

Audit of Curriculum Content to Assess the Integration of CASN Informatics

Competencies in a BScN Program

By

©Sherry Bowman

A report submitted to the

School of Nursing

In partial fulfillment of the

Requirements for the degree of

Master of Nursing

School of Nursing

Memorial University of Newfoundland

May, 2015

St. John's

Newfoundland and Labrador

Report Summary

In 2012 the Canadian Association of Schools of Nursing (CASN) published “Nursing Informatics: Entry-to-practice competencies for Registered Nurses.” These nursing informatics (NI) competencies provide a clear description of the NI competencies that student nurses should meet upon graduation. The use of evidence-informed practice and information technology is increasingly common in clinical practice settings and employers expect that nurses will enter practice with competency in the use of information and communication technology (ICT). Despite the proliferation of technology there is a need to strengthen the capacity of graduating nurses to manage information and to use health care specific information systems for the planning and evaluation of nursing care. Nurse educators must take an active role to ensure that students have the learning opportunities to develop these competencies. This project is an important first step toward integration of the NI competencies in a curriculum. Iwasiw and Goldenberg’s (2009) context-relevant curriculum development model was used as a guide. An audit tool was adapted and a pilot audit was completed to assess the extent to which NI entry to practice competencies (CASN, 2012) were covered in five of the courses in St. Francis Xavier University (STFX) Bachelor of Science in Nursing (BScN) curriculum. All participants in the project expressed interest and enthusiasm for strengthening the integration of informatics competencies in nursing courses across the curriculum. Key gaps tend to be in the area of nursing specific informatics competency and involvement in the use and development of health information systems. Continuation of the audit of nursing courses for NI competencies and a strategic approach to strengthening integration of NI competencies are recommended.

Acknowledgements

This project was possible because of the support I received throughout the process and I sincerely thank all of the following for their roles in helping me to see this project to fruition. First, thank you to Dr. Shirley Solberg, my Masters of Nursing Practicum Supervisor at Memorial University of Newfoundland (MUN), for her incredible support and guidance, she has been truly inspirational. Thank you to Dr. Wendy Young, who was initially my co-supervisor until she retired from MUN, whose guidance was instrumental in the early stages of this project. The support I received in the agency where I work was enthusiastic and vital to this success of this project. I would like to thank Dr. Diane Duff, Director of the School of Nursing at St. Francis Xavier University, who agreed to be the agency contact for my project and provided valuable insight and encouragement, as well as Dr. Joanne Whitty Rogers, former Interim Director, for supporting this project from its inception and participating in the audit process. In addition thank you to my colleagues, both Faculty and Nurse Educators at STFX who generously participated in this project. My sincere gratitude is also extended to Michelle Caines-Puddester, Academic Program Assistant at MUN whose assistance with communications and help with organizing is invaluable.

Table of Contents

	page
Report Summary.....	2
Acknowledgements	3
List of Tables	5
List of Figures	6
Introduction	7
Background	8
Rationale	9
Objectives	10
Literature Review	12
Development of the CASN NI entry-to-practice competencies	12
The need for NI Competencies for entry-to-practice	14
Informatics Competencies in Curricula	18
Audits for assessing NI competencies in curriculum.....	23
Conceptual Framework.....	25
Methods	26
Findings	29
Discussion	37
Advanced Nursing Competencies	39
Conclusion	42
References	43
Appendix A: Information for Faculty/Nurse Educators.....	48
Appendix B: NI Competencies Audit Tool	52

List of Tables

	page
Table 1: Foundational skills (device & application use)	29
Table 2: Competency – uses relevant information and knowledge to	30
Support the delivery of evidence-informed patient care	
Table 3: Competency – uses ICTs in accordance with professional	31
and regulatory standards and workplace policies	
Table 4: Competency – uses information and communication	32
technologies In the delivery of patient/client care	
Table 5: Knowledge and information management indicators	33
Table 6: Professional and regulatory accountability indicators	34
Table 7: Information and communication technologies indicators	35

List of Figures

Figure 1: Context Relevant Curriculum Development25

The ability to effectively use information and communication technology has become increasingly important in all aspects of health care, including nursing, as many new technologies and electronic health information systems have permeated the healthcare environment. As nurse educators, we have a responsibility to prepare nursing students for beginning practice with the capacity to provide safe and ethical care utilizing the technologies available to support optimal care and information management.

The Canadian Association of Schools of Nursing (CASN) recognized the need for nursing students to graduate with essential skills and attitudes, or competencies, in information and communication technology required for beginning nursing practice (CASN, 2012). In a collaborative effort funded by Canada Health Infoway, CASN led the process of identifying the nursing informatics competencies required for entry-to-practice as registered nurses. Subsequently, in 2012 the Canadian Association of Schools of Nursing (CASN) published the document “Nursing Informatics: Entry-to-practice competencies for Registered Nurses.” These CASN (2012) entry-to-practice competencies include foundational skills anticipated of all students on entry into nursing education, one over-arching nursing informatics (NI) competency, and three specific NI competencies and indicators for these three competencies. The three NI competencies are in the domains of information management, professional and regulatory accountability, and use of information and communication technologies (ICTs). There is a list of observable and assessable indicators accompanying the foundational skills and each of the three competencies. The competencies were developed as part of a project to promote the integration of NI in nursing education and nursing practice (CASN, 2012). The work engaged a team of experts in NI from across Canada and was based on key research in the field.

The CASN NI competencies are a basis for informatics competency required on entry into nursing practice. In order to ensure that nursing students are able to successfully meet these competencies upon graduation it is encouraged and preferred that the NI entry-to-practice competencies be integrated in the curriculum of undergraduate nursing education programs (CASN, 2012; Ornes & Gassert, 2007; Staggers, Gassert, & Curran, 2002). The purpose of this project is to develop an audit tool that can be used to assess the integration of CASN (2012) NI entry-to-practice competencies in the BScN curriculum at St. Francis Xavier University, pilot the use of the audit tool for five courses, and make preliminary recommendations on the use of the audit tool and the findings for the courses audited.

Background

Globally the use of evidence-informed practice and information technology is becoming increasingly common in clinical practice settings (CASN, 2012; Williamson, Fineout-Overholt, Kent, & Hutchinson, 2011). Nursing, as knowledge work, is information intense and technology is useful in managing the information nurses use every day (Williamson et al., 2011). Among employers there is a growing expectation that nurses will enter practice with competency in the use of ICTs. Despite the proliferation of technology there is an apparent need to strengthen the capacity of graduating nurses to manage information and to use health care specific information systems for the planning and evaluation of nursing care (Choi, 2012; Flood, Gasiewicz, & Delpier, 2010; Ornes & Gassert, 2007). Nursing education has lagged behind other sectors in the integration of informatics needed to ensure students have the informatics competencies they require on entry to practice. Nursing faculty and nursing students have been found to have relatively weak IT knowledge and skills (Choi, 2012; Fetter, 2009).

Baccalaureate nursing students were generally found to be moderate to competent in informatics knowledge, attitudes, and skills and tended to rate their own IT knowledge and skills higher than their performance showed (Choi). In an initiative to improve IT outcomes for undergraduate nursing students at one American college Fetter (2009) reported that faculty lacked the knowledge, skills, motivation, and resources to improve IT outcomes for entry-to-nursing practice, and that this situation was consistent with previous findings in the literature. Integrating NI competencies throughout undergraduate nursing education and making it a priority to improve IT outcomes are strongly recommended (Fetter).

Rationale

It can reasonably be expected that the NI competencies are already being integrated in the School of Nursing curriculum to some extent, but the degree to which this is being done is not readily apparent. According to Flood et al. (2010) the level of informatics competency of nursing students and beginning nurses is less than desired. To improve the capacity of nursing students to attain essential NI competencies it is important to determine how courses in the nursing curriculum support student development of these competencies and to identify any gaps that exist. There is already significant pressure in nursing education to incorporate an expanding array of competencies including, for example, immunization competencies for health professionals (Public Health Agency of Canada, 2008), home health nursing competencies (Community Health Nurses of Canada, 2010), palliative and end-of-life care competencies (CASN, 2011). In addition it is a challenge to ensure nursing students have a sufficient knowledge base across a broad spectrum of nursing when the amount and diversity of information/knowledge in healthcare continues to rapidly expand. A

strategic initiative is desirable to address the attainment of NI competencies in an integrated and manageable manner.

