Delphi Round 2	Expert Champion	networking, conferences, published resources
Delphi Round 2	Expert Champion	web based training
Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	Involve staff nurses in development care plan with staff nurses
Delphi Round 2	Expert Champion	HIMSS
Delphi Round 2	Expert Champion	programs and tools developed in house
Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	coursework
Delphi Round 2	Expert Champion	HIMSS
Delphi Round 2	Expert Champion	web based training
Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	HIMSS
Delphi Round 2	Expert Champion	webinars

Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	Provide links to ANIA, ANA, HIMSS educational offerings on hospital nursing page
Delphi Round 2	Expert Champion	websites, journals
Delphi Round 2	Expert Champion	HIMSS
Delphi Round 2	Expert Champion	networking, webinars, web search
Delphi Round 2	Expert Champion	conferences, web based training
Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	websites
Delphi Round 2	Expert Champion	HIMSS
Delphi Round 2	Expert Champion	organizations and conferences
Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	Involvement in ANIA, HIMSS
Delphi Round 2	Expert Champion	coursework
Delphi Round 2	Expert Champion	HIMSS
Delphi Round 2	Expert Champion	web based training
Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	EBSCO host, CINAHL available to staff
Delphi Round 2	Expert Champion	tutorials
Delphi Round 2	Expert Champion	not sure
Delphi Round 2	Expert Champion	working with SME's

Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	Utilizing Dr. Virginia Saba as model for Care Plan project
Delphi Round 2	Expert Champion	IT workgroups
Delphi Round 2	Expert Champion	HIMSS
Delphi Round 2	Expert Champion	organizations
Delphi Round 2	Expert Champion	conferences, workshops, workplace training, self-study
Delphi Round 2	Expert Champion	Enhanced report development
Delphi Round 2	Expert Champion	coursework on report-writing, tutorial on facilities' EDW
Delphi Round 2	Expert Champion	HIMSS
Delphi Round 2	Expert Champion	working with SMES, conferences and organizations
Delphi Round 3	Expert Champion	additional National Nursing Organizations
Delphi Round 3	Expert Champion	learn how to use software to document workflow, use AHIMA free online training materials on workflow and process documentation, shadow regular users to gain more detailed knowledge of particular systems
Delphi Round 3	Expert Champion	partner with IT colleague, review materials available through HIMSS Nursing Informatics Task Force, volunteer as a stakeholder and active participant at the facility level, encourage interdisciplinary care teams
Delphi Round 3	Expert Champion	Nursing Informatics Boot Camp
Delphi Round 3	Expert Champion	Nursing Informatics Boot Camp
Delphi Round 3	Expert Champion	Review HIMSS Future of Nursing position statement
Delphi Round 3	Expert Champion	establish familiarity with reviewing multiple types of data, including clinical quality, finance, and productivity
Delphi Round 3	Expert Champion	change management training

Delphi Round 3	Expert Champion	training in usability, advance training to understand the inputs to business intelligence tools, evaluate data quality, and interpret significant of report
Delphi Round 3	Expert Champion	interprofessional training
Delphi Round 3	Expert Champion	utilize change management and other theories
Delphi Round 3	Expert Champion	stakeholder in templates creation and testing
Delphi Round 3	Expert Champion	ANA Code of Ethics, lead by example mentoring models, stay informed and current with HIPAA rules
Delphi Round 3	Expert Champion	Nursing Informatics Boot Camp
Delphi Round 3	Expert Champion	Nursing Informatics Boot Camp
Delphi Round 3	Expert Champion	work with pharmacy department
Delphi Round 3	Expert Champion	HealthIT.gov, utilize CMS EHR Incentive Programs website, attend QualityNet training webinars differentiating MU and IQR, leverage the Meaningful Use Whiteboard form the Advisory Board
Delphi Round 3	Expert Champion	journals include Online Journal of Nursing Informatics (HIMSS); Health Affairs, Nursing Economics, Participate in public comment on legislation and policy through HIMSS Nursing Informatics Workgroup
Delphi Round 3	Expert Champion	annual survey
Delphi Round 3	Expert Champion	learn software such as Adobe and Microsoft Office, software training in Microsoft Office Suite, familiarize self with adult learning theory, books, articles, websites
Delphi Round 3	Expert Champion	read JAMIA
Delphi Round 3	Expert Champion	survey software such as Survey Monkey, evaluate nursing competency using QSEN and TIGER competencies for baccalaureate and masters prepared nurses, establish and routinely evaluate IT/Informatics competencies, leveraging sample materials provided on QSEN
Delphi Round 3	Expert Champion	AMIA, leverage ONC's health IT workforce training materials available through AMIA or healthit.gov
Delphi Round 3	Expert Champion	MOOCs

