

Assessing the Informatics Education Needs of Canadian Nurses Educational Institution Component

Educating Tomorrow's Nurses – Where's Nursing Informatics?

Executive Summary

Background

There has been rapid growth and expectations of health care information systems and technology in health care settings. With this growth has come the need to ensure that nurses have the necessary informatics competencies (knowledge, skills, attitudes and decision making) to effectively meet their responsibilities and standards for nursing practice. The goal of nursing informatics is to improve the health of populations, communities, families, and individuals by optimizing information management and communication. This includes the use of information and technology in the direct provision of care, in establishing effective administrative systems, in managing and delivering educational experiences, in supporting lifelong learning, and in supporting nursing research.

The study

The overall goal of the national study was to promote the development of nursing informatics (NI) competencies required now and in the future for clinical nursing practice and education. The national study aimed to describe the current situation of undergraduate nursing informatics education in Canada. Specifically it assesses and describes:

- The nursing informatics education opportunities currently available to undergraduate students in schools of nursing across the country;
- The level of preparedness and expertise of nursing faculty to provide necessary education opportunities in nursing informatics for undergraduate nursing students;
- The information and communication technology infrastructure and support for providing the education opportunities; and
- Opportunities and needs, including policy, for enhancing nursing curricula, faculty preparedness and Information and Communication Technology (ICT) infrastructure and support in Canadian schools of nursing.

The national study used survey questionnaire methods and referent group discussions. The survey component used web-based technology – SurveyTracker[®] survey software. The three survey questionnaires constructed for this project were 1) *Undergraduate Education Opportunity Questionnaire*; 2) *Infrastructure Assessment Questionnaire*; and 3) *Faculty Preparedness and Expertise Questionnaire*. These were implemented in the fall of 2002.

All Canadian Schools of Nursing with undergraduate education programs comprised the target audience for the survey component, for a potential number of schools participating being 81. Four schools declined to participate (N=77). Within the remaining target audience were sub-audiences: 1) school of nursing infrastructure to support integration of nursing informatics in the program; 2) the program curriculum – learning opportunities for students; and 3) faculty members with responsibility for some aspect of nursing information, as per the definition provided.

Response rates were: Infrastructure 48% (37 schools); curriculum 51% (39 schools); and faculty 130

representing 38% (29) of schools. The respondents had the knowledge and authority to provide credible information. University baccalaureate programs and collaborative college/technical institution programs were equally represented; there were no diploma only programs.

Referent group discussions were held at national and regional nursing conferences, as well as a college (educators) and a hospital (Ontario Nursing Informatics Group members). The purpose of these discussions was to examine the critical findings with respect to implications, recommendations and dissemination. Feedback in all phases of the project was solicited through the Canadian Nursing Informatics Association (CNIA) website, project Advisory Committee and members of the organizations they represented, Board members of the CNIA, and NI experts. This study component occurred January to March 2003.

Findings

The findings from the survey questionnaires, referent group discussions and other feedback corroborated those of several recent Canadian and American studies examining similar issues. The following were the critical findings from this study.

1. School Information and Communication Technology (ICT) Access

- Universal access to the Internet, e-mail, library, software programs and computers ~100% for faculty; less to students (~20% less).
- Universal access to research data-bases is available to faculty in ~75% of the schools; less so for students.
- Appropriate ICT in the classrooms is inadequate.

2. Clinical Information and Communication Technology (ICT) Access

- Faculty has more access to clinical institution ICT than students. A desirable level of access is available in less than 1/3 of schools.
- There is greatest access to the library (68% faculty; 43% students) and least to clinical information systems (22% faculty; 14% students).
- There is little connectivity between educational and clinical services settings except for e-mail.
- Students' greatest access to clinical applications is in acute care settings and least in home care. Their access is increased if working as RN or with an RN.
- Faculty note: access to clinical ICT systems is important, but the systems have been underdeveloped and their access guarded.

3. Educational applications of ICT

- WEB-CT or other distance ICT applications are used in approximately 3/4 of the schools.
- There is variability in use of educational ICT, primarily due to limited school resources.

4. Education opportunities – ICT and NI

- More educational opportunities are available to faculty than to students, except computer labs that are more available to students.
- Basic computer education is more available than use of computers in nursing.
- Less than 1/3 of schools offer NI credit courses.