As a nurse educator in a BScN program at a small Nova Scotia university I am aware that NI is having an impact on nursing education and nursing practice. I have been interested in NI for several years and was eager to be involved in the integration of NI competencies in our nursing curriculum. I thought it would be beneficial to initiate the process of finding out if NI competencies are integrated in the curriculum because it can be helpful to have an individual or small team of people with NI interests to foster the process (Flood et al., 2010). The School of Nursing at St. Francis Xavier University where I work supported the need for this work.

Objectives

The overall goal of this practicum project is to pilot an audit to assess the extent to which nursing informatics entry to practice competencies (CASN, 2012) are covered in five of the courses in STFX BScN curriculum, identify gaps, and provide preliminary recommendations. The objectives of the project are to:

1. Become familiar with the CASN informatics competencies for beginning nurses and the issues involved in integrating the informatics competencies in an undergraduate nursing curriculum;
2. Conduct a literature review to:
 - critically appraise tools that may be suitable for a curriculum audit of nursing informatics competencies, and adapt an audit tool for the project;
 - identify potential issues and challenges that may arise in the process of the course audits; and

- provide background information on the integration of nursing informatics entry to practice competencies;
3. Champion the nursing informatics competencies at my workplace by engaging with faculty, nurse educators and students to discuss informatics competencies and their place in nursing education and nursing practice;
 4. Complete a pilot audit of five nursing courses at STFX to determine how the nursing informatics competencies are threaded through those courses, and to identify gaps that may exist;
 5. Develop a plan of action in collaboration with the curriculum committee for completing an audit of all remaining BScN courses if warranted;
 6. Provide initial recommendations to address gaps in informatics competencies in courses audited that may be identified in consultation with the course professor and nurse educators; and
 7. Demonstrate the use of advanced nursing practice competencies.

Literature Review

A literature review was conducted to provide background information on the CASN entry-to-practice competencies for Registered Nurses, the importance of NI competencies for nursing students and practicing nurses, and the integration of NI competencies in curricula. In addition the process of curriculum audit to assess integration of competencies was explored, and potential audit tools were evaluated to determine if a suitable tool could be found or adapted to use for conducting an audit of NI competencies in undergraduate nursing courses.

Development of the CASN NI entry-to-practice competencies

Funded by Canada Health Infoway, a Task force was formed by CASN, which included nurse educators, practitioners, NI experts, employers, student nurses, and provincial and territorial association representatives, to work toward developing a culture that embraces NI in nursing curricula and professional nursing practice. The first step of the task force was to articulate the NI competencies for entry-to-practice based on key research in the field of NI. The CASN NI competencies “incorporate the minimum knowledge and skills new registered nurses require to practice in an increasingly technology-enabled environment” (CASN, 2012, p.3).

Ongoing work to promote a culture that embraces NI continues as CASN leads the development of resources that can be used to increase the capacity of nursing faculty to teach NI and to develop outcomes based objectives for undergraduate nursing curricula (CASN, 2012). The entry-to-practice NI competencies were published in 2012 and include this overarching competency: “Uses information and communication technologies to support information synthesis in accordance with professional and regulatory standards in the delivery of patient/client care” (CASN, 2012, p. 5).

The foundational skills described by CASN (2012) are the skills students are expected to have on entry to undergraduate studies through their basic education and/or through exposure to ICTs in their daily lives. The foundational skills include the use of common ICT devices, basic computer software, electronic communications, the Internet, and awareness or use of common social media. The three NI competencies are the competencies that all nurses should attain by the time they graduate from an undergraduate nursing program in Canada. Each of the three NI competencies has a set of indicators, which provide a means to observe and assess acquisition of the particular competency. The three NI competencies are in the domains of information and knowledge use, professional and regulatory accountability; and use of information and communication technologies for patient/client care.

There are two key definitions that form the basis of competency in NI. The definition of competency is “a complex know-act based on combining and mobilizing internal resources (knowledge, skills, attitudes) and external resources to apply appropriately to specific types of situations” (CASN, 2012, p. 13). The definition of Nursing Informatics (NI) is the “science and practice (which) integrates nursing, its information and knowledge, and their management, with information and communication technologies to promote the health of people, families and communities worldwide” (IMIA, 2009 as cited in CASN, 2012, p. 1).

The CASN (2012) NI entry-to-practice competencies for registered nurses are aligned to the frequently cited seminal work by Staggers et al. (2001). These authors noted that NI competencies have been discussed in the literature since the 1980’s but there was no comprehensive valid list of informatics competencies for registered nurses that was based on research. To address this gap Staggers et al. defined four distinct skill

levels of practicing nurses and developed a list of informatics competencies expected at each level through a rigorous process engaging NI experts. The levels are: level 1 – beginning nurse, level 2 – experienced nurse, level 3 – informatics specialist, and level 4 – informatics innovator.

The need for NI Competencies for entry-to-practice

The need for NI competencies for nurses is an international issue (Bond & Procter, 2009). Expectations of nurses in Canada have evolved with the expansion of technology in healthcare. One of the key points of the Canadian Nurses Association (CNA) position paper on nursing information and knowledge management (CNA, 2006) is that competencies in information management and information and communications technology are no longer add-ons for the provision of health care; rather they are an integral part of health care and nursing. It is essential for the provision of patient care that healthcare professionals, including nurses, are using accurate information and the best evidence available. Nurses require competencies to be able to use information systems and ICTs effectively in their practice. In addition, it is essential that nurses play an active role in the selection, design, implementation, and evaluation of ICT solutions. Nurse educators and researchers are called upon by CNA to be collaborators in CNA's e-Nursing strategy by incorporating NI competencies in nursing education at all levels, and developing research programs that will help nurses more effectively use ICTs in nursing practice.

Historically nursing has been slower to embrace technology than other constituencies. Simpson (2006) asserted that:

Despite a wealth of studies showing how information technology (IT) improves care, makes the workplace better for clinicians, and reduces costs, nursing has

been the slowest constituency to accept it. Whatever basis nursing has for not using IT, there are even more compelling reasons why nursing must. Paramount among these is the rise of consumerism in healthcare and the resultant demand for evidence-based nursing (EBN) (p. 12).

Reasons for a technology lag in nursing include concern about holistic humanistic care versus technology characterized as dehumanizing (Care, Gregory, & Chernomas, 2010). Purnell (1998) suggested there was a dissonance between technology and nursing, noting that we would benefit from nurse engineers who could contribute to technological design so that we maximize the use of technology. To do this we need nursing students to have opportunity to learn and explore, and to nurture interest in developing technologies for improving patient outcomes from a holistic nursing perspective.

Ainsley and Brown (2009) discussed the gaps in informatics competencies for nurses, noting that informatics is identified as one of five core competencies necessary for all health professionals identified in the American Institute of Medicine report titled "Health Professions Education: A Bridge to Quality" (Ainsley & Brown, p. 228). In addition they noted that informatics supports the other four core competencies, which are patient-centered care, working in interdisciplinary teams, emphasizing evidence-based practice, and quality improvement. Ainsley and Brown noted concerns with the lower than expected level of informatics competencies among nurses and baccalaureate nursing students. Even though competencies are expected by nursing deans and directors they are often not taught.

Despite more nursing informatics content, on-line courses, and adoption of specific technologies, educators and undergraduate nursing students frequently do not meet expectations for ICT competencies and graduate nurses still do not meet the criteria

for NI competencies needed on entry-to-practice (Fetter, 2009). Fetter noted that in a longitudinal study by MacDowell and Ma conducted in 2007, nursing students' self-assessment of their basic computing and information literacy skills improved during undergraduate education, but nursing specific informatics competencies and advanced skills such as constructing spreadsheets and databases remained largely unchanged. In her report Fetter asserts that data collected in their initiative to improve IT outcomes for undergraduate nursing students in one American college and the literature reviewed for the report supported the claim that failure to achieve IT competence among nurses is not just an educational issue; it is a threat to the quality of patient care. Baccalaureate nursing programs are being compelled to ensure graduates are prepared to meet the IT expectations of agencies and hospitals (Choi, 2012; Fetter, 2009).

