

Preparing Nursing Graduates for the Future: Adding Informatics Education To Entry Level Programs

Carolyn Sue Watts

A rural community college desiring to add nursing informatics education to their practical nursing and associate nursing programs provided a project for a Masters of Nursing student. The purpose of the project was to integrate nursing informatics education into an already accelerated and shortened program. Although the research recommends core competencies for Bachelors of Science in nursing programs of study, the practical and associate degree graduates make up a larger segment of practicing nurses in the workforce with virtually no formal education in basic computer, information literacy, or information management skills. Ignoring the informatics education needs in practical and associate coursework contributes to a gap in education for all practicing nurses in using technology for safe nursing practice. The project addressed this gap by developing a program of nursing informatics education accommodating a seamless transition from the practical nursing level to the associate degree level. The project provided a foundation for safe practice as well as continuing education into the bachelor's degree level. The project developed leadership skills, used the latest research, and provided innovative modalities to educate students in key areas of nursing informatics. As a result of the project, graduates gained an understanding of nursing informatics and its importance to practice, the nursing profession, and its positive influence on the nurse-patient therapeutic relationship. Using the Technology Informatics Guiding Education Reform Initiative core competency guidelines and the Quality Safety Education Nursing framework recommendations, an introductory course was developed that prepared nursing graduates for safe practice and promotes lifelong learning.

The transformation of health care in the United States with the passing of Affordable Care Act (ACA) in 2009 directed attention to the use of technology to meet the goals and initiatives of improved health care for all. The ACA pushed for the use of electronic health records (EHRs) and its meaningful use by funding development and supplying incentives to the health care industry, changing the face of health care forever. Health care reform also highlighted the need for education reform to bring health care practitioners into the present age of technology in order to leverage its use to provide safe, cost effective care. Nursing, the largest and most trusted profession in health care, holds the promise of contributing to the success of health care reform, as demonstrated by its influence on patient outcomes over the years (Sensmeier & Murphy, 2014). Unfortunately, nursing as a whole has been lacking technology skills in the workplace, and gaps continue to exist in educational programs at all levels. The Technology Informatics Guiding Education Reform (TIGER) Initiative was formed to determine ways to improve nursing practice, including educational strategies in the use of health information technology. The vision of the TIGER Initiative, as stated in the latest



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report *Collaborating to Integrate Evidence and Informatics into Nursing Practice and Education: An Executive Summary*, follows (DuLong, 2009, p. 6):

- Allow informatics tools, principles, theories, and practices to be used by nurses to make health care safer, effective, efficient, patient-centered, timely, and equitable.
- Interweave enabling technologies transparently into nursing practice and education, making information technology the stethoscope for the 21st century.

The American Nurses Association (ANA) and the TIGER Initiative have both stated that all nurses should have a basic education in nursing informatics to practice safely, but the research focus has been on educating nurses at the Bachelors of Science in Nursing (BSN) level, resulting in associate degree and practical nurses entering the workforce without nursing informatics education, contributing to a gap in the nursing profession's competent use of technology.

Challenges for Nursing Informatics Education

The ANA (2008) defined *nursing informatics* as "the integration of nursing science, computer information science, and cognitive science to manage communication and expand the data, information, knowledge, and wisdom of nursing practice" (p. 1-2). The TIGER Initiative included recommendations to advance nursing practice through core competencies for all nurses in nursing informatics. In 2008, the Robert Wood Johnson Foundation and the Agency for Healthcare Research and Quality collaborated to address this need and formed the Quality Safety Education for Nursing (QSEN), which outlined educational pursuits to improve nursing practice in six key areas (Spencer, 2012; Tellez, 2012). Informatics was one of those key areas. The American Association of Colleges of Nursing embraces QSEN recommendations, calling for all BSN educational programs to include nursing informatics into core curriculum. According to the Health Resources and Services Administration (HRSA) report of 2011 (2014), registered nurses (RNs) without a bachelor's degree represent 60% of all RNs taking the NCLEX-RN exam. In that same year, there were a total of 3.1 million registered nurses (not including practical nurses, which numbered approximately 690,000) (HRSA, 2014). Because of their