Delphi Round 3	Expert Champion	Nursing Informatics Boot Camp
Delphi Round 3	Expert Champion	certification in nursing informatics
Delphi Round 3	Expert Champion	CIN Journal, participate in hospital research committee, review articles in JAMIA, Health Affairs, Applied Clinical Informatics, JAMA, BMJ, JONA
Delphi Round 3	Expert Champion	literature search techniques, develop competency with reference management tools
Delphi Round 3	Expert Champion	Attend ANA's annual Nursing Big Data conference; develop familiarity with standard vocabularies, specifically SNOMEDCT and LOINC, and articulate their role in structuring nursing assessments and interventions; participate in trials evaluating mapping of nursing documentation to standard vocabularies

APPENDIX M

PERMISSION TO USE COMPETENCIES FROM ANCC INFORMATICS ROLE DELINEATION STUDY

From: lee.skinner@ana.org Lee Skinner
To:
Date: Mon, 7 Apr 2014 08:27:38 -0500
Subject: RE: Request for Electronic Data from Role Delineation Study

Good day!

Thanks for your email below and your kind words about the Nursing Informatics Role Delineation study. Please know the RDS summary report on the ANCC website is available to you for your research if proper credit is given to ANCC in any written materials. Please know the raw data and final results are only included in our comprehensive RDS report and that is considered confidential. Sorry I am not able to release that to you but I do wish you the best of luck with your project.

Lee

From: Tammy Means [mailto:tlbmeans@gmail.com]
Sent: Friday, April 04, 2014 10:00 PM
To: Lee Skinner
Subject: Request for Electronic Data from Role Delineation Study

Hello, I received your contact information from Melissa Barthold. I am a student at the University of Southern Mississippi completing a dissertation study entitled A Study Identifying Information Technology Development Strategies for Nursing Professional Development Specialists Practicing in Healthcare Settings.

The goals of my study is to:
1) validate informatics competencies for hospital nurse educators
2) identify strategies for developing informatics/IT competency in hospital nurse educators

I have read the ANCC Nursing Informatics Role Delineation study. It is truly a GREAT study that meets the demands for present day informatics-infused healthcare settings.. The data in the ANCC Role Delineation study will be of value to my dissertation study. I would like to ask your permission for the raw data, final results based on each participant, possibly in spreadsheet format. I especially want to analyze the responses of the 16 nurse educators who responded to this study. Is this possible?

If the requested data is shared with me, I will give credit in my dissertation to the ANCC.

Thank you for your time.

Sincerely,
Tammy L. Means, MS, PhD Candidate
Department of Human Capital Development
The University of Southern Mississippi
Hattiesburg, MS
Email: tammy.baker@eagles.usm.edu<mailto:tammy.baker@eagles.usm.edu>
Phone: 601-434-3457

APPENDIX N

UNIVERSITY OF SOUTHERN MISSISSIPPI

INSTITUTIONAL REVIEW BOARD APPROVAL

INSTITUTIONAL REVIEW BOARD
118 College Drive #5147 | Hattiesburg, MS 39406-0001
Phone: 601.266.5997 | Fax: 601.266.4377 | www.usm.edu/research/institutional-review-board

NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months.
  Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: **13120401**
PROJECT TITLE: **A Study Identifying Information Technology Development Strategies for Nursing Professional Development Specialists in Healthcare Settings**
PROJECT TYPE: **New Project**
RESEARCHER(S): **Tammy Means**
COLLEGE/DIVISION: **College of Science and Technology**
DEPARTMENT: **Human Capital Development**
FUNDING AGENCY/SPONSOR: **N/A**
IRB COMMITTEE ACTION: **Expedited Review Approval**
PERIOD OF APPROVAL: **02/24/2014 to 02/23/2015**

Lawrence A. Hosman, Ph.D.
Institutional Review Board

APPENDIX O

PERMISSION TO CONDUCT STUDY WITH HIMSS ORGANIZATION

HIMSS NURSING INFORMATICS COMMUNITY

CHICAGO, IL

1/6/2014

Ms. Tammy L. Means
14060 North White Swan Drive
Gulfport, MS 39503

Tammy:

Please accept this letter as affirmation granting you permission to conduct research on essential information technology (IT) competencies and strategies for developing IT competency among Nursing Professional Development Specialists.

I am delighted that you will be conducting such a profound research with the HIMSS NI community.

I hope that your research and findings will be beneficial to you. It is indeed a pleasure to assist you in your doctoral research. Should you need additional information, feel free to give me a call at 312.915.9520 or email canderson@himss.org

Cordially,

Christel Anderson, MA
HIMSS Director Clinical Informatics

REFERENCES

Agency for Health Research and Quality [AHRQ]. (2004). *Literacy and health outcomes*. Retrieved from http://archive.ahrq.gov/clinic/epcsums/litsum.htm.