5. Human Resources

- Technical human resources (e.g. computer lab technicians) are more adequate to integration of NI into undergraduate education program than human resources relevant to teaching (e.g. faculty competencies).
- Less than 1/3 of the schools perceive that faculty and new students have adequate NI competencies and computer skills.
- Approximately 1/4 of the schools are likely to have clinical preceptors/staff with adequate competencies.
- Approximately 5% schools are likely to have adequate graduate students to assist with teaching NI and using ICT.

6. Organizational Culture and Strategic Plan

- Approximately 3/4 of the schools have a culture that supports using ICT in teaching and learning.
- However, less than 1/2 of the schools have a strategic plan or vision with goals and supportive policies for integration of ICT and NI in nursing education – or a nursing committee to examine the role of ICT and NI in nursing education and practice.
- Approximately 1/2 of the schools have a representative on a campus committee that controls financial and personnel resources to develop and maintain technology.
- Less than 1/3 of the schools have an adequate budget specifically allocated for technology.
- Collaboration for integration of ICT and NI into the schools is rare – almost non-existent with the ICT industry.

7. Curriculum characteristics

- Approximately 3/4 of the schools integrate NI throughout undergraduate curriculum, but do not know exactly where or how many hours are devoted to NI.
- Approximately 2/3 of the schools have a curriculum vision or design that includes NI competencies, but do not have explicit outcome objectives.
- NI educators are most likely to be nurses – faculty members.

8. Curriculum objectives

- The most consistently addressed outcome objective (at least to some extent) is computer literacy in applications such as word processing, WWW, Internet, and presentations.
- Approximately 3/4 of the schools have outcome objectives that address to some extent:
 - i. Use of ICTs to monitor & assess clients, document and evaluate care, client education;
 - ii. Security, confidentiality and privacy of clients in the use of ICT; and
 - iii. Moral, ethical and legal aspects of informatics with respect to all domains of nursing.
- Fewer schools address outcome objectives related to:
 - i. Nursing information systems and their potential for enhancing the nursing process;
 - ii. Understanding information flow through a health care agency and application of ICT;
 - iii. Benefits/limitations of health and nursing information systems (e.g. taxonomies);
 - iv. Access, evaluate and use information clinically; and
 - v. Understand historical trends.

9. Objectives – Competencies for entry level practitioners

- Suggested competencies are consistent with the categories/areas of outcome objectives. Communication competencies are also suggested (e.g. use of ICT to collaborate, publish and interact with faculty and colleagues). Competencies cannot be achieved with current level of attention to curriculum objectives.

10. Faculty Computer Literacy

- The majority of faculty are most skilled in using common software programs, but integrate these skills in teaching to a somewhat lesser extent than their skill level.
- There is considerably less literacy in using statistical and educational applications.
- There is least literacy with the use of clinical application systems.
- Integration of these latter computer skills/competencies occurs infrequently ($\leq 25\%$).

11. Faculty Knowledge of NI Requirements for undergraduate nursing education

- Approximately 1/3 of faculty respondents perceive that they have good to very good knowledge of the five areas of NI educational requirements. Approximately 1/3 have no or poor knowledge of these five areas.

12. Faculty NI Competencies

- **Greatest competencies** with respect to:
 - i. Ethical and legal issues and concerns and
 - ii. Computer assisted instructional aids in teaching.
- ~1/2 the faculty have **some of the necessary competencies** for
 - i. Teaching and evaluating NI competencies for providing nursing care.
- Faculty have **least NI competencies** with respect to:
 - i. Defining new informatics competencies in conjunction with other nurses;
 - ii. Using ICT to enter, retrieve and manipulate data;
 - iii. Teaching-evaluating informatics competencies required for nursing administration; and
 - iv. Designing, developing and implementing hardware and software for teaching.
- Some faculty question the relevancy of NI and ICT to quality patient care and nursing.

13. Faculty Access and Experience

- There is poor faculty access to health and nursing informatics and instructional development courses.
- There is limited access to databases for research and to clinical information systems.
- 1/3 of the faculty respondents have taken general informatics courses – few have taken health or nursing informatics courses

14. Faculty Attitudes and Values

- **Greatest agreement** among faculty respondents that
 - i. NI and ICT competencies are essential to practicing nurses and
 - ii. Undergraduate programs should use ICT to teach about NI and ICT.
- **Less agreement** that

- i. Nursing faculty feel NI has potential to significantly improve quality of nursing care and
- ii. Faculty are comfortable in abilities to incorporate NI & ICT in the nursing program.
- **Little agreement** that
 - i. Web-based instruction and learning is of the same quality as on-site instruction and
 - ii. School culture is one of being well informed about NI and ICT in nursing education.
- Respondents feel comfortable with ICT but perceptions of colleagues is less positive.
- Some note: their colleagues are beginning to recognize
 - i. The need to increase their own competencies in NI and ICT and
 - ii. Educating students to be leaders in nursing must recognize that NI is invaluable.