Many of the current students in nursing programs have grown up in the digital age. But we cannot assume that this will adequately prepare them for the skills and applications they will be required to use in health care. University students entering nursing programs have variable and often extensive experience with technology including video games, text messaging, and social media such as Facebook and YouTube (Care et al., 2010). Their classroom experiences with computers may have been limited, often to word processing, so it is not sufficient to assume that incoming students possess the foundational skills expected. The proliferation of technology in everyday life does not ensure graduating nurses have the capacity to use health care specific information systems for the planning and evaluation of nursing care (Choi, 2012; Ornes & Gassert, 2007). Fetter (2009) and Choi (2012) cited several studies that supported the conclusion that students and faculty had relatively weak IT knowledge and skills. Baccalaureate nursing students were generally found to be moderate to competent in informatics knowledge,

attitudes, and skills, however they tended to rate selves higher than their performance showed. Choi (2012) examined informatics competencies of BSN students in three programs, e.g., traditional, post RN to BSN, and accelerated BSN students. Findings included that all students perceived selves as most competent in 1) "basic computer knowledge" and 2) "clinical informatics attitudes", and least competent in "applied computer skills" and "clinical informatics role" (Choi, p. 6).

In a simulation exercise for a doctoral program on the integration of NI competencies in an undergraduate nursing program, the doctoral nursing students did not clearly define NI in a consistent way or identify many core competencies that will be essential for undergraduate nurses of the future (Dixon & Newlon, 2010). They tended to focus on computer literacy, which is often the case, rather than on information and informatics literacy that is needed to transform nursing education. Dixon and Newlon asserted that there is need to integrate informatics in nursing education to support transformation of health care and the nursing workforce to improve quality of health care and promote patient safety. The doctoral nursing students' performance was considered an important indicator since they will be the nursing educators of the future.

Informatics competency is an issue for other health disciplines as well. Brown and Dickson (2010) found that high school students are more confident in their e-Health literacy skills than students enrolled in a Masters program in occupational therapy (OT). The students in the OT program could critically appraise literature but they did not feel comfortable using information to guide decisions without being advised by a healthcare professional.

Since nurses form the largest group of providers in health care, Bond and Proctor (2009) assert that nurses as a group need to be confident and competent in the use of

electronic records if the implementation of electronic records is to be successful. The importance of NI in nursing practice is also evident because the use of technology in healthcare is expanding, healthcare is information intense, and technology can be used to help manage information, improve patient safety, reduce errors, and provide decision support (Bond & Procter, 2009; Ornes & Gassert, 2007). Technology also provides a means to access evidence to support practice and critical thinking. Nursing guidance can support patients who are increasingly reliant on ICT for accessing information and managing their health (Bond & Procter).

Informatics competencies in curricula

More strategic effort to promote nursing informatics competencies is needed to optimize utilization of technology and information systems including faculty development together with undergraduate and graduate education and research. There are signs of transformation including the position statement from CASN on nursing informatics in undergraduate curricula, and the call to commit to ICT and provide students with the education and experience required to ensure they are e-Health literate, and to promote research into the effectiveness of incorporating technology in nursing education (Care et al., 2010). According to Shorten, Wallace, and Crookes (2001) improved information-literacy skills and knowledge would result from integrating informatics competencies in the curriculum by teaching, learning, and assessment of these skills throughout the curriculum rather than teaching this knowledge and skills separate from the curriculum.

In 2003 the Health and Info Highway Division of Health Canada released the results of a national study conducted to promote development of NI competencies. The researchers for the study used a survey to assess the situation in undergraduate nursing

informatics education in all but 4 of 81 schools of nursing across Canada. At that time they found a culture that supported ICT in teaching and learning but rarely found a strategic plan or vision for the integration of ICT and NI in undergraduate nursing education. Some of the discrepancies they found were that faculty had more ICT access than students, greatest access to the library, and least access to clinical ICT systems. More education opportunities in ICT and NI were available to faculty than students; basic computer education was more available than NI, and less than one third of schools offered NI credit courses. Budgets for technology were found to be inadequate and it was very rare to find collaboration between ICT industry and schools of nursing. Although about three quarters of schools reported they integrate NI in the undergraduate curriculum, they did not know where the material was placed or how many hours were devoted to NI. Two thirds of schools of nursing surveyed had a curriculum vision or design that includes NI competencies but no outcome objectives. Faculty respondents agreed that NI and ICT essential for practicing nurses should be taught in undergraduate programs; but were less likely to agree that NI could improve quality of nursing care. Some of the conclusions warrant attention. For example, health informatics practice is outpacing nursing academia, as ICT and HIS are increasingly common in healthcare agencies. With the lack of supportive infrastructure, partnership with private sector is needed to move forward.

CNA (2006) called for nursing regulatory bodies in Canada to recognize ICT competencies as entry-level requirements for beginning nurses. This has come to pass as nurse regulators in Canada have included NI competencies in the beginning nurse competencies. The College of Registered Nurses of Nova Scotia (CRNNS) (2013) has since included the following NI competencies in the beginning competencies for registered nurses:

- Demonstrates critical inquiry in relation to new knowledge and technologies that change, enhance, or support nursing practice (CRNNS, 2013, p. 6).
- Understands nursing informatics and other information and communication technologies used in health care (CRNNS, 2013, p. 8).
- Uses information and communication technologies to support information synthesis (CRNNS, 2013, p.8).
- Verifies that clients have an understanding of essential information and skills to be active participants in their own care (CRNNS, 2013, p. 11).

Many of the CRNNS (2011) standards of practice relate to nursing informatics competencies and a few of the most obvious ones are highlighted here. Nursing informatics competencies support evidence based practice and improved safety consistent with

- Standard 1, Item 1.9 "contributes to safe, supportive and professional practice environments" (p. 9);
- Standard 2, Item 2.11 "utilizes and integrates current research findings in her/his practice" (p. 10) can be supported through the use of evidence-based practice (EBP) resources and tools at the point of care;
- Standard 3, 3.6 "provides relevant information to clients regarding their health" (p. 11), could include the sharing of Internet resources, smart phone apps for health management, and use of computer applications for patient education.; and

- Standard 4 includes at least three indicators that are directly impacted by nursing informatics, 4.1 "demonstrates leadership in developing strategies to improve client care outcomes" and 4.8 "supports and participates in developing, implementing and evaluating quality initiatives that improve nursing and/or healthcare and 4.9 "acts as a role model to clients, learners, peers and colleagues" (p. 12).

The focus on NI competency can be seen in the context of a movement toward broader competency driven curricula. Berdrow and Evers (2010) studied university students' and recent graduates' perceived competencies and compared these to corporate employers' expectations. Though the study by Berdrow and Evers was more directly applicable to a broad spectrum of university graduates it did have implications for nursing. The growing expectation by corporate organizations that employees be able to demonstrate competence in key areas was notable. Changes in workplaces have had an impact on this expectation and educational institutions are being compelled to adopt or consider adopting competency-based education. Similar to the situation that is seen with NI competencies, university students and graduates rated themselves higher in basic skills than in high level tasks such as managing people and mobilizing innovation or change; confidence in decision making did not always progress in a linear manner; undergraduate students often underestimate workplace demands; and skills demanded at the workplace are ones students feel least confident about. As nursing organizations continue to publish entry-level competencies in a variety of areas including NI, feedback from students about their ability to achieve desired outcomes will be important to ensure outcomes are achieved. In this project designed to audit NI competencies in undergraduate courses student feedback was not sought as it was beyond the scope of the project at this time.

Integration of skills learned throughout their educational programs helps nurses become competent in the use of NI skills. In a review of the literature on integration of health informatics (HI) in nursing curricula DeGagne, Bisanar, Makowski, and Neumann (2012) found inconsistencies in the extent that informatics competencies are integrated in undergraduate nursing education. They noted that NI outcomes for student nurses often do not meet the expectations of employers or workplace demands. Key recommendations they made were that informatics must be reinforced and emphasized; prerequisite informatics skills should be required to enter a BSN program and should be ensured by requiring certification such as the European Computer Driving License (ECDL)¹; faculty members should also be certified in pre-requisite informatics skills, and faculty members' interest and commitment in this area is essential for success. They recommend more research as well as leadership to promote HI in nursing curriculum.