Alexander, J. A., Ramsay, J. A., & Thomson, S. M. (2004). Designing the health workforce for the 21st century. *Medical Journal of Australia*, *180*(1), 7-9. doi:10.1.1.157.3565&rep=rep1&type=pdf

Alpay, L., & Russell, A. (2002). IT training in primary care: The nurses' voice. *Computer Informatics Nursing, 20*(4), 136-142. doi:10.1097/00024665-200207000-00008

Alquraini, H., Alhashem, A. M., Shah, M. A., & Chowdhury, R. I. (2007). Factors influencing nurses' attitudes towards the use of computerized health information systems in Kuwaiti hospitals. *Journal of Advanced Nursing, 57*(4), 375-381. doi:10.1111/j.1365-2648.2007.04113.x

American Health Information Management Association (AHIMA). (2006). *Building the workforce for health information transformation*. Retrieved from http://www.amia.org/

American Nurses Association [ANA]. (2001). *Scopes and standards of nursing informatics practice*. Washington, DC: American Nurses Association.

American Nurses Association [ANA]. (2008). *Nursing informatics: Scope and standards of practice.* Washington, DC: American Nurses Association.

American Nurses Association [ANA]. (2010). *Nursing professional development: Scopes and standards of practice*. Washington, DC: American Nurses Association.

American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, § 3005 (2009). Retrieved from http://www.gpo.gov/

American Society for Training and Development. (2006, March). *ASTD learning system user's guide ,* Module 4, *Measuring and Evaluating*. Alexandria, VA: ASTD Press.

Anderson, C., & Sensmeier, J. (2011). TIGER Initiative—roaring into 2011 with a new communication vehicle. *CIN: Computers, Informatics, Nursing*, *29*(3), 199-200. doi:10.1097/NCN.0b013e318216e611

Anderson, G. F, Frogner, B. K., Johns, R. A., & Reinhardt, U. E. (2006). Health care spending and use of IT in OECD countries. *Health Affairs: The Policy Journal of the Health Sphere*, *25*(3), 819-831. doi:10.1377/hlthaff.25.3.819

Anderson, R. H., & Bikson, T. K. (1998). Focus on generic skills for IT literacy. Workshop conducted at a conference of the National Research Council, Irvine, California. Retrieved from http://www.rand.org/

Agrawal, A. (2009). Medication errors: prevention using IT systems. *British Journal of Clinical Pharmacology*, *67*(6), 681-686. doi:10.1111/j.1365-2125.2009.03427.x

Armstrong, M. L. (1986). Present and future computer competencies for nurse educators in basic and continuing education (Doctoral dissertation). East Texas State University, United States–Texas. (Publication No. AAT 8614718).

Armstrong, M. L. (1987). Before Instructional Information Systems Must Come Computer Competent Nurse Educators. In *Proceedings Annual Symposium*

Computers Applications Medical Care, p. 421–424. Retrieved from http://www.ncbi.nlm.nih.gov/

Armstrong, M. L. (1989). Computer competencies identified for nursing staff development educators. *Journal of Nursing Staff Development*, *5*(4), 187-191.

Ash, J. S., & Bates, D. W. (2004). Factors and forces affecting EHR system adoption: Report of a 2004 ACMI discussion. *Journal of American Medical Informatics Association*, *12*(1), 8-12. doi:10.1197/jamia.M1684

Avillion, A. E. (2008). A p*ractical guide to staff development: Evidence-based tools and techniques for effective education*. Danvers, MA: HCPro, Inc.

Avillion, A. E. (2011). *Professional growth in staff development: Strategies for new and experienced educators*. Danvers, MA: HCPro, Inc.

Bastable, S. B. (2008). *Nurse as educator: Principles of teaching and learning for nursing practice* (3rd ed.). Sudbury, MA: Jones and Bartlett Publishers.

Becker, G. S. (1962). Investment in Human Capital: A Theoretical Analysis. *The Journal of Political Economy*, *70*(5), 9-49. doi:10.1086/258724

Benner, P. (1982). From novice to expert. *The American Journal of Nursing*, *82*(3), 402-407. doi:10.1177/074171369904900401

Benner, P. (1984). *From novice to expert: Excellence and power in clinical nursing practice*. Reading, MA Addison-Wesley Publishing Company.

Benner, P. (2001). *From novice to expert: Excellence and power in clinical nursing practice* (commemorative edition). Upper Saddle River, NJ: Prentice Hall.

Blumenthal, D. (2009). Stimulating the adoption of health IT. *The New England Journal of Medicine*, *360*(15), 1477-1479. doi:10.1056/NEJMp0901592

Blumenthal, D. (2011). Wiring the health system – origins and provisions of a new Federal program, *The New England Journal of Medicine, 365*(24), 2323-2329. doi:10.1056/NEJMsr1110507

Blumenthal, D., & Tavenner, M. (2010). The "MU" regulation for electronic health records, *The New England Journal of Medicine*, *363*(6), 501-504.

Bruce, S. L. (2009). *Core curriculum for staff development*. Pensacola, FL: National Nursing Staff Development Organization.