Table 1.
PN and ADN Nursing Informatics Course Content

PN or First Year of ADN	Second Year of ADN
Module I	Module IV
*Basic Skills Self-Assessment	*Legal and Ethical Implications
*Basic Computer Competencies	*Cultural and Economic Considerations
*Information Literacy Competencies	*HIPAA Security Rule
*Introduction to Workbook	*Social Media
*PATCH Assessment Scale	Module V
Module II	*TIGER Initiative
*Introduction to Nursing Informatics:	*QSEN
*Electronic Documentation	*DIKW Continuum
*Computer History in Health Care, Nursing	*Future Trends in Technology
*Defining Informatics	*Nursing Process and Systems
*Defining Nursing Informatics	*PATCH Assessment Scale
*ANA Statement	
Module III	
*Terminology:	
*Technology Components	
*Hardware, Software, and Computing	
*PATCH Assessment Scale	

lack of education in nursing informatics, associate degree nurse (ADN) and practical nursing (PN) graduates struggle to understand what nursing informatics is, why it is important to their practice, and how to use it proficiently in practice and in promoting lifelong learning.

Integrating Nursing Informatics into Curriculum

The capstone project was designed to introduce nursing informatics content into the existing curriculum in both the PN and ADN programs of a rural community college in southern Ohio. The curriculum was reviewed to determine the logical placement of nursing informatics content to be added to facilitate learning and correspond to existing simulated academic electronic health record (AEHR) used throughout program instruction and simulation laboratory. The college uses SimChart as their AEHR for their simulation lab, which was developed by Elsevier and was utilized with the nursing informatics content being introduced to compliment class content (Elsevier, 2013). The course content covered nursing informatics definition, the history and importance to practice, as well as instruction on the electronic health record components of the electronic Medication Administration Record (eMAR), Bar Code

Medication Administration (BCMA), Computerized Provider Order Entry (CPOE), Care Planning, and assessment documentation. A workbook was designed by the project learner to facilitate student self-assessment and reflection in an accelerated and compressed nursing program. The workbook followed the developed modules of informatics content. The college has a state-of-the-art simulation lab with computerized wireless mannequins. The AEHR was designed to be used simultaneously within the simulation lab during simulated assessments for real-time point-of-care documentation (Johnson & Bushey, 2011). The accelerated nursing programs consist of two years of instruction: the first year preparing PNs for licensure, leading into the second year for the ADN students. Nursing informatics content and the use of SimChart was introduced in the PN level or the first year of study for the ADN level. Informatics coursework continued into the second year with basic content on theory, ethical, legal, and regulatory considerations, and future trends, as well as continued simulation practice of all components in the AEHR (see Table 1).

Identifying Gaps in Skills And Knowledge

TIGER and QSEN recommend that all nurses have basic computer skills, proficiency in information literacy, and possess information management competencies. Basic computer skills include knowledge of computer software and hardware and the ability to maneuver programs for presentations, managing files, browsing the internet, and communicating with email. The competencies for information literacy refer to understanding what information is needed, how to access it, how to use it, and how to evaluate it for delivery of patient care. Information management describes the continuum of data, information, and knowledge with the collection of data, processing into specific information, and transformation into knowledge that can guide nursing care to improve outcomes (Tellez, 2012). Therefore, it was recommended that these entry level nursing programs incorporate informatics education throughout the course content.

To determine the individual learning needs of each student, an initial assessment of the level of computer literacy and information technology is a necessary first step (Finney-Rutten et al., 2014). A basic skills assessment tool was designed by the project learner to determine gaps in skills and education needs of the students. The basic skills assessment was guided by the TIGER recommendations and the QSEN guidelines. The basic skills assessment focused on the use of technology and basic computer functions. This tool served as a guide for the student and gauge for the instructor of where students need more support and instruction and was included in the workbook (Clancy, 2014). Resources were provided to point students to where they could find online assistance to improve skills (see Table 2 for the basic skills assessment tool). The **Pretest for Attitudes Toward Computers in Healthcare (PATCH Assessment Scale)**, developed by Kaminski (2011), was also part of the student workbook and an important component for students to understand their knowledge of informatics and its importance to nursing practice. The tool has been tested and proved useful for determining computer skills, information literacy, and attitudes toward using computers and technology. It is well established that attitudes toward computers are directly related to competency in basic computer skills (Staggers, 2014;