Informatics competencies can be integrated into curriculum successfully (Desjardins et al., 2005; Ornes & Gassert, 2007) however routine measurement of informatics competence, rather than relying on self-reported competence, is needed to refine curriculum so that competence is achieved. In order to integrate the CASN NI competencies there is a need to evaluate if and what NI competencies are present in current curricula (Desjardins et al., 2005; Ornes & Gassert, 2007). Once the current situation is evident nurse educators can develop strategies to include required NI competencies in the program (Ornes & Gassert).

¹ ECDL Foundation provides certification that computer skills meet international certification standards for these skills (www.ecdl.com)

Audits for assessing NI competencies in curriculum

Assessing the integration of NI competencies in a curriculum is an important first step in order to identify any gaps in this process. Seager and Anema (2003) presented an overview of an audit process for conducting curriculum review. They defined audit as "a process that compares curriculum elements to existing standards" (Seager & Anema, 2003, p. 5) and outlined a number of steps in the process. Steps in the audit were: 1) identify the competencies to be used, 2) develop a master template for the audit based on the competencies, 3) form teams from each site teaching in each course, 4) have teams at each site review course material, exams, and discuss additional information in each course to identify if and how each competency was met in a course, 5) compile material using a different color pen for each course to make it easy to visualize, and 6) have team members from all sites compare and revise the evaluations to compile one audit for each course noting any apparent discrepancies. Seager and Anema (2003) reported that the audit process was helpful in identifying deficiencies and areas of overlap. This process was suggested for the review of the entire curriculum of the Nursing Associate Degree Program at the Tennessee State University where the authors are affiliated using "Educational Competencies for Graduates of Associate Degree Programs". The process of curriculum audit described by Seager and Anema was appropriate for adapting to the assessment of integration of the CASN (2012) NI competencies for entry-to-practice for registered nurses. It was apparent that using an audit tool to compare the CASN NI competencies (standards) to the current curriculum would be helpful in assessing the integration of NI competencies in courses offered in the SON. There were discrepancies between sites and among those conducting the audit described by Seager and Anema. To

help limit the potential for those kinds of discrepancies it was decided it would be beneficial to have an individual or team work through the process.

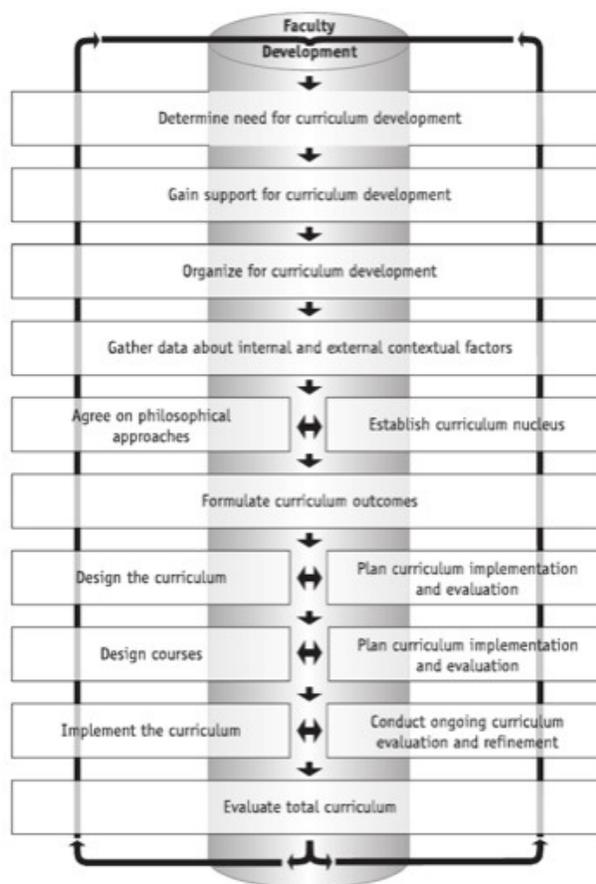
Ornes and Gassert (2007) described how a nursing program developed a tool to evaluate their curriculum for informatics content and gave an outline of the tool and a sample matrix. The sample tool shown in Ornes and Gassert and the presentation of the results of the audit were very beneficial in preparation for an audit of NI competencies in an undergraduate nursing program. The results were revealing as the authors noted that all of the competencies addressed in the curriculum were in the area of computer skills and there was no evidence of covering any of the informatics knowledge competencies in any of the course syllabi audited. According to these authors the key implication is that faculty members are the greatest barrier to incorporating informatics competencies in nursing education and they recommend adding criteria related to informatics practice by faculty to faculty evaluations. The key limitation of the study was that it relied on course syllabi. In-depth interviews of faculty and students would be helpful to assess further how well NI competencies were integrated as well as identifying some of the barriers and facilitators for improved integration.

The review of the literature supported the importance of student nurses attaining informatics competencies in preparation for entry-to-practice. This can be achieved by integrating NI competencies throughout the curriculum as is widely recommended. The practicum project presented in this report is a reasonable way to initiate the process of strategically integrating NI competencies by first conducting an audit of the current state of integration of NI competencies in nursing courses in the BScN program. This project pilots the use of an audit tool developed for this purpose to assess five courses in the BScN program.

Conceptual Framework

The audit of NI competencies in the BScN nursing curriculum at StFX was conceptualized using Iwasiw and Goldenberg's (2009) model of context relevant curriculum development (see Figure 1 below). This representation of curriculum development helped me to understand how my project links into the overall process of curriculum development in the School of Nursing and the use of this model is specific to the work in this report only. It is not used for other elements of the curriculum within the BScN program.

Figure 1: Context Relevant Curriculum Development



Source: Iwasiw, C.L. & Goldenberg, D. (2009). Curriculum Development in Nursing Education, 2nd Ed. Sudbury, MA: Jones and Bartlett Publishers, p. 8.

The auditing of the integration of the CASN NI competencies is driven by the need for curriculum development, imposed by external forces including the licensing bodies articulation of informatics competencies within beginning competencies for registered nurses, the expanding role of technology in health care, the increasing reliance on information systems in nursing practice, and the reality of current and anticipated continued growth in the role of information management systems and ICT in health care. Rather than applying the model to the whole curriculum I see it being useful for guiding the process of developing curriculum focusing on the integration of the CASN nursing informatics competencies. The key aspects of the model that apply to my practicum include conducting ongoing curriculum evaluation and refinement, in this case evaluating the integration of NI competencies, and the feedback loop represented by the arrows in the diagram fit with the feedback to the curriculum committee and with members of the School of Nursing regarding findings. Depending on the feedback, the need for curriculum development may be identified and the process of development would follow through the other phases of the model. The work, as it evolves, may be part of a larger curriculum development process or may be specific to the refinement of curriculum specifically focused on the NI competencies. This work is the early data gathering process.

Methods

The main focus of this practicum project is to audit the curriculum of the School of Nursing for the integration of NI competencies. Initially the topic came to my attention with the release of the CASN (2012) NI entry-to-practice competencies for Registered Nurses. The topic was reviewed with my practicum supervisors and the Director of the School of Nursing where I am employed to determine if the topic would be feasible for my practicum project. The Director of the School of Nursing at my place of employment

supported the need for this project. This support is an important component of context-relevant curriculum development as noted in Figure 1 on p. 22. In consultation with my practicum supervisors it was determined that I would select and adapt an audit tool for assessing the integration of NI competencies, conduct an initial pilot of the audit tool for one course and make revisions as needed. The revised audit tool would then be used to audit five courses for NI competencies.

The review of the literature was conducted to gather data about factors that influence the development curriculum related to NI and the integration of competencies in curricula to provide data on internal and external factors affecting context-relevant curriculum. The literature on integrating NI competencies in nursing curricula revealed one audit tool used by Ornes and Gassert (2007) to assess curricula for NI competencies. The tool was a basic table containing the competencies and criteria for assessment in each row, and the course number in each column. This tool was adapted to the CASN NI entry-to-practice competencies for Registered Nurses. There are four sections in the audit tool, one for the foundational skills for nursing students identified in CASN (2012) and the other three are for each of the three CASN NI competencies. The four sections for foundational skills and three competencies are in the first column under Competency/Domain. Each section contains a list of criteria for assessment, these are the indicators listed in the second column of the form for each of the four sections on the CASN foundational skills and NI competencies. The audit tool is in Appendix B of this report. The initial iteration of the audit tool was piloted with an audit of one course, and then minor revisions were made to provide some basic information to the user when interviewing participants for conducting a course audit. The results of the initial pilot of the audit tool are not included in this report as there has been considerable revision to the

course since that initial audit was completed. The main purpose of the initial audit was to test the audit tool and refine it for the subsequent course audits.