Brunt, B. A. (2005). *Identifying performance criteria for staff development competencies.* (Unpublished dissertation). University of Dundee, Scotland.

Brunt, B. A. (2007). *Competencies for staff educators: Tools to evaluate and enhance nursing professional development*. Danvers, MA: HCPro

Buxton, T. G. (2001). *Preparing nurse educators to teach online* (Master's thesis). Available from ProQuest Dissertations and Theses database. (UMI No. 1404042)

Carter, B. E., & Axford, R. L. (1993). Assessment of computer learning needs and priorities of registered nurses practicing in hospitals. *Computers in Nursing, 11*(3), 122-126. Retrieved from http://www.ncbi.nlm.nih.gov/

Chang, C. (2008). Development and validation of the computer technology literacy self-assessment scale for Taiwanese elementary school students. *Adolescence*, *43*(171), 623-634. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/19086674

Chang, J. (2007). *Nursing informatics competencies required of nurses in Taiwan: A delphi method*. (Doctoral dissertation). The University of Utah, United States. Available from ProQuest Dissertations and Theses database. (UMI No. 3255204)

Cherry, B., & Jacob, S. R. (2008). *Contemporary nursing: Issues, trends, and management* (4th ed.). St. Louis, MO: Mosby.

Classen, D. C., & Bates, D. W. (2011). Finding the Meaning in MU. *The New England Journal of Medicine*, *365*(9), 855-858.

Committee on IT Literacy. (1999). *Being fluent with IT*. Washington, DC: National Academy Press.

Cooper, R. B., & Zmud, R. W. (1990). IT implementation research: A technological diffusion approach. *Management Science, 36*(2), 123–139. doi: 10.1287/mnsc.36.2.123

Cornell, P., Herrin-Griffith, D., Keim, C., Petsconek, S., Sanders, A. M., D'Mello, S., Golden, T. W., & Shepherd, G. (2010a). Transforming nursing workflow, part 1: The chaotic nature of nurse activities. *The Journal of Nursing Administration*, *40*(9), 366-373. doi:10.1097/NNA.0b013e3181ee4261

Cornell, P., Riordan, M., & Herrin-Griffith, D. (2010b). Transforming nursing workflow, part 2: The impact of technology on nurse activities. *The Journal of Nursing Administration*, *40*(10), 432-439. doi:10.1097/NNA.0b013e3181f2eb3f

Courtney, K. L., Demiris, G., & Alexander, G. L. (2005). IT: Changing nursing processes at the point-of-care. *Nursing Administration Quarterly*, *29*(4), 315-322. Retrieved from http://www.ncbi.nlm.nih.gov/

Curran, C. R. (2003). Informatics Competencies for Nurse Practitioners. *AACN Clinical Issues: Advanced Practice in Acute and Critical Care*, *14*(3), 320–330. doi:10.1097/00044067-200308000-00007

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of IT. MIS Quarterly, (September), 319–340. doi:10.2307/249008

Davis, D., Stullenbarger, E., Dearman, C., & Kelley, J. A. (2005). Proposed nurse educator competencies: development and validation of a model. *Nursing Outlook*, *53*(4), 206–2h11. doi:10.1016/j.outlook.2005.01.006

Dearnley, C., Haigh, J., & Fairhall, J. (2008). Using mobile technologies for assessment and learning in practice settings: A case study. *Nurse Education in Practice, 8*(3), 197-204. doi:10.1016/j.nepr.2007.07.003

Dixon, B. E., & Newlon, C. M. (2010). How do future nurse educators perceive informatics? Advancing the nursing informatics agenda through dialogue. *Journal of Professional Nursing, 26*(2), 82-89. doi:10.1016/j.profnurs.2009.05.001

Dorin, M. (2010, January). Do you want to be a staff-development specialist? *2010 Nursing Career Directory*, *40*(1), 25. doi:10.1097/01.NURSE.0000387066.37626.98

Dreyfus, S. E., & Dreyfus, H. L. (1980). *A five-stage model of the mental activities involved in direct skill acquisition*. Retrieved from http://www.dtic.mil/docs/citations/ADA084551

Dreyfus, H. L., & Dreyfus, S. E. (1984) *Putting computers in their proper place: analysis versus intuition in the classroom*. New York: Teachers' College Press.

Dreyfus, S., Dreyfus, H. (1986). *Mind over machine: The power of human intuition and expertise in the era of the computer*. New York: Collier MacMillan.

Dreyfus, H., & Dreyfus, S. (1988). *Mind over machine*. New York: Free Press.

Ehigie, B. O., & Ehigie, R. I. (2005). Applying qualitative methods in organizations: a note for industrial/organizational psychologists. *The Qualitative Report*, *10*(3), 621-638. Retrieved from http://www.nova.edu/

Electronic Health Record Incentive Program, Centers for Medicare and Medicaid Services, Department of Health and Human Services [HHS]. (September 4, 2012). Final rule. Federal Register, 77(171), 53967-54162. Retrieved from http://www.gpo.gov/fdsys/pkg/FR-2012-09-04/pdf/2012-21050.pdf.