Table 2.
Basic Computer Skills Self-Assessment

Basic Computer Skills	Yes	No	Not Sure
Can you locate and start a program?			
Are you able to navigate between programs?			
Are you able to save files to a hard drive or removable storage like a CD or flash drive?			
Are you able to exit or quit a program?			
Do you understand how to log off a computer?			
Can you explain the functions of computer hardware such as monitor, keyboard, or file storage?			
Word Processing Skills			
Do you know how to create a new document?			
Are you able to do the following?			
Save a document?			
Cut, copy, and paste text?			
Check your document with spell-check?			
Center text?			
Change the line spacing in a document?			
Set margins?			
Change the page orientation from portrait to landscape?			
Add page numbers?			
Insert headers and footers?			
Create a numbered or bulleted list?			
Insert or create a table?			
Insert graphics, images, or clip art?			
Spreadsheet Skills			
Have you ever used Excel?			
Can you use the Formula Bar to perform mathematical calculations?			
Can you use the built-in Function capability to create equations?			
Can you create charts?			
Can you sort and filter information?			

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Vijayalakshmi, Ramachandra, & Math, 2014). An advantage of using this tool is that it contains a scoring system and includes an individualized interpretation for the student. It also provides space for the student to develop a plan of action and set goals for improvement. The PATCH Assessment Scale was used initially to assess student's attitudes and skills and again at the end of the first year to show improvements and needs. For students continuing on to the second year, it served as an update and an initial basis for self-assessment to encourage personal responsibility to continue working on

weak areas. Incremental use of the PATCH Assessment Scale reflected the progress of student learning and the effectiveness of nursing informatics content. The PATCH Assessment Scale, along with the workbook, promotes the lifelong learning necessary with the constant changes in technology and health care.

The student population is mostly Appalachian heritage with low socio-economic status, a culture of using smartphones and the internet, but competency cannot be assumed (Finney-Rutten et al., 2014). The self-assessment tools may also be used by faculty to

Table 2. (continued)
Basic Computer Skills Self-Assessment

Internet	Yes	No	Not Sure
Can you locate a website given the address?			
Can you use a browser's capabilities to go backward, forward, reload/refresh, print, and stop?			
Can you use a web browser to follow links to another website?			
Can you save a website address in the bookmarks or favorites?			
Can you find information using a search engine such as Google or Yahoo?			
Can you download and save files, such as graphics, documents, or PDFs from the internet?			
Can you download and install software from the internet?			
Can you install and update antivirus software?			
Email			
Do you know how to set up an email account on Google or Yahoo?			
Can you read email messages?			
Can you compose and send email messages?			
Can you reply to an email message?			
Can you manage your email by moving messages between folders, forwarding messages, and deleting messages?			
Can you send attachments through email?			

determine their learning needs, as one of the barriers to nursing informatics education is the gap in knowledge of nursing educators (Tellez, 2012). A list of resources has been included for nurse educators needing support in teaching content.

Modules for Seamless Education

The Institute of Medicine's 2010 report *The Future of Nursing: Leading Change, Advancing Health* from the two-year study supported by the Robert Wood Johnson Foundation, noted the importance of improving the education of nurses to support seamless progression into higher education. The capstone project developed coursework that was broken down into modules: three for the Fundamentals level of the practical nursing program and two in the associate level of the program. The two levels were designed to stand alone as well as integrate seamlessly into each other for students continuing to the associate degree program, and make a smooth transition to one of several reciprocity agreements the

college has entered into with other college BSN programs. The Introduction to Nursing Informatics course was based on QSEN strategies for learning knowledge, skills, and attitudes (KSAs) and the guidelines of the TIGER Initiative for core competencies (Tellez, 2012).

System View of Project Stakeholders

Stakeholders of the project were the students in the PN and ADN programs who graduated better prepared to practice safely in the workplace by having an understanding of nursing informatics and its technology components used in daily practice. The faculty represents another stakeholder of the project who benefited with a complete curriculum integrating nursing informatics, including syllabus, outline, and outcomes. The Director of Nursing also mentored the project and as a vital stakeholder, recognized the need for nursing informatics education to be included in the current curriculum to prepare graduates for nursing practice.