15. Program Type

There were few statistically significant differences between university and non-university programs (i.e. community colleges and technical institutes), although a few trends emerged.

- Statistically significant differences were:
 - i. University programs more likely to have curriculum objectives related to nursing informatics and
 - ii. Non-university faculty feel more competent to teach nursing informatics and use computer assisted learning and internet technology in teaching.
- Trends were for non-university programs
 - i. to provide better access to education opportunities;
 - ii. to have a nursing informatics component in the curriculum; and
 - iii. faculty to feel more competent in teaching NI and using ICT in teaching.

Conclusions

The findings from the survey questionnaires, referent group discussions and other feedback corroborated those of several recent Canadian and American studies examining similar issues. Of particular significance are the following conclusions:

1. The link between nursing informatics and evidence-based practice needs to be made and valued.
2. There is a need to have concurrent education and capacity building of educators, clinicians and students.
3. There is a danger of practice outpacing academia as ICT and Health Information Systems (HIS) become commonplace in health care settings.
4. There is a need to identify where nursing informatics is in the curriculum, identify core objective, competencies and outcomes.
5. There is a lack of supportive infrastructure (human, material and financial) in both educational and clinical settings – for faculty, staff and students.
6. Partnerships are needed within and across settings and with the private sector.
7. There is a need to follow-up this study to:
 - ✓ identify what the health care system's expectations are for new graduates; and how to influence NI and ICT development;
 - ✓ look for ways of partnering to increase resources in clinical and educational settings; and
 - ✓ demonstrate to nurses and educators that adding NI to nursing knowledge has significant benefit to patient care and outcomes.
8. Other reports: The findings, conclusions and recommendations from this and other Canadian reports

of studies on nursing informatics can be no longer ignored. It is time to take action.

Recommendations

The following major recommendations are made with lead organizations identified. Sub-recommendations have also been developed.

1. Recommended that a comprehensive national nursing informatics strategy be developed. LEAD: Office of Nursing Policy, Health Canada, and Canadian Nursing Informatics Association
2. Recommended that specific messages about nursing informatics be developed for specific audiences. LEAD: Canadian Nursing Informatics Association
3. Recommended that national entry-level nursing informatics competencies be established and reflected in the Canadian Registered Nurse Examination. LEAD: Canadian Nurses Association
4. Recommended that nursing curricula include specific nursing informatics outcomes objectives. LEAD: Canadian Association of Schools of Nursing
5. Recommended that addressing educator capacity building and learning opportunities is a priority in a national strategy. LEAD: Canadian Association of Schools of Nursing
6. Recommended that education and clinical use and development of information and communication technology be addressed on both national and jurisdictional bases. LEAD: Academy of Canadian Nurse Executives
7. Recommended that the culture and expectations of schools of nursing embrace nursing informatics and appropriate use of information and communication technology in teaching and learning. LEAD: Canadian Association of Schools of Nursing
8. Recommended that school of nursing infrastructure requirements (human, material and financial) and strategies for addressing them be developed on national, provincial/territorial and local levels. LEAD: Canadian Association of Schools of Nursing
9. Recommended that follow-up to this study be undertaken. LEAD: Canadian Nurses Association

Conclusions drawn from previous Canadian studies and their subsequent recommendations provide further impetus for taking action on the conclusions and recommendations of this study.

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Introduction

Background

There has been rapid growth and expectations of health care information systems and technology in health care settings. With this growth has come the need to ensure that nurses have the necessary informatics competencies (knowledge, skills, attitudes and decision making) to effectively meet their responsibilities and standards for nursing practice. The goal of nursing informatics is to improve the health of populations, communities, families, and individuals by optimizing information management and communication. This includes the use of information and technology in the direct provision of care, in establishing effective administrative systems, in managing and delivering educational experiences, in supporting lifelong learning, and in supporting nursing research (Staggers & Bagley Thompson, 2002).