Participants were selected for the audit of five undergraduate nursing courses. The plan to initially audit five courses was believed to be necessary to ensure that there was sufficient time to complete the audits as a pilot project. The participant selection was made to accommodate the timeframe available as well as availability of faculty and to get a broad representation of courses across the years of the program and with a variety of courses in undergraduate nursing at the university where I work. Potential participants were approached in person, provided with an introduction and invited to participate. All of the participants approached were willing and available to meet for approximately 45 minutes to one hour during October or November of 2013 when the audits would be conducted. In all there were nine nursing faculty and nurse educators who participated as one course had more than one section and two faculty members teaching one section. Another course had one course professor teaching the theory component of the course and two nurse educators teaching the clinical component. Where possible, all individuals involved in each course were included to help ensure that the data was a reflection of all facets of the courses. All participants were provided with a handout briefly describing this practicum project. The handout is in Appendix A of this report.

Interviews with participants were conducted to complete the audit of NI competencies in the selected nursing courses with participants over a period of two weeks in early to mid-November, 2013. Each of the courses audited was assigned a number from 1 to 5. For one Section of Course #3 the audit was conducted with two participants in attendance as they shared the teaching of one section. All other audits were conducted via one-to-one interviews. Two of the interviews for course audits were conducted via

telephone as the participants were teaching the clinical component of the course and were not available for face-to-face meetings. In all eight interviews were conducted to complete the audit of the five courses selected.

Using the audit tool in Appendix A, I recorded whether or not each indicator was addressed over five areas. These five areas are: content (theory component of the course), practice (clinical practice component of the course), assessment (including graded assignments, tests or exams or clinical evaluation), syllabus (yes or no) and objectives (yes or no). The findings of the audit are reported in the next section of this report. This project was presented via teleconference at Memorial University of Newfoundland (MUN) to faculty and students in the MN program and feedback from that presentation provided useful insights for improving the audit process and presentation of findings.

Findings

The findings of the course audits of integration of NI entry-to-practice competencies are presented in table format with discussion to provide more detail. Tables 1 through 4 present the data from the audits for each of the foundational skills and the 3 NI competencies. For each course numbered 1 through 5 there is a check mark to indicate if the competency/domain is addressed in each of the five components of the course as noted previously in the Methods section.

Table 1: Foundational skills (device and application use) – expected on entry into undergraduate education (CASN, 2012)

Course Number	1	2	3	4	5
Content (Theory)	✓	✓	✓	✓	✓
Practice (Clinical)		n/a	n/a	✓	✓
Assessed		✓	✓	✓	✓
Syllabus					✓
Objective					✓

In Table 1 above it is apparent that all of the five courses audited address some of the basic skills needed to use computers and other devices, and use some software for completing assignments, communicating or accessing information about the course. More often than not the skills are expected, not taught, and word processing and email are the most commonly used applications across the five courses. Only Course 5, which is a senior nursing elective, includes some aspect related to foundational skills in the course objectives and course syllabus.

Table 2: Competency - Uses relevant information and knowledge to support the delivery of evidence-informed patient care

Course Number	1	2	3	4	5
Content (Theory)	✓	✓	✓	✓	✓
Practice (Clinical)	✓	n/a	n/a	✓	n/a
Assessed	✓	✓	✓	✓	✓
Syllabus	✓		✓		✓
Objective	✓		✓		✓

In Table 2 above all five courses are noted to include this competency at least to some extent in the course content or theory component. Most of the indicators of this competency were addressed at least superficially in all five courses. In upper level courses (Courses 3, 4, and 5) in particular there is significant focus on search, critique, and analysis of literature. There is some use of evidence-based-practice guidelines and some critique of these guidelines as well, it is variable depending on the course and the course professor. In practice (clinical) there is variability between clinical agencies depending on accessibility and inconsistencies within patient records may be addressed. Assessment of this competency is through assignments on use of relevant literature, literature search and critique, care plans and in clinical evaluation tools. Only one indicator, search and critical appraisal is noted in syllabi and/or objectives, and in Course 1 an objective regarding use of resources to support EBP is noted.

Table 3: Competency – uses ICTs in accordance with professional and regulatory standards and workplace policies

Course Number	1	2	3	4	5
Content (Theory)	✓	✓	✓	✓	✓
Practice (Clinical)	✓	n/a	n/a	✓	n/a
Assessed		✓	✓	✓	✓
Syllabus			✓		✓
Objectives			✓		✓

The use of ICTs in accordance with regulatory standards and workplace policies is addressed to some degree in the content or theory component of the five courses as noted in Table 3 above. The indicators addressed include ethical standards of use, advocating for use of ICT, and use of professional judgment. Course 3 has little or only very superficial reference to inclusion of system processes, system down-time and the importance of nursing involvement in design, selection and implementation of information systems. Assessment related to this competency includes the clinical evaluation to assess students' performance in advocating for the use of ICT to support safe, quality care.

Table 4: Competency – uses information and communication technologies in the delivery of patient/client care

Course Number	1	2	3	4	5
Content (Theory)		✓	✓	✓	✓
Practice (Clinical)	✓	n/a	n/a	✓	n/a
Assessed			✓	✓	✓
Syllabus					
Objective					

In Table 4 above it appears that this competency is integrated in four of the five courses. However the details of the audits suggest that the indicators for this competency are touched on in terms of EBP to guide decisions, and consideration of benefits of informatics to improve health systems and quality of inter-professional practice is addressed in course number 5 in particular. Some assessment of this competency may

occur in Course 3 but it is highly variable as it depends if students include any EBP guidelines in one of the assignments, it is not required. Course 4 assessed the use of ICT to support (not interfere with) nurse-patient relationship in clinical evaluations.

The following three tables: Tables 5, 6 and 7 provide an overview of the coverage of each indicator in the three domains of the NI competencies. Each checkmark represents one course of the five that addresses the indicator either superficially or comprehensively. Thus five checkmarks would indicate that all of the courses address the indicator in some way. From the data in Tables 5, 6 and 7 it can be seen that there is a tendency for many of the courses to address a few of the indicators, while other indicators are not addressed in any of the five courses. In Table 5 it is noteworthy that the significance of information standards for interoperability is addressed in respect to population health data because this was included in a community nursing course.

Table 5: Knowledge and Information Management

Indicator	Content	Practice	Assessment	Syllabus	Objective
Search & critical appraisal	✓✓✓ ✓✓	✓	✓✓✓✓	✓✓✓ ✓✓	✓✓✓✓ ✓
Analyze, interpret & document using clinical terminologies	✓	✓	✓✓		
Assists patient & families evaluate & retrieve info using ICTs	✓	✓			
Assists patient & families with leveraging ICTs to manage health		✓			
Describes data gathering, identify gaps & risks	✓✓	✓	✓✓✓		
Articulate significance of info standards for interoperable records	✓	✓			
Articulate importance of standardized nursing data to reflect nursing practice	✓✓✓	✓	✓		
Critically evaluates data and info from variety of sources to inform delivery of nursing care	✓✓✓ ✓	✓✓	✓✓	✓✓✓ ✓	✓✓

Table 6: Professional and regulatory accountability

Indicator	Content	Practice	Assessment	Syllabus	Objective
Complies with legal/regulatory requirements, ethical standards, policies	✓✓✓ ✓	✓✓	✓✓✓	✓	✓
Advocates for use of current & innovative ICTs that support safe, quality care	✓✓✓ ✓✓	✓✓	✓✓	✓	✓
Identifies and reports system process & functional issues	✓	✓	✓		
Maintains effective nursing practice & patient safety during system unavailability		✓	✓		
Demonstrates professional judgment must prevail in presence of technologies (monitoring devices/decision support tools)	✓✓✓ ✓	✓✓	✓		
Recognizes importance of nurses' involvement in design, selection, implementation & evaluation of HIS	✓	✓			

Table 7: Information and Communication Technologies

Indicator	Content	Practice	Assessment	Syllabus	Objective
Identifies & demonstrates appropriate use of ICTs (EHR, EMR, telehomecare, etc.) across variety of settings	✓	✓✓			
Uses decision support tools to assist clinical judgment & safe patient care	✓✓	✓✓			
Uses ICTs in manner that support the nurse-patient relationship	✓	✓	✓✓		
Describes components of HIS (e.g., results reporting, order entry, clinical documentation, MAR)		✓			
Describes various types of electronic records and their clinical and administrative uses	✓				
Describes benefits of informatics to improve systems & inter-professional patient care	✓✓✓ ✓	✓			

Discussion

The findings from the pilot audit of five courses in the BScN program to determine if CASN (2012) nursing informatics competencies are integrated have been useful in identifying strengths and gaps that can help guide future endeavors to continue the audit process and some preliminary suggestions to further integrate informatics competencies. The process of conducting the audits was very positive as all participants in the project expressed interest and enthusiasm for embracing informatics competencies.