The project mentor also showed vision for the future of the organization and the nursing profession by being motivated to lead this vision in welcoming the capstone project to add nursing informatics content (Tellez, 2012). The organization has a vested interest in increasing its value and reputation in the community as leading change and innovation in health care. The hiring facilities fall within the stakeholders of the community, who needed better prepared nursing graduates requiring less comprehensive training. Lastly, the patients in the community are the most important stakeholders who depend on nursing graduates to understand the importance of technology in practice and demonstrate competence in the use of technology to educate and direct patient care.

Project Conceptualization

The course content focused on the definition of nursing informatics, history and theory, and the use of clinical decision support systems in the EHR to guide nursing practice and safe patient care. The course was guided by the competencies recommended by TIGER and utilized the KSAs outlined by QSEN for educating nurses to promote lifelong learning (Spencer, 2012). Knowledge competencies of QSEN contained information on safe quality care while using the components of the EHR, such as electronic flow sheets and care plans, decision support systems, eMAR, BCMA, and CPOE. Skills competencies of QSEN included instruction in using technology and information management tools prior to giving care, such as hands-on training in the simulation lab and on SimChart. Attitudes of the QSEN framework provided the students with appreciation of technology as a tool in nursing practice and the need to continue advancing their skills with lifelong learning (Spencer, 2012).

Theoretical Concepts

Providing a basic history of nursing informatics, a clear definition, and theory behind using data to generate knowledge are important to incorporate into all levels of nursing education (Bowers et al., 2011). The theoretical framework chosen was the Nelson Model of Information Theory (2002). Nelson's Model expanded on Bruce Blum's Model (1986), which linked data, information, and knowledge concepts that had also been used beyond health informatics (Nelson & Staggers, 2014). Blum defined *data* as isolated components

with little meaning. *Information* was defined as a collection of data elements that provides output over time. *Knowledge* occurs when the data and information were shown to represent relationships, defining meaning between them. Nelson added to this by including *wisdom* in the continuum, defining it as using the knowledge gained to apply to human problems and their management. Nurses use the continuum of data, information, knowledge, and wisdom in practice and build on their own wisdom, as well as adding to the body of wisdom in nursing. The more knowledge a nurse possesses, the more wisdom is gained from the information and data. The theory fits well with the QSEN framework of KSAs and helps to correlate nursing informatics with nursing practice. The EHR becomes a tool to move through the data to wisdom continuum (Bowers et al., 2011). In addition, as the student understands this continuum and begins practice, using decision support adds to the knowledge and wisdom of the graduate by giving options based on evidence-based research. Ultimately, the reliance on the nurse's own accumulated knowledge and wisdom base will determine appropriateness of following the decision support system.

Project Implementation Supports Advancement of Nursing

The call for all nurses to have nursing informatics education and knowledge is the responsibility of all nurse leaders, especially education, administration, and informatics specialties of advanced practice registered nurses (APRN). The nursing informatics course content supported these recommendations and promoted lifelong learning through web activities, readings, lecture, and class discussion. Using the KSAs outlined by the QSEN framework, nursing advanced by showing individual nurses the importance of taking responsibility for continued education and advancement in technology skills (Spencer, 2012). A workbook was designed by the project learner to chart individual progress and for use as a reference for future study and self-assessment for personal advancement of skills.

Project Leadership

Interprofessional teamwork is the basis for solving all complex problems that APRNs will be called on to solve. It is most effective when each member understands the contribution of each other.

Therefore, Interprofessional Education (IPE) is promoted as vital for APRNs to become socialized in their role as a team member on a variety of interprofessional teams (Farrell, Payne, & Heye, 2015). The capstone project helped immerse the project learner as leader into the role of an advanced practice nurse by the socialization process of working on the project with other APRNs. This learning process helped the project learner understand the professional values exhibited by the interprofessional team and guided thinking to include those values into the new APRNs' professional behaviors. Farrell and colleagues (2015) note that successful socialization into the APRN role helps one learn risk taking, how to overcome barriers, abandon comfort zones, and to give more personally to impact the nursing profession. The project learner demonstrated leadership in determining content needed to meet objectives and outcomes and presented the content for approval to the team with evidence-based research. Leadership was also demonstrated by educating the team on the importance of nursing informatics and using the latest evidence to summarize best practices for educating students in nursing informatics.