This current project builds on the 1999 National Nursing Informatics Project. It is influenced as well by the Canadian Nurses Association national Health Information: Nursing Components (HI:NC) policy initiative and Health Canada's Office of Health and the Information Highway (OHIH) work in conjunction with the Canadian Nurses Association (Vision 2020 – ICT in Nursing) and with the University of Victoria Summit on health informatics competencies. (See Appendix A for details.)

Project Goal and Objectives

The overall goal of the national study was to promote the development of nursing informatics (NI) competencies required now and in the future for clinical nursing practice and education. As well, it was expected that faculty would increase their awareness and understanding of the relevance and importance of nursing students developing core competencies in nursing informatics and the use of information and communication technology (ICT). The findings are to be used to inform education decision makers and funders of information and communication technology of the needs related to enhancement of nursing curricula and faculty preparedness in nursing informatics and of information and communication technology requirements in Canadian schools of nursing.

The national study aimed to describe the current situation of undergraduate nursing informatics education in Canada. Specifically it assesses and describes:

- The nursing informatics education opportunities currently available to undergraduate students in schools of nursing across the country;
- The level of preparedness and expertise of nursing faculty to provide necessary education opportunities in nursing informatics for undergraduate nursing students;
- The information and communication technology infrastructure and support for providing the education opportunities; and
- Opportunities and needs, including policy, for enhancing nursing curricula, faculty preparedness and ICT infrastructure and support in Canadian schools of nursing.

Researchers, Partners and Funders

Heather F. Clarke, RN, PhD was the project manager responsible for all aspects of the project. Dr. Clarke has extensive experience in survey methodology and is knowledgeable about the subject matter –

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nursing informatics and undergraduate education. Lynn Nagle, RN, PhD, President of the Canadian Nursing Informatics Association (CNIA) and Chief Information Officer, Mt. Sinai Hospital, Toronto is an expert in nursing informatics and was responsible for overseeing the project on behalf of CNIA. An Advisory Committee was responsible for liaising with their respective organizations, promoting the project and providing advice and feedback to the project manager. (See Appendix C for terms of reference and membership). The project was funded by Health Canada, Office of Health and the Information Highway (OHIH), with in-kind support from CNIA.

Methodology

Design

The national study used survey questionnaire methods and referent discussion groups. The survey component used web-based technology – SurveyTracker[®] survey software. Web surveys are placed on a World Wide Web page and accessed from any computer with a Web browser. Surveys are laid out from within SurveyTracker[®] and previewed on one's Web browser from within the program. The program limits one response per person, while also forcing respondents to respond to all questions before completing the survey. Responses are collected in a file stored on the server as well as in a message sent to a designated e-mail address. Detailed statistical analysis is provided and open-ended questions can be coded for quantitative data analysis or printed out verbatim in a report.

Web-based research provides many advantages such as access to specific populations, speed of data access, and decreased costs for data collection and data entry (Duffy, 2002). However there are methodological problems associated with Web-based methods. The following potential problems were addressed in this study.

1. Control over survey environment. To impose some control over the survey conditions and greater standardization of survey-completion among the participants, potential participants were provided with instructions for completing the questionnaires, the critical definitions used in the questionnaires, and a reference questionnaire document to refer to prior to completing the online questionnaire.
2. Access. To ensure Web access, a pre-survey questionnaire was sent to all schools of nursing to determine the ability of potential participants to easily access the Web. The Web-based questionnaires were pilot tested in various settings across Canada to determine if different browser software programs and hardware displayed both French and English questionnaires in the same configuration and that this could be done in a timely manner. Contact information was provided for web difficulties, as well as for questions about the study. Queries were followed up immediately with online help if required.
3. Anonymity and validity of data. While no names of individuals were collected, the school of nursing identification was requested in both program and faculty responses.
4. Ethics review and consent. Ethical review was sought and obtained from the University of British Columbia, with the understanding that, as with all survey questionnaires, completing and submitting the questionnaire is in itself providing informed consent. To enhance the "informed" part of the consent, potential participants were provided a cover letter detailing the study objectives, design and contact information if there were concerns about privacy and confidentiality. Background information to the study was provided and a link to that information posted on the CNIA website.
5. Security. The software and hardware receiving the survey responses was protected with a high-quality anti-virus program and regular backup files of the data received were kept in a separate and

secure location.