In general the findings of the audits were consistent with previous reports in the literature. There tends to be more focus on basic computer skills and device use, as well as search and critical appraisal of literature and other resources than on other aspects of informatics competencies. There was considerable variability in the amount of coverage, if any, for several indicators as they were often addressed informally and only under specific circumstances as they arose. There were also variations in opportunity to engage in the use of health information systems in nursing practice depending on the clinical agencies.

A few key gaps in the integration of informatics competencies were identified. One gap was assisting patients and families to access and evaluate information using ICTs and another was assisting patients and families to leverage ICTs to manage their own health. These competencies have taken on increasing importance given the widespread use of information on health available and accessed on the Internet. Patients and families need to know how to use this information well and to their benefit. A third area which was a considerable gap in the courses audited was specific to nursing informatics; including articulating the importance of standardized nursing data to reflect nursing practice, advancing nursing knowledge, and contributing to the value and understanding of nursing.

The importance of nursing involvement in the design, selection, implementation, and evaluation of information systems was another related gap, as was the ability to differentiate various types of electronic records and their uses across the continuum of care. These gaps tend to be in the area of informatics competency rather than information literacy. This is consistent with findings reported by Fetter (2009) that nursing specific informatics competencies were generally not addressed in theory courses. There is a need to strengthen outcomes and advanced skills.

The audit tool itself was helpful because it provided a format to discuss each of the indicators of the foundational skills and NI competencies. Each indicator was presented to the participant and they were asked to comment on how that indicator was addressed in their teaching, assessment, and in the course syllabi and objectives. Providing an opportunity for participants to answer in an open-ended manner helped to generate further discussion about the NI competencies and also provided an opportunity for participants to comment on ways they could enhance the integration of NI competencies and concerns they had about potential impact of disparities in health in relations to such things as information standards and their limitations in exceptional circumstances.

Initial feedback following an oral presentation of this report to peers via teleconference included a suggestion to capture whether the indicators were integrated in a comprehensive versus superficial manner. This suggestion is very helpful and will be recommended to incorporate if the School of Nursing where the audit was done makes a decision to continue the audit of the remaining courses in the BScN nursing curriculum. I attempted to address this issue in the written comments regarding the findings of the audit to date.

Advanced Nursing Competencies

Through the experience of developing and completing this practicum project I have continued to develop advanced nursing practice competencies as defined by Canadian Nurses Association (2008). Reflecting on the advanced nursing practice competencies, I found that this project helped me use my graduate nursing education to develop competencies in four main areas.

First, I have increased my understanding and ability to participate in the process of curriculum development to enhance education for student nurses so that they have the opportunity to graduate with essential skills in NI for beginning practice in a technologically advanced healthcare environment. My practice is in nursing education thus my clinical competence is reflected in improving my capacity to contribute to the education of nursing students. I have indirectly contributed to enhancing student nurses' NI competencies through working with my colleagues on the beginning phase of improving the integration of NI competencies in our curriculum, and I have contributed directly to enhancing student nurses' NI competencies by using some of the knowledge I gained in planning and delivering computer documentation training in the lab and supervising student nurses using computer documentation systems and electronic resources in clinical practice.

Second, I have developed research competencies in terms of being able to analyze, integrate and disseminate evidence-based nursing knowledge. The CASN (2012) NI competencies for entry-to-practice are well researched and formulated by a team of experts, nurse regulators, nurse educators, student nurses and practicing nurses from across Canada. I also reviewed significant and key research that informed the development of the CASN NI competencies, that addressed nursing informatics in

nursing education, and that informed the process of curriculum audit to assess integration of NI competencies. This research was used to provide the background and rationale for my practicum project and to develop the methods for the project. Through the review of research I have developed comprehensive knowledge of nursing informatics competencies for entry to practice and the issues that impact the integration of these competencies in undergraduate nursing curricula. I disseminated evidence-based nursing knowledge on NI competencies and related issues in the interviews I conducted during the course audit process and in my presentation at Memorial University of Newfoundland and at St. Francis Xavier University where I am employed. I conducted a presentation of my project at curriculum committee and have made my presentation available to the curriculum committee at St. Francis Xavier University for further dissemination and development.

Third, I have demonstrated development of leadership competency by identifying the need for, and engaging my colleagues in assessing the integration of NI competencies in our nursing curriculum. I presented the idea for the project to the director of the School of Nursing and the chair of the curriculum committee who supported the need for this project. I initiated the process of assessing integration of CASN NI competencies for entry-to-practice in undergraduate nursing courses at St. Francis Xavier University. Through my work on this project I advocated for enhancing nursing students NI competencies to ultimately improve patient outcomes and advance the profession of nursing and interdisciplinary practice.

Fourth, this project has helped me to develop competencies in consultation and collaboration. I was able to collaborate effectively with the curriculum coordinator and the director to explore the need for the project, and I continued to consult them as I

planned and implemented the pilot audit of the integration of NI competencies in undergraduate nursing courses. I also consulted with my Masters of Nursing supervisor at Memorial University for guidance and feedback on my project. I consulted with colleagues for feedback on the audit tool and on their knowledge and attitudes toward nursing informatics in general and nursing informatics competencies in particular to help me develop and present this project. I arranged and coordinated meetings with my work colleagues in nursing to introduce the project, recruit participants and conduct interviews to complete the audit of five courses for integration of NI competencies. I initiated a meeting with the curriculum committee so that I could present my work to them and receive feedback from them. The curriculum committee was enthusiastic about this project as they are proceeding with a broader curriculum review and this fits well with that process.

I realized that in advanced nursing practice there are challenges coordinating an initiative with any community, in this case a community of my peers, as scheduling conflicts and workplace demands often arose. This awareness is important for future work as I learned the importance of identifying a few key people to work with to help ensure success.

I value the experience I have had with this project and am committed to further work on integrating NI competencies in undergraduate nursing education and enhancing my capacity to contribute positively to development of nursing curriculum, nursing education and nursing practice. I recognize the importance of graduate education in my development as a nurse educator and have strengthened my commitment to life-long learning.

Conclusion

Following the completion of this project I make the following preliminary recommendations.

- First that the audit of NI entry-to-practice competencies in the remaining courses in the BScN program continues;
- Second that the remaining audits assess if each indicator is addressed in a comprehensive or superficial manner; and
- Third I would recommend that plans to present this report to the curriculum chair and committee and to the members of the School of Nursing where the audit is being done be carried to fruition. Following those presentations the curriculum committee, other faculty and nurse educators can make a collective decision about if and how to continue this process.

References

- Ainsley, B., & Brown, A. (2009). The impact of informatics on nursing education: A review of the literature. *The Journal of Continuing Education in Nursing, 40*, 228-232. doi: 10.3928/00220124-20090422-02.
- Bond, C. S., & Procter, P. M. (2009). Prescription for nursing informatics in pre-registration nurse education. *Health Informatics Journal, 15*(1), 55-64. doi:10.1177/1460458208099868.
- Brown, C. A., & Dickson, R. (2010). Healthcare students' e-literacy skills. *Journal of Allied Health, 39*, 179-184. Retrieved from <http://docserver.ingentaconnect.com.qe2a-proxy.mun.ca/deliver/connect/asahp/00907421/v39n3/s10.pdf?expires=1400688838&id=78223760&titleid=6329&acname=Memorial+University+of+Newfoundland&checksum=18E25EFD25F367B26B3D205E51440C83>
- Canadian Nursing Informatics Association (2003). *Assessing the informatics education needs of Canadian nurses educational institution component: Educating tomorrow's nurses – where's Nursing Informatics?* Retrieved from: <http://nursing-informatics.com/niassess/OHIHfinal.pdf>
- Canadian Association of Schools of Nursing. (2012). *Nursing informatics entry-to-practice competencies for Registered Nurses*. Ottawa, ON: Author. Retrieved from http://www.casn.ca/en/Whats_new_at_CASN_108/items/123.html.