Executive Office of the President, Council on Economic Affairs. (2009). *The Economic Case for Healthcare Reform*. Retrieved from http://www.whitehouse.gov/assets/documents/CEA_Health_Care_Report.pdf

Faugier, J., & Sargeant, M. (1997). Sampling hard to reach populations. *NHS Executive North West*, *26*(4), 790-797. doi:10.1046/j.1365-2648.1997.00371.x

Fetter, M. S. (2009). Improving IT competencies: Implications for psychiatric mental health nursing. *Issues in Mental Health Nursing*, *30*, 3-13.

doi:10.1080/01612840802555208

Glister, P. (1997). *Digital literacy*. New York: John Wiley & Sons.

Goad, T. (2002). *Information literacy and workplace performance*. Westport, CT: Quorum Books.

Graves, J. R., & Corcoran, S. (1989). The study of nursing informatics. *Journal of Nursing Scholarship*, *21*(4), 227-231. doi:10.1111/j.1547-5069.1989.tb00148.x

Griffin-Sobel, J. P., Acee, A., Sharoff, L., Cobus-Kuo, L., Woodstock-Wallace, A., & Dornbaum, M. (2010). A Transdisciplinary Approach to Faculty Development in Nursing Education Technology. *Journal of Nursing Education*, *31*(1), 4–7. doi:10.1043/1536-5026-31.1.41

Grobe, S. J. (1988). Nursing informatics competencies for nurse educators and researchers. *NLN Publications*, (14-2234), 25–40. Retrieved from http://www.ncbi.nlm.nih.gov/

Grobe, S. J. (1989). Nursing informatics competencies. *Methods of Information in Medicine*, *28*(4), 267–9. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/2622377.

Harrison, D., Georgia, W., Ve, C., Mcpeak, D., Georgia, W., & Ve, C. (2004). Validating competencies underlying a professional accounting credential. Retrieved from http://www.cga-canada.org/en-ca/ResearchReports/ca_rep_2004-07-09_competencies_Harrison_McPeak.pdf.

Hart, M. D. (2008). Informatics competency and development within the US nursing population workforce. *CIN: Computers, Informatics, Nursing*, *26*(6), 320-329. doi:10.1097/01.NCN.0000336462.94939.4c

Hart, M. D. (2010). A Delphi study to determine baseline informatics competencies for nurse managers. *CIN: Computers, Informatics, Nursing*, *28*(6), 364-370. doi:10.1097/NCN.0b013e3181f69d89

Haux, R. (2006). Individualized, globalization and health--about sustainable information technologies and the aim of medical informatics. *International Journal of Medical Informatics*, *75*, 795-808. Retrieved from http://www.ncbi.nlm.nih.gov/

Health IT. (n.d.a) "EHR Incentives & Certification", Retrieved from http://www.healthit.gov/providers-professionals/meaningful-use-definition-objectives.

Health IT. (n.d.b) Frequently Asked Questions: What is Health IT, Retrieved from http://www.healthit.gov/providers-professionals/frequently-asked-questions/333#id1.

Health Information Management and Systems Society [HIMSS]. (n.d.a) "HIMSS Member Advancement Program Frequently Asked Questions". Retrieved from http://www.himss.org/resourcelibrary/TopicList.aspx?MetaDataID=767

Health Information Management and Systems Society [HIMSS]. (n.d.b) "What is Nursing Informatics? Retrieved from http://www.himss.org/files/HIMSSorg/content/files/HIMSSMemberAdvancementProgramFAQ.pdf

Hebda, T., & Calderone, T. L. (2010). What nurse educators need to know about the TIGER initiative. *Nurse Educator*, *35*(2), 56-60. doi:10.1097/NNE.0b013e3181ced83d

Hersh, W. (2010). The Health IT Workforce. *Applied Clinical Informatics*, *1*(2), 197–212. doi:10.4338/ACI-2009-11-R-0011

Hersh, W. & Wright, A. (2008). Characterizing the health IT workforce: Analysis from the HIMSS analytics database. Retrieved from http://www.himssanalytics.org/docs/hit_workforce_himss_analytics.pdf.

Hobbs, S. D. (2002). Measuring nurses' computer literacy: An analysis of published instruments. *Computer, Informatics, Nursing*, *20*(2), 63-73. doi:10.1097/00024665-200203000-00012

Hsu, C., & Sandford, B. A. (2007). The Delphi Technique: Making Sense of Consensus. *Practical Assessment, Research & Evaluation*, *12*(10).

Human Resource Systems Group [HRSA]. (2013). The Competency-based management blog. Retrieved from http://blog.competencycore.com/2013/04/competencymodelvalidation2.html.