Referent group discussions were held at national and regional nursing conferences, as well as a metropolitan college and a hospital. Findings from the project survey component were presented. The purposes of the groups were to discuss implications of the survey questionnaire findings, suggest recommendations and advise on dissemination. As well the referent group discussions were a component of the evaluation of the project.

Feedback in all phases of the project was solicited through the CNIA website, Advisory Committee and members of the organizations they represented, Board members of the CNIA, and NI experts. This also formed part of the evaluation of the project.

Target Audience

All Canadian Schools of Nursing with undergraduate education programs comprised the target audience for the survey component, for a potential number of schools participating being 81. Four schools declined to participate. See conclusions section for description. Within the remaining target audience were sub-audiences: 1) the program curriculum – learning opportunities for students (N=77); 2) school of nursing infrastructure to support integration of nursing informatics in the program (N=77); and 3) faculty members with responsibility for some aspect of nursing information, as per the definition provided. The number of potential eligible faculty members as a sub-audience is unknown. School responses on the Participation Response Form ranged from 3 → 75 eligible faculty members per school (28 response forms returned).

Referent Groups were comprised of registrants attending national and regional conferences. All registrants were eligible to attend. They were invited through conference information provided in print and on the conference web sites. Members of the Ontario Nursing Informatics Group and faculty of a Toronto college on an open invitation made up two other referent groups.

Instruments

Three questionnaires were constructed based on input from the schools of nursing on their Participation Response Forms, review of the literature and three instruments – two of which were reliable and valid for the United States of America context (Austin, 1996; Carty, 1996). The third questionnaire “Computer and Internet teaching strategies” was administered to Canadian Schools of Nursing in 1999 (Ferguson, 1999). The three survey questionnaires constructed for this project were 1) *Undergraduate Education Opportunity Questionnaire*; 2) *Infrastructure Assessment Questionnaire*; and 3) *Faculty Preparedness and Expertise Questionnaire*. The three questionnaires, in English, were pilot tested online with seven nursing informatics experts from education, practice, administration and research. As well, pilot testers reviewed the cover letter and document of definitions and provided feedback on their clarity, relevance and comprehensiveness. The final questionnaires and other documents upon revision based on the pilot test were translated into French. Back-translation into English was done from the online French version to ensure accuracy, as well as suitability of translation for technical terms. Copies of the English version of the three questionnaires, cover letters and definition document are found in Appendix D. Copies of the French versions are available on request.

Referent Group discussion questions and feedback questions included:

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1. What are the implications of these findings?
2. What recommendations should be made? To whom?
3. How should the findings and recommendations be disseminated?

Implementation

Implementation of the project occurred in three phases. The first phase, preparation and data collection, comprised the first four months. The project employed survey methodology for obtaining primary source data from undergraduate programs in schools of nursing and faculty members with nursing informatics responsibilities. The second phase focused on data management, including data cleaning and analyses. Phase three of interpretation, recommendation and evaluation, used referent group discussions at national and regional conferences and local venues, as well as Advisory Committee meetings and feedback from CNIA Board members.

Phase I – Preparation and Data Collection

Participants

The participants were the contact people named by the dean or director of each school of nursing. Where no response form was returned indicating the contact person, it was deemed to be the dean or director. It was this person to whom all e-correspondence was addressed. The school contact person ensured that the appropriate faculty members were involved in completing the program-based questionnaires (i.e. infrastructure and curriculum) and the faculty-based questionnaire (faculty preparedness).

Time frame and activities

Communication with deans, directors and designated contact persons

Prior to sending out information about the survey questionnaires, deans and directors of all Canadian Schools of Nursing with undergraduate programs received first of all a flyer via e-mail announcing the project (July 2002). This announcement was followed up with more detailed information about the national project, its goals and objectives and provided opportunities to dialogue with the project manager and CNIA president (August 2002). As well, a Participation Response Form was provided to solicit information about the appropriate contact person, potential numbers of faculty appropriate to respond to the faculty questionnaire, opportunities for group meetings and important questions to be asked. Appendix B contains documents sent in preparation for participating. The Background Paper was also sent (Appendix A).