Collaboration with faculty, simulation technicians, instructors, and project mentor was needed on a regular basis to determine format of the syllabus, areas that could incorporate the nursing informatics education, how to integrate content with SimChart, and assessment of the levels of education and their learning needs for the modules. The faculty meetings were important to assure the content was not overwhelming for the student course load and corresponded to their level of education. Objectives and outcomes of the course were approved and the outline developed to support the modules.

Nurses' Roles and Responsibilities

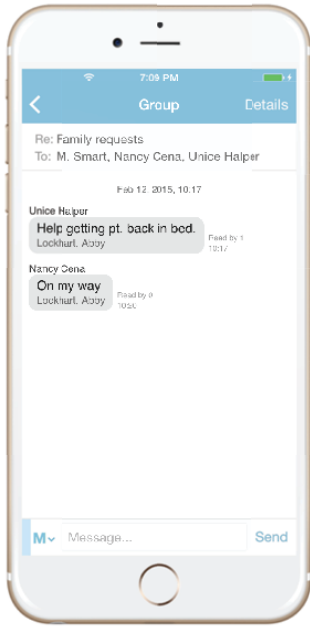
A disservice is done to entry level nurses when they have no understanding of the system they will be expected to use once they are hired. Health care organizations will train and educate these new graduates, but only to the extent of what the organization and management believes they need to know for their institutional purposes, specifically limited to the systems they are using. Little attention is given to systems thinking when using technology in practice, how nursing informatics promotes safe care, and advances nursing practice

(Dolansky & Moore, 2013). These facets of education are the responsibility of the nursing profession and should not be left for other professions and stakeholders who do not have nursing's goals and viewpoint at heart.

Using the knowledge gained by advanced practice education, the project learner assumed the role of change agent by identifying gaps in nursing education, developing skills assessment tools, and interpreting needed content to prepare graduates for safe practice. In the role of nursing informatics leader, the project learner used the project to focus on promoting the patient-nurse therapeutic relationship by emphasizing the importance of student education in evaluating online patient portals and educational materials. The project learner, as a nursing informatics specialist, was also responsible for evaluating the effectiveness of the project in the future through survey of students, graduates, instructors, and community employers.

Leadership Strategies for Success

Edmondson (2012) described *teaming* as the answer to the short-term team of individuals put together for a specific project completion, which then dissolves much like the capstone project in which a goal or project is completed in a short period of time. Traditional team structures that require time to create and meld together are not practical. The project learner was able to shift focus from composing and managing teams to inspiring and enabling team members to finish the project. Edmondson also offered some strategies for dealing with obstacles, such as emphasizing purpose, building psychological safety, embracing failure, and putting conflict to work (2012). Emphasizing what is at stake or why the project is important is a leadership tool for motivation. The project learner was able to build psychological safety by acknowledging that people will voice their opinion and disagree. When this happened, the project learner asked thoughtful questions, acknowledged lack of understanding about a topic (as in nursing informatics among faculty), and was prepared to show the project learner's own fallibility (such as lack of knowledge of nurse educator challenges). Embracing failures conveys the idea that we will learn from them because failures provide valuable information. The leader of teaming encouraged members to explain



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why they have specific viewpoints and to show interest in one another's opinions to facilitate change and accomplish project goals.

Systems, Safety, and Continuous Improvement

The project learner used systems thinking to consider each team member's importance in the project and why they were needed to make the project successful. The simulation lab technician and instructors were necessary as the SimChart needed to be used more in the curriculum at the ADN level and during simulated assessments (Johnson & Bushey, 2011). The mission and vision of the organization was considered during the project conception and design. The project was also guided by the project mentor in considering her needs and responsibilities for the project. During the design of the curriculum, focus was on student success in transitioning to practice, as well as patient safety and quality outcomes.