Huselid, M. A., Becker, B. E., & Beatty, R. W. (2005) *The workforce scorecard: Managing human capital to execute strategy*, Cambridge, MA: Harvard Business School Publishing.

Hwang, H., Chen, R., Chang, L., & Hsiao, J. (2008). A study of the informatics literacy of clinical nurses in Taiwan. *CIN: Computers, Informatics, Nursing*, *26*(5), 290-299. doi:10.1097/01.NCN.0000304836.70133.d1

Institute of Medicine [IOM]. (1999). *To err is human: Building a safer health system.* Retrieved from https://www.iom.edu/~/media/Files/Report%20Files/1999/To-Err-is-Human/To%20Err%20is%20Human%201999%20%20report%20brief.pdf

Institute of Medicine [IOM]. (2000). *To err is human: Building a safer health system*. Washington, DC: National Academy Press.

Institute of Medicine [IOM]. (2001) *Crossing the quality chasm: A new health system for the 21st century*. Washington, DC: National Academies Press.

Institute of Medicine [IOM]. (2003). *Health professions education: A bridge to quality*. Washington, DC: The National Academies Press.

Johnson-Laird, P. N., & Wason, P. C. (1977). Thinking: Readings in Cognitive Science. New York: Cambridge University Press.

Joint Workforce Task Force. (2008). Health information management and informatics core competencies for individuals working with electronic health records. Chicago, IL: American Health Information Management Association and American Medical Informatics Association. Retrieved from http://www.nihi.ca/nihi/ir/AMIA%20Work%20Force%20Report.pdf.

Koivunen, M., Välimäki, M., Jakobsson, T., & Pitkänen, A. (2008). Developing an evidence-based curriculum designed to help psychiatric nurses learn to use computers and the Internet. *Journal of Professional Nursing*, *24*(5), 302–14. doi:10.1016/j.profnurs.2007.10.015

Kovner, A. R., & Knickman, J. R. (2008) *Jonas and Kovner's health care delivery in the United States* (9th ed.) New York: Springer Publishing.

Kudless, M. W., & White, J. H. (2007). Competencies and roles of community health nurses. *Journal of Psychosocial Nursing and Mental health Services*, *45*(5), 36–44.

Kwon, T. H., & Zmud, R.W. (1987). Unifying the fragmented models of information systems implementation. In R. J. Boland & R. A. Hirschheim (Eds.), *Critical issues in information systems research* (pp. 227-251). Hoboken, NJ: Wiley.

Ludwick, D. A, & Doucette, J. (2009). Adopting electronic medical records in primary care: lessons learned from health information systems implementation experience in seven countries. *International Journal of Medical Informatics*, *78*(1), 22–31. doi:10.1016/j.ijmedinf.2008.06.005

Markus, L. H., Cooper-Thomas, H. D., & Allpress, K. N. (2005). Confounded by Competencies? An Evaluation of the Evolution and Use of Competency Models. *The New Zealand Journal of Psychology*, *34*(2), 117–126.

McCartney, P. R. (2010). What is Computer Literacy. *International Nursing Index*, *35*(4), 239. doi:10.1097/NMC.0b013e3181dd7aa6.

McCormick, K. A. (1983). Preparing nurses for the technologic future. *Nursing and Health Care*, *4*(7), 379-382.

McNeil, B. J., Elfrink, V., Beyea, S. C., Pierce, S. T., & Bickford, C. J. (2006). Computer literacy study: report of qualitative findings. *Journal of Professional Nursing*, *22*(1), 52-59. doi:10.1016/j.profnurs.2005.12.006

McNeil, B. J., Elfrink, V., Bickford, C. J., Pierce, S. T., Beyea, S. C., Averill, C., & Klappenbach, C. (2003). Nursing IT knowledge, skills, and preparation of student nurses, nursing faculty, and clinician: A U. S. survey. *Journal of Nursing Education*, *42*(8), 341–349.

Medicare Payment Advisory Committee. (2004). *Report to the Congress: New Approaches in Medicare*. Washington, DC. Retrieved from http://www.medpac.gov/documents/june04_entire_report.pdf

Merriam, S. B., Caffarella, R. S., & Baumgartner, L. M. (2006). *Learning in adulthood: A comprehensive guide*. San Francisco, CA: John Wiley & Sons.

Mocker, D. W., & Spear, G. E.. (1982). Lifelong Learning: Formal, Nonformal, Informal, and Self-Directed. Washington, DC: National Center Publications, National Center for Research in Vocational Education. Retrieved from http://files.eric.ed.gov/fulltext/ED220723.pdf

Murphy, J. (2010). Nursing informatics: the intersection of nursing, computer, and information sciences. *Nursing Economic*, *28*(3), 204–7. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/20672545.