On October 19, 2002 the following information, in French and English, was sent in mass distribution to Deans and Directors of Canadian Schools of Nursing with Undergraduate Nursing Programs:

- Cover letters for the School Contact and for the faculty members participating
- Definitions for reference in the project
- Reference documents for each of the three questionnaires
- Internet links to the three questionnaires, with accompanying instructions

Follow-up reminders were provided by:

- E-mail (in mass) to deans, directors and contact persons – November 1, 2002
- CASN Council meeting for all deans and directors – verbal and information package insert

- E-mail (in mass) to deans, directors and contact persons – November 12, 2002 with response rate and extension date. Response rates: Infrastructure – 22%; Curriculum – 23%; Faculty – 19%
- Due date was extended to November 20, 2002
- Personal e-mail messages to each dean, director and contact person requesting completion of survey questionnaires, noting data gaps and providing response rates update – November 20 – 21, 2002. Response rates: Infrastructure – 28%; Curriculum – 31%; Faculty – 23%

On December 13, 2002 feedback on response rates and invitations for participation in referent group discussions were sent by e-mail to all school of nursing contacts. The contacts were asked to share this information with their colleagues and encourage participation in the referent group discussions.

Ethics Review

The survey questionnaire component of the project – the data collection component – was submitted to the University of British Columbia for ethics review. Ethics approval certificate B02-0527, dated October 4, 2002 was received (Appendix E).

Project Advisory Committee

The Advisory Committee met regularly by conference call to address issues of distribution, response rates, publicity, conference and meeting participation, referent group input and project evaluation.

Publicity

From the beginning of the project, we aimed to have high visibility in the nursing informatics and education communities. The project was profiled on websites, at conferences and meetings, and through members of the Project Advisory Committee and CNIA Board of Directors.

Web sites and list serves that featured the project were:

- Canadian Nursing Informatics Association www.cnia.ca
- Canadian Association of Schools of Nursing www.casn.ca
- Western Region Canadian Association of Schools of Nursing www.wrcausn.ca
- Canadian Nurses Association www.cna-nurses.ca
- Academy of Canadian Executive Nurses list serve

Print Media

Advisory Committee members provided access to having articles about the project in their newsletters. This included the October issues of the newsletters of Canadian Association of Schools of Nursing and Health Canada, Office for Nursing Policy. Links were provided to the Canadian Nursing Informatics Association website for the background paper and updates.

A letter to the editor of the *Canadian Nurse* was written and published in the November 2002 issue titled: “Tomorrow’s nurses and informatics.” The letter commented on two nursing informatics related articles in the August 2002 issue and briefly described the goals and objectives of the current project.

Referent Group invitations were included in the following registrant conference materials:

- Canadian Nurses Association Leadership Conference – February 2003 - >500 registrants
- Western Region Canadian Association of Schools of Nursing Education Conference – February

2003 - >250 registrants

- Canadian Association of Schools of Nursing National Nursing Education Conference – April 2003 - >250 registrants

Conferences and Meetings – abstracts were submitted and presentation were made to:

- International Educators' Conference – *Educating Tomorrow's Nurses*, Registered Nurses Association of Ontario – October 24, 2002 – keynote luncheon speaker, with powerpoint presentation on the project and encouraging participation.
- CASN Council meeting – Business item – November 8, 2002 – encouraging deans and directors to promote and support participation in the project.
- *Ethel Johns Annual Research Day*, Vancouver, British Columbia - *Educating Tomorrow's Nurses – Where's Nursing Informatics?* – February 1, 2003. Abstract submitted – accepted. Presentation to ~50 nurse clinicians, researchers, educators and managers.
- Canadian Association of Schools of Nursing - Nursing Education Conference - *Educating for New Dimensions in Nursing Practice – The Future is Now*. Halifax, Nova Scotia, April 24 – 26, 2003. Abstract submitted – accepted.
- Sigma Theta Tau International Nursing Honors Society – Biennial Convention – *Building Diverse Relationship*. Toronto, Ontario, November 1 – 3, 2003. Abstract submitted – accepted.
- COACH eHealth 2003 – *A catalyst for change*. Toronto, Ontario. May 24 – 27, 2003. Dr. Lynn Nagle requested to participate in an executive summit and present some of the study findings and recommendations. A meeting of the CNIA Board of Directors and members will also take place and include discussion of the project findings, recommendations and dissemination.

Context

Phase I was planned to begin after the fall school term had started and to be complete prior to the end of the school term – presumed to be the least hectic for deans, directors and faculty members. While this was probably true, there was significant feedback that a number of requests were coming into schools for other survey completion. Thus, the Nursing Informatics Education project had to compete with other requests, some of which came from professional associations and thus may have been of higher priority.