Project Outcomes

The following were the planned capstone project outcomes:

Function as team leader and expert in nursing informatics to develop course

curriculum to be introduced to a community college practical and associate degree nursing programs. The project developed content specific to the needs of the organization because of the ability of the capstone learner's skills to organize, direct, and lead the team with meetings and effective communication. The capstone learner functioned as expert in nursing informatics by introducing evidence-based guidelines of QSEN and TIGER into the curriculum (DuLong, 2009).

Develop and apply knowledge of curriculum design for nursing informatics content into existing curriculum. This outcome was met with the approval of the project mentor and the acceptance of the course outline, objectives, and outcomes. The project mentor was also satisfied with the inclusion of QSEN competencies, modes of instruction, the workbook toolkit, and the skills assessment tool.

Extrapolate from nursing educators in the area of simulation education, teaching environment, curriculum design, and student level of focus. The capstone project met the goals of the organization to introduce nursing informatics and harmonized with the simulation lab and SimChart being used in the programs. Faculty approved the organization of the modules into the two levels of nursing programs, and the

capstone project mentor approved the content to reflect the amount and level of education for each program within the current curriculum.

Significance to Stakeholders And Nursing Profession

Project significance to graduate nurses was an understanding of nursing informatics and core competencies, which helped them view computers in the workplace as necessary and an important tool for safe practice. Nurse educators have the opportunity to increase their skills and knowledge in nursing informatics and evaluate the outcomes of students for years to come. They have an introductory course to build on as technology changes. The mentoring nurse experienced gratification of leading her faculty, students, and organization toward the goal of the nursing profession to have all nurses using technology to provide safe quality care (DuLong, 2009). Their example can be used to guide other nursing programs at any level of education. Nursing informatics education benefited the community health care providers by hiring better educated and prepared entry level nurses who required less training and time to acclimate to their clinical information system. Patients

in the community are benefited by having confident nurses who are practicing with proficient use of technology instead of being hindered by it. Patients served by these students in the future will also benefit from their knowledge in evaluating internet and website resources for the education of chronic illness and health promotion from reputable websites (Finney-Rutten et al., 2014).

Personal Advancement

The project learner used scholarship to thoroughly research the topic of educating entry level nurses in nursing informatics. All content was backed by evidence-based research that extended beyond the associate and practical nursing levels. A spirit of inquiry was needed to establish the informatics need for practical and associate levels of nursing students where there was little research available. Open-minded flexibility and adaptability was useful to understand the role of nurse educators and the barriers they face (Spencer, 2012). New modes of education were incorporated into the content to facilitate learning in a compressed curriculum, as recommended by the Institute of Medicine (2010).

Online learning programs associated with the SimChart and the simulation lab technology used the latest innovation, as well as the capstone content to impart skills in setting up patient portals and determining valid websites for patient education. The capstone project promoted lifelong learning for students and faculty as outlined in the QSEN framework and impressed on the capstone learner the importance of this concept in personal practice and individual goal development and attainment.

Conclusion

The nursing informatics capstone project involved developing and blending nursing informatics education into the current curriculum of practical nursing and associate degree nursing programs at a rural community college. Nurses at all levels are expected to use technology in caring for patients, and they need informatics competencies and familiarity with the electronic health record as well as computer literacy upon graduation. The capstone successfully integrated an introduction to nursing informatics into the current curriculum, despite the lack of examples in the literature at this level of nursing education. The project attempted to fill this gap with a course that prepared graduates for the workforce and lifelong learning

through an understanding of why nursing informatics is important to safe practice and the advancement of the nursing profession. The project also provided an example for other educational institutions on how to introduce nursing informatics education at a small community college with strict budgetary, time, and content limitations.

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Suggested Reading

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Carolyn Sue Watts, MSN, RN, has been a nurse for 20 years, experiencing many EHR implementations from the VAMC in Cincinnati to rural county hospitals and home health agencies as an end-user and super-user. Her clinical experience covers telemetry, med-surg, ICU, home health, hospice, and psychiatric mental health nursing. She just earned her Masters in Nursing Informatics Degree from Excelsior College in October 2015 and is preparing for the Nursing Informatics certification exam in March 2016.

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Heather Jean Curran, MSN, BSN, FNP-C, RN, is a BSN Nursing Instructor, University of Maine, Fort Kent, ME.

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