- Canadian Association of Schools of Nursing. (2011). *Palliative and end-of-life care competencies and indicators for Registered Nurses*. Ottawa, ON: Canadian Association of Schools of Nursing. Retrieved from: https://www.casn.ca/en/Competencies_and_indicators_168/items/3.html.
- Canadian Nurses Association. (2006). Position Paper: Nursing information and knowledge management. Retrieved from: <http://www.cna-aiic.ca/~media/cna/page%20content/pdf%20en/2013/07/26/10/40/ps87-nursing-info-knowledge-e.pdf>
- Canadian Nurses Association. (2008). *Advanced Nursing Practice: A national framework*. Ottawa, ON: Canadian Nurses Association. Retrieved from: http://www.cna-aiic.ca/sitecore%20modules/web/~media/cna/page%20content/pdf%20fr/2013/09/05/19/21/anp_national_framework_e.pdf#search=%22advanced%20nursing%20practice%20framework%22
- Care, W.D., Gregory, D.M., & Chernomas, W.M. (2010). Nursing, technology, and informatics: understanding the past and embracing the future. In M. McIntyre & C. McDonald (Eds.), *Realities of Canadian Nursing Professional, Practice, and Power Issues* (3rd ed., pp. 238-258). Philadelphia, PA: Lippincott, Williams & Wilkins.
- Choi, J. (2012). Comparative assessment of informatics competencies in three undergraduate programs. *Online Journal of Nursing Informatics*, 16(2). Retrieved from <http://ojni.org/issues/?p=1700>
- College of Registered Nurses of Nova Scotia. (2013). *Entry-level competencies for Registered Nurses in Nova Scotia*. Halifax, NS: Author. Retrieved from <http://www.crnns.ca/default.asp?mn=414.1116.1124.1161>.

- College of Registered Nurses of Nova Scotia. (2011). *2012 Standards of Practice for Registered Nurses*. Retrieved from <http://www.crnns.ca/default.asp?mn=414.1116.1124.23363>.
- Community Health Nurses of Canada. (2010). *Home Health Nursing competencies version 1.0, March 2010*. Retrieved from <http://www.chnc.ca/competencies.cfm>.
- DeGagne, J.C., Bisanar, W.A., Makowski, J.T., & Neumann, J.L (2012). Integrating informatics into the BSN Curriculum. *Nurse Education Today*, 32, 675-82. doi: 10.1016/j.nedt.2011.09.003
- Desjardins, K.S., Cook, S.S., Jenkins, M., & Bakken, S. (2005). Effect of an informatics for evidence-based practice curriculum on nursing informatics competencies. *International Journal of Medical Informatics*, 74, 1012-1020. Retrieved from: <http://www.sciencedirect.com.qe2a-proxy.mun.ca/science/journal/13865056/74/11-12>
- Dixon, B.E., & Newlon, C.M. (2010) How do future nursing 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.
- Fetter, M.S. (2009). Curriculum strategies to improve baccalaureate nursing information technology outcomes. *Journal for Nursing Education*, 48(2), 78-85. doi:10.3928/01484834-20090201-06.
- Flood, L., Gasiewicz, N., & Delpier, T. (2010). Integrating information literacy across a BSN curriculum. *Journal of Nursing Education*, 49, 101-104. doi:10.3928/01484834-20091023-01

- Ornes, L. L., & Gassert, C. (2007). Computer competencies in a BSN program. *Journal of Nursing Education*, 46(2), 75-78. Retrieved from: <http://web.a.ebscohost.com.qe2a-proxy.mun.ca/ehost/pdfviewer/pdfviewer?vid=3&sid=00cf90d3-12f8-4c0f-bf40-413733f4935c%40sessionmgr4004&hid=4109>
- Public Health Agency of Canada (2008). *Immunization competencies for health professionals*. Ottawa, ON: Author. Retrieved from <http://www.phac-aspc.gc.ca/im/pdf/ichp-cips-eng.pdf>.
- Seager, S.R., & Anema, M.G. (2003). A process for conducting a curriculum audit. *Nurse Educator*, 28, 5-6. doi: 10.1097/00006223-200301000-00003
- Shorten, A., Wallace, M., & Crookes, P. (2001). Developing information literacy: a key to evidence-based nursing. *International Nursing Review*, 48(2), 86-92. Retrieved from: <http://web.a.ebscohost.com.qe2a-proxy.mun.ca/ehost/pdfviewer/pdfviewer?vid=3&sid=62e77598-cc07-4251-8278-2354ee9666a3%40sessionmgr4002&hid=4109>
- Simpson, R.L. (2006). What's nursing's PLAN for IT ubiquity? *Nursing Management*, 37, 12-16. Retrieved from <http://web.b.ebscohost.com.qe2a-proxy.mun.ca/ehost/pdfviewer/pdfviewer?vid=13&sid=a65dfbab-42e1-4681-b175-3e3cb1823464%40sessionmgr110&hid=113>
- Staggers, N., Gassert, C. A., & Curran, C. (2001). Informatics competencies for nurses at four levels of practice. *The Journal of Nursing Education*, 40, 303-316. Retrieved from: <http://web.a.ebscohost.com.qe2a-proxy.mun.ca/ehost/pdfviewer/pdfviewer?vid=3&sid=caa7b533-9cf4-4048-ac4f-f277e7624d56%40sessionmgr4002&hid=4109>

- 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, 383-390. Retrieved from: http://ovidsp.tx.ovid.com.qe2a-proxy.mun.ca/sp-3.12.0b/ovidweb.cgi?&S=OGPKFPHOINDDBIEHNCMKOHMCINJLAA00&Link+Set=S.sh.54.55.58.63%7c6%7csl_10
- Williamson, K.M., Fineout-Overholt, E., Kent, B., & Hutchinson, A.M. (2011). Teaching EBP: integrating technology into academic curricula to facilitate evidence-based decision-making. *Worldviews on Evidence-Based Nursing*, 8, 247-251 . doi: 10.1111/j.1741-6787.2010.00192.x

APPENDIX A: Information for Faculty/Nurse Educators

STFX, School of Nursing

Nursing Informatics Competencies audit:

Information for Faculty/Nurse Educators

Sherry Bowman

I am currently completing a practicum project in the Masters of Nursing program at Memorial University of Newfoundland. My project will be to pilot an audit tool which will be used to assess the extent to which nursing informatics entry-to-practice competencies (CASN, 2012) are integrated in five of the courses in STFX 4 year BScN curriculum, identify gaps and provide preliminary recommendations. Below I provide a brief introduction to the competencies and to my project.

Background

In 2012 the Canadian Association of Schools of Nursing (CASN) published the “Nursing Informatics: Entry-to-practice competencies for Registered Nurses”. The nursing informatics (NI) competencies include one over-arching competency, foundational skills anticipated of all students on entry into nursing education, and three entry-to-practice competencies. There are a list of observable and assessable indicators accompanying the foundational skills and each of the three competencies (CASN, 2012). In all they form a list of expected capabilities of nurses entering practice on completion of undergraduate education. The competencies were developed as part of a project to promote the integration of NI in nursing education and nursing practice funded by Canada

Health Infoway (CASN, 2012). The work engaged a team of experts in NI from across Canada and was based on key research in the field.

Globally the use of evidence-informed practice and information technology is increasingly common in clinical practice settings (CASN, 2012; Williamson, Fineout-Overholt, Kent, & Hutchinson, 2011). Nursing, as knowledge work, is information intense. Technology is useful in managing the information nurses use every day (Williamson et al., 2011). Among employers there is a growing expectation that nurses will enter practice with competency in the use of ICT. Despite the proliferation of technology there is an apparent need to strengthen the capacity of graduating nurses to manage information and to use health care specific information systems for the planning and evaluation of nursing care (Choi, 2012; Ornes & Gassert, 2007).