The Participation Response Form aimed to gauge the extent to which schools of nursing had access to the Internet and thus their potential for participating in a web-based project. From the responses (response rate ~20%) it was deemed feasible to use web-based technology for the questionnaires and to continue to implement the project using only the Internet and e-mail.

Informal conversation and comments indicated awareness among deans, directors and faculty that nursing informatics education and competency attainment are of a critical nature. However, this emerging, but essential element of nursing education is also seen to be competing with other essential nursing education components. Thus, it does not always get the priority ranking that some would wish – or espouse.

All Canadian schools of nursing with undergraduate programs were included in the population of interest. Although graduates of all schools write the same national RN examinations (except Quebec

which has its own RN exam), the process and content of preparing them to do so varies within and among programs. The intent of the project was to capture that variation as accurately as possible. However, it was exactly these variations that posed difficulties to the schools in answering the two program questions (curriculum and infrastructure) and determining the appropriate faculty members for completing the faculty preparedness questionnaire. Some schools of nursing have multiple undergraduate programs (.e.g. basic, post-RN, fast-track etc) and although there are similarities in some of the courses, there are also differences. For example, one school respondent noted: “Nous avons trois programmes de baccalauréat: Collaboration avec collège en français, collaboration avec un autre collège en anglais, et Post-RN.” The schools were not instructed to make a choice of a particular undergraduate program for the basis of completing the questionnaires, but rather encouraged to generalize across programs when completing each of the two program questionnaires. For example, a school respondent stated: “Collaborative Program with technical institute. Degree (BSN) awarded by university. I have responded for years 3 and 4 only for the basic program plus for our Post Registration BSN Program (offered only by the University).” It had been decided not to have a school of nursing complete a curriculum questionnaire for each of its undergraduate programs, as this would add an increased response burden that had the potential to affect the response rate.

This is also a time of change in Canadian schools of nursing with the development of collaborative programs, closure of diploma schools, launch of new programs and shortage of faculty members. While it was determined that a diploma school of nursing that was phasing out would not be included in the project population, it was deemed important to capture information from new schools of nursing, even though the entire program was not in place. Responding to the questionnaires posed some problems for these new schools as to whether they should be answering only from the perspective of what was or what would be. For example, a school respondent said: “We are one of ten partner sites offering a nursing program leading to a baccalaureate nursing degree. Until recently we offered a diploma exit and students moved to a degree-granting partner in order to complete their Baccalaureate. Our diploma exit is being phased out and we will be offering the full program at this site beginning in January 2003 in collaboration with one of our degree-granting partners.” The decision was made that the perspective should be taken from what had been approved by Senate and administration, even though it might not have been operationalized in totality at the time of the project. With respect to collaborative programs, schools of nursing were instructed to respond to the questionnaires with respect to the undergraduate program or component of such that the particular school was responsible for, and not to include information about those programs with which they were collaborating. However, this was not always a clean-cut as one would think, as there are a number of collaborative models and schools are in different parts of the process of establishing their collaborative relationships. The shortage of faculty was raised as an issue for a number of schools of nursing as they lacked the resources (e.g. faculty members, time) to respond at all or as thoroughly and thoughtfully as they would have wished.

Phase II – Data Management

The data submitted through the online questionnaires were captured in the SurveyTracker[®] software program and saved in numerical and text files. Responses were reviewed to ensure that there was only one submission per school for the program-based questionnaires (i.e. infrastructure and curriculum). Where there was more than one submission per school, the school contact was requested to identify which one of the questionnaires should be included in the data analysis. For schools that had completed

separate curriculum questionnaires for the basic and post-RN programs, it was deemed appropriate to include the one completed for the basic program. The cleaned data were entered into SPSS (Statistical Package for Social Sciences) and the necessary variable and label naming done. Faculty questionnaires were also coded for the type of school of nursing program where there was the name of a school of nursing provided. Correlation analysis was done by type of program (i.e. university and non-university program – all other types of programs – collaborative and technical).

Survey analysis reports were generated by SurveyTracker[®] on descriptive statistics by question for all three questionnaires and saved in html and pdf formats. The reports include statistics, as well as charts. Faculty data were aggregated by school when there were \geq five faculty respondents.