Myers, M. D. (2008). *Qualitative research in business & management.* Thousand Oaks, CA: Sage Publications.

National Advisory Council on Nurse Education and Practice. (1997). *A national informatics agenda for nursing education and practice*. Retrieved from http://www.bhpr.hrsa.gov/nursing/nacnep/informatics.

National League for Nursing [NLN]. (2009). *Preparing the next generation of nurses to practice in a technology-rich environment□: An Informatics agenda*. Retrieved from http://www.nln.org/aboutnln/PositionStatements/informatics_052808.pdf.

Nelson, R., & Staggers, N. (2008). Implications of the American Nurses Association Scope and Standards of Practice for nursing informatics for nurse educators: A discussion. *Nursing Outlook*, *56*(2), 93–94.

doi:10.1016/j.outlook.2008.01.007

Paquette, M. (2006). Redefining the education of the advanced practice psychiatric nurse. *Perspectives in Psychiatric Care*, *42*(4), 213–214. doi:10.1111/j.1744-6163.2006.00090.x

Perez, J., & Murray, M. C. (2010). Generativity: The New Frontier for Information and Communication Technology Literacy. *Interdisciplinary Journal of Information, Knowledge, and Management*, *5*, 127–137. Retrieved from: http://digitalcommons.kennesaw.edu/cgi/viewcontent.cgi?article=2380&context=facpubs

Perez, B., & McCarty, T. L. (1998). *Sociocultural context of language and literacy.* Mahwah, NJ: Lawrence Erlbaum Associaties.

Smith, V. K., Gifford, K., Kramer, S., Dalton, J., MacTaggart, P., & Warner, M. L. (2008). *State E-Health Activities in 2007: Finding from a State Survey.* Retrieved from http://www.commonwealthfund.org/usr_doc/1104_Smith_state_e-hlt_activities_2007_findings_st.pdf?section=4039

Ramsburg, L. (2010). *An initial investigation of the applicability of the Dreyfus Skill Acquisition Model to the professional development of nurse educators*. Marshall University Graduate College, Huntington, WV. Retrieved from http://mds.marshall.edu/cgi/viewcontent.cgi?article=1371&context=etd

Rayudh, C. S. (1993). *Media and Communication Management*. Mumbai: Himalaya Publishing House.

Repique, R. J. R. (2007). Computers and information technologies in psychiatric nursing. *Perspectives in Psychiatric Care*, *43*(2). doi:10.1111/j.1744-6163.2007.00083.x

Roberts, C. M. (2010). *The dissertation journey: A practical and comprehensive guide to planning, writing, and defending your dissertation*. 2nd Edition. Thousand Oaks, CA: Corwin Press.

Rodkey, G. V. (2010). Electronic health records. *New England Journal of Medicine*, *363*(24), 2372–2374. doi:10.1056/NEJMc1010028#SA3.

Roth, R. A., & Mahoney, P. (1975). *Teacher competencies and assessment techniques.* Conference proceedings. Retrieved from http://files.eric.ed.gov/

Sacket, D. L., Rosenberg, W. M., Gray, J. A., Haynes, R. B., & Richardson, W. S. (1996). Evidence based medicine: what it is and what it isn't. *British Medical Journal*, *312*(7023), 71–72. doi:10.1136/bmj.312.7023.71

Schugurensky, D. (2000). The forms of information learning: towards a conceptualization of the field. Retrieved from https://tspace.library.utoronto.ca/

Schleicher, A. (2008). PIAAC: A New Strategy for Assessing Adult Competencies. *International Review of Education*, *54*(5-6), 627–650. doi:10.1007/s11159-008-9105-0

Sensmeier, J. (2007). The future of IT? Aggressive educational reform. TIGER initiative preps nurses for healthcare's digital era. *Nursing Management*, *38*(9), 2–8. doi:10.1097/01.NUMA.0000288833.71770.68

Shi, L., & Singh, D. (2009). *Essentials of the U. S. healthcare care system.* 2nd edition. Burlington, MA: Jones and Bartlett Publishers.

Simpson, R. L. (1994). Nursing informatics core competencies. *Nursing Management*, *25*(5), 18, 20. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/8196876

Simpson, R. L. (2005). Is Nursing Ready for 2006? *Nursing Management*, *36*(12), 32-34.

Skiba, D. J., & Dulong, D. (2008). Using TIGER Vision to Move Your Agenda Forward. *Nursing Management*, *39*(3), 14–16. doi:10.1097/01.NUMA.0000313090.04519.22

Skiba, D. J., & Rizzolo, M.A. (2009). National League for Nursing's Informatics Agenda. *CIN: Computers, Informatics, Nursing*, *27*(1), 66–69. doi:10.1097/NCN.0b013e3181931eef

Staggers, N., Gassert, C. A., & Curran, C. (2002). A Delphi study to determine informatics competencies for nurses at four levels of practice. *Nursing Research*, *51*(6), 383-390. doi:10.1097/NCN.0b013e3181f69d89

State Alliance for E-Health. (2009). *Preparing to Implement HITECH: A State Guide for Electronic Health Information Exchange*. *Journal of Psychiatric Practice*, *30*, 123–215. doi:10.1097/01.pra.0000327310.96528.a5.