Nurse regulating authorities across Canada, including The College of Registered Nurses of Nova Scotia (CRNNS, 2013), include broad nursing informatics competencies in the entry-to-practice competencies for registered nurses. These competencies are consistent with the CASN informatics competencies for entry-to-practice. There is a growing expectation that technologically competent nurses entering practice will be proficient users, and that some of those nurses may help develop innovative solutions to further use of evidence informed practice (Bond & Procter, 2009). In addition, patients and families are using ICT to access information and make decisions about their care, and nurses need to be able to provide guidance and support in accessing and using information (Bond & Procter).

To promote the integration of the informatics competencies in the BScN Nursing Program at St. Francis Xavier University (STFX) it would be helpful to first determine the extent to which the CASN nursing informatics competencies are threaded through the

courses offered and to identify any gaps that may exist. Then strategies can be developed to address those gaps. As part of my Masters of Nursing program, I decided to pursue this project to select, adapt and pilot an audit tool that could be used to conduct an audit of nursing informatics competencies in nursing courses in the BScN program at STFX.

Plan of action

I will meet with each course professor who has agreed to participate in the pilot audit for five courses identified and use the audit tool to review each indicator for the foundational skills, and the three nursing informatics competencies. To get a better understanding of how informatics competencies are integrated I will consider if each indicator is covered in course content or in clinical practice, whether the indicator is assessed either through assignments or evaluation, and if the indicator is identified in the course syllabus or course objectives. When I have completed the audits I will compile the results, provide preliminary recommendations, and present them to course professors who participated in the competencies audit, and to the Director of the School of Nursing and the Coordinator of the Curriculum Committee. I will be presenting my practicum project to MUN in the Masters Program. In consultation with the Director of the School of Nursing and the Curriculum committee the audit of nursing informatics competencies may be extended to include all courses in the BScN program, though this will be additional to my practicum project.

Acknowledgements

I appreciate the willingness of all who have agreed to participate in my practicum project. I would like to acknowledge my supervisor, Dr. Shirley Solberg for her support and guidance. I also would like to acknowledge Dr. Diane Duff for supporting this review of courses for NI competencies and my Masters Practicum project.

References

- Bond, C. S., & Procter, P. M. (2009). Prescription for nursing informatics in pre-registration nurse education. *Health Informatics Journal*, 15(1), 55-64.
doi:10.1177/1460458208099868
- Canadian Association of Schools of Nursing (2012). *Nursing Informatics: entry-to-practice competencies for Registered Nurses*. Ottawa: Author. Retrieved from:
<https://www.casn.ca/vm/newvisual/attachments/856/Media/NursingInformaticsEntryToPracticeCompetenciesFINALENG.pdf>
- Choi, J. (2012). Comparative assessment of informatics competencies in three undergraduate programs. *Online Journal of Nursing Informatics*, 16(2): Retrieved from: <http://ojni.org/issues/?p=%201700>
- College of Registered Nurses of Nova Scotia (2013). *Entry-level competencies for Registered Nurses in Nova Scotia*. Halifax, NS: Author. Retrieved from:
<http://www.crnns.ca/documents/Entry-LevelCompetenciesRNs.pdf>
- Ornes, L. L., & Gassert, C. (2007). Computer competencies in a BSN program. *Journal of Nursing Education*, 46(2), 75-78. Retrieved from <http://search.ebscohost.com.qe2a-proxy.mun.ca/login.aspx?direct=true&db=rzh&AN=2009498850&site=ehost-live&scope=site>
- Williamson, K.M., Fineout-Overholt, E., Kent, B., & Hutchinson, A.M. (2011). Teaching EBP: Integrating technology into academic curricula to facilitate evidence-based decision-making. *Worldviews on Evidence-Based Nursing*, 8, 247-251.
doi: 10.1111/j.1741-6787.2010.00192.x

Appendix B: NI Competencies Audit Tool adapted from Ornes and Gassert, 2007

Course Name: _____
 Course Number: _____

For each indicator note if it is addressed in course syllabus, objectives, content, lecture/practice, and if it is assessed

Competency (Domain)	Indicator	For content, practice and assessment use 3 point scale for each item (0 = not addressed, 1 = partial or introduced, 3 = comprehensive)			Yes (Y) / No (N)	
		Content	Practice	Assessment	Syllabus	Objectives
Through elementary and secondary education, and life experience nursing students are expected to be competent in these foundational skills on entry into an undergraduate program. (notes for each indicator in this section consider if students are learning, practicing or using the foundational skills within the framework of the course. Some of these skills are areas that students are often not confident with despite the expectation that they have learned these in Elementary and Secondary School)	1. Device Use					
	a) Demonstrates basic skills in the use of ICTs components (PC, hand held, tablets, smart phones, workstations, modems, Bluetooth-enabled devices, keyboarding, mouse or touchpad, peripheral devices, USB devices, and on line learning tools)					
	b) Uses Internet and extranet networks to navigate systems (shared file servers, VPNs, www, cloud computing, knowresnet)					
	2. Application use					
	a) Uses electronic communication					
	b) Familiar with the use of multimedia presentations					
	c) Uses word processing					
	d) Uses spreadsheets					
	e) Uses presentation graphics (slide shows, displays*)					
	f) Navigates primary operating systems for file management (create, delete, manage), printing, access to installed applications					
	g) Uses technology for self-directed learning					
	h) Is familiar with social networking applications (Twitter, Facebook, LinkedIn, etc)					

Information and Knowledge Management	Content	Practice	Assessment
<p>Uses relevant information and knowledge to support the delivery of evidence-informed patient care (note: for each of the indicators consider if the course material enables the students to develop the ability to achieve this indicator)</p>	<p>1. Performs search and critical appraisal of online literature and resources to support clinical judgement, and evidence-informed decision making</p>		
	<p>2. Analyzes, interprets, and documents pertinent nursing data and patient data using standardized nursing and other clinical terminologies (ICNP, C-HONC, and SNOMED-CT, etc.)</p>		
	<p>3 (a). Assists patients and their families to access, review and evaluate information the receive using ICTs (current, credible and relevant)</p>		
	<p>3 (b). Assists patients and their families with leveraging ICTs to manage their health (social media apps, smart phone applications, online support groups, etc.)</p>		
	<p>4 (a). Describes the processes of data gathering, recording and retrieval, in hybrid or homogeneous health records (electronic or paper)</p>		
	<p>4 (b). Identifies informational risk, gaps, and inconsistencies across the healthcare system</p>		
	<p>5. Articulates the significance of information standards necessary for interoperable electronic health records across the healthcare system</p>		

<p>6. Articulates the importance of standardized nursing data to reflect nursing practice, to advance nursing knowledge, and to contribute to the value and understanding of nursing</p>						
<p>7. Critically evaluates data and information from a variety of sources (experts, clinical applications, databases, practice guidelines, relevant websites, etc.) to inform the delivery of nursing care.</p>						
<p>Professional and Regulatory Accountability</p>						
<p>Uses ICIS in accordance with professional and regulatory standards and workplace policies (Notes for each indicator consider there is opportunity to achieve the noted indicator through course material/practice)</p>	<p>1. Complies with legal and regulatory requirements, ethical standards, and organizational policies and procedures (e.g., protection of health information, privacy, and security)</p>					

	<p>6. Recognizes the importance of nurses' involvement in the design, selection, implementation, and evaluation of applications and systems in health care</p>										
	<p>Information and Communication Technologies</p> <p>Uses information and communication technologies in the delivery of patient/client care (Note: for each indicator consider if there is opportunity for students to develop necessary skills/attributes to achieve)</p>		<p>1. Identifies and demonstrates appropriate use of a variety of information and communication technologies (e.g., point of care systems, EHR, EMR, capillary blood glucose, hemodynamic monitoring, telemedicine, fetal heart monitoring devices, etc.) to deliver safe nursing care to diverse populations in a variety of settings</p>		<p>2. Uses decision support tools (e.g., clinical alerts and reminders, critical pathways, web-based clinical practice guidelines, etc.) to assist clinical judgment and safe patient care</p>		<p>3. Uses ICTs in a manner that supports (does not interfere with) the nurse-patient relationship</p>		<p>4. Describes the various components to health information systems (e.g., results reporting, computerized provider order entry, clinical documentation, electronic Medication Administration Records, etc.)</p>		<p>5. Describes the various types of electronic records used across the continuum of care (e.g., EHR, EMR, PHR, etc.) and their clinical and administrative uses</p>
											<p>6. Describes the benefits of informatics to improve health systems, and the quality of interprofessional patient care</p>