Stepankova, O., & Engova, D. (2006). Professional competence and computer literacy in e-age, focus on healthcare. *Methods of Information in Medicine*, *45*(3), 300-304.

Strickland, R. J., & O'Leary-Kelley, C. (2009). Clinical nurse educators' perceptions of research utilization: Barriers and facilitators to change. *Journal for Nurses in Staff Development*, *25*(4), 164-171. doi:10.1097/NND.0b013e3181ae142b.

Sundaram, S., Schwarz, A., Jones, E., & Chin, W. W. (2007). Technology use on the front line: how IT enhances individual performance. *Journal of the Academy of Marketing Science*, *35*(1), 101–112. doi:10.1007/s11747-006-0010-4.

Swihart, D., & Johnstone, D. (2010). What does a nursing professional development specialist (nurse educator) do? *American Nurse Today*, *5*(8). Retrieved from http://www.americannursetoday.com/

Technology Informatics Guiding Education Reform [TIGER]. (n.d). *Transforming Education for an Informatics Agenda: TIGER Education and Faculty Development Collaborative*. Retrieved from http://www.tigersummit.com/uploads/Educ.Tiger.Report_final4.pdf.

Technology Informatics Guiding Education Reform [TIGER]. (2007). Informatics Competencies for Every Practicing Nurse: Recommendations from the TIGER Collaborative. Retrieved from http://www.tigersummit.com/uploads/3.Tiger.Report_Competencies_final.pdf.

Technology Informatics Guiding Education Reform [TIGER]. (2015). HIMSS - TIGER Transition FAQ. Retrieved from http://www.thetigerinitiative.org/docs/HIMSS-TIGERTransitionFAQ.pdf

Technology Informatics Guiding Education Reform [TIGER]. (2009). Collaborating to Integrate Evidence and Informatics into Nursing Practice and Education: An Executive Summary. Retrieved from http://www.thetigerinitiative.org/docs/TIGERCollaborativeExecSummary_20090405_002.pdf

Tingoy, O., & Gulluoglu, S. S. (2011, October). Informatics education in different disciplines at university level. *Turkish Online Journal of Educational Technology*, *10*(4), 221-229. Retrieved from http://www.tojet.net/articles/v10i4/10422.pdf

Turner, M. P. (2010). Stratifying computer literacy: A competency measurement strategy. *CIN: Computers, Informatics, Nursing, 28*(5), 291-296. doi:10.1097/NCN.0b013e3181ec23fe

University of Nebraska. (n.d.). *The definition of competencies and their application at NU*, Retrieved from http://hr.unl.edu/compensation/nuvalues/corecompetencies.shtml

U.S. Department of Health and Human Services, National Committee on Vital and Health statistics. (2001). *Information for Health: A strategy for building the national health information infrastructure*. Retrieved from http://www.ncvhs.hhs.gov/nhiilayo.pdf

Waneka, R., & Spetz, J. (2010). Hospital IT impact on nurses and nursing care. *Journal of Nursing Administration*, *40*(12), 509-514. doi:10.1097/NNA.0b013e3181fc1a1c.

Weber, A. S., & Demetrak, R. (Directors). (2006). Information literacy: The Perils of online research [Motion Picture]. New York: Cambridge Educational.

Weinger, M. B. (2010). Electronic health records. *New England Journal of Medicine*, *363*(24), 2372–2374. doi:10.1056/NEJMc1010028.

White House. (2000). *Clinton-Gore Administration Announces New Actions to Improve Patient*. White House report. Retrived from http://clinton4.nara.gov/WH/New/html/20000222_1.html

White House. (2004). *Executive Order: Incentives for the Use of Health IT*. Retrieved from http://georgewbush-whitehouse.archives.gov/news/releases/2004/04/20040427-4.html.

Whitman, N. I., Smith, M. J., Nelson, R., & Joos, I. (1996). *Computers in small bytes* (2nd edition). Washington, DC: National League for Nursing.

Young, T.A, Cole, J. R., & Denton, D. (2002). Improving technological literacy. *Issues in Science and Technology, 18*(4), 73-79. Retrieved from http://www.issues.org/18.4/young.htm

Yvonne, C. (2008). *IT Management in Local Health Departments: Implications for Emergency Preparedness* (Doctoral Dissertation). Available from ProQuest Dissertation and Theses database. (UMI No. 3387632)

Zmud, R. W., & Apple, L. E. (1992). Measuring technology incorporation/infusion. *Journal of Product Innovation Management*, *9*(2), 148-155. doi:10.1111%2F1540-5885.920148.