Qualitative data entered as text in the questionnaires were saved as MS Word documents and subjected to content analysis for themes and explanations of the quantitative data.

Phase III – Interpretation, Recommendations, Evaluation

Phase III was involved not only educators, but clinicians, administrators, managers, researchers, and policy makers in interpreting the survey questionnaire findings, formulating recommendations and providing feedback on Phase I. Phase II began in early 2003. Referent Group discussions were held, with participation obtained by open invitation (Appendix F – sample invitation). A PowerPoint presentation and handout of significant findings and discussion questions were used in the group meetings. The Canadian Nurses Association, and National and Western Region Canadian Association of Schools of Nursing were generous in their support for advertising the groups, providing space and arranging logistics of holding the groups. Centennial College and the Ontario Nursing Informatics Group arranged two sessions in Toronto. Schools of nursing, nursing professional associations, nursing informatics experts and members of the Canadian Nursing Informatics Association Board of Directors were provided with a summary of significant findings and feedback form, as well as a link to the CNIA website for more information. Over 55 nurses from education, administration, research and clinical practice participated in the referent group discussions. Feedback responses were received from one School of Nursing, three professional nursing associations, and individuals, eight CNIA Board of Directors, including two provincial nursing informatics groups; two members of the Academy of Chief Executive Nurses; and the project Advisory Committee members. All feedback was analysed and summarized with respect to implications, recommendations and dissemination strategies.

Evaluation forms were sent to each member of the CNIA Board of Directors and each member of the project Advisory Committee. All were asked to rate the degree to which they agreed that each of the project objectives were met and to comment on aspects of the project process that added strength to the project or would be recommended for change and why.

In addition, the Advisory Committee members were asked to comment on aspects of the Advisory Committee process that added strength to the project or would be recommended for change and why and to rate the degree to which they agreed that:

1. There was a communication/marketing plan to ensure an excellent response rate;
2. Project design was feasible, acceptable and adequate;
3. Survey instruments were reliable, valid and relevant;

4. Dissemination was planned to promote effective uptake of findings and national action; and
5. Networking opportunities were provided to engage senior decision-makers in health and nursing education systems in follow-up of findings and their implications

Findings

Survey

Detailed descriptive and correlation findings are found in Appendix G

RESPONDENTS

The respondents had the knowledge and authority to be providing credible (reliable and valid) the information on behalf of the school of nursing or as faculty respondents. Faculty respondents were those most likely to have nursing informatics responsibilities in the undergraduate program. University baccalaureate programs and college/technical institution programs in collaboration with a degree granting institution were equally represented.

INFRASTRUCTURE

Information and communication technology access and connectivity

Schools provide greater accessibility to ICT for faculty (almost 100%) than students and students more frequently have a fee levied for access. While networking capabilities are the norm within and beyond the schools, appropriate ICT in the classrooms is inadequate. There is a faculty-student disparity in offsite access to school software programs and electronic services, ICT help and connections with libraries and the World Wide Web.

There is limited or no access to the school's collaborating clinical institutions' technological infrastructure (e.g. clinical information and telecommunication systems) for faculty and students, but some access to library systems and clinical information resources. While faculty have more access than students to health care information systems relevant to nursing, a desirable level of access occurs for less than 1/3 of the schools. There is little connectivity between educational and clinical service settings (e.g. clinical assignment bookings preceptor arrangements etc.) except for e-mail.

There are no significant differences in information and communication technology access and connectivity by type of program.

Education opportunities

While continuing education in the basic use of computers is more frequently available than use of computers for nursing; in general there are few opportunities for faculty or students to gain the necessary ICT competencies. Computer learning laboratories and instruction development programs provide limited resources and less than 1/3 of the schools offer credit courses in nursing informatics to either faculty or students. There were no significant differences by program type. However, non-university programs are more likely than university programs to have universal access to basic computer education and use of computers in nursing education.

Human Resources

In general the schools of nursing do not consider their human resources to be adequate for the

integration of nursing informatics and information and communication technology in their undergraduate education program. The competencies of faculty, clinical staff/preceptors and students on entry are only somewhat adequate for the majority of schools. There are more likely to be adequate human resources for a computer laboratory, learning resource centre and LAN administration. Few schools of nursing have graduate students to assist faculty in their NI responsibilities or have ergonomics consultation. There were no statistically significant differences between program types.

Organizational Culture and Strategic Plan

While there is a culture that supports using ICT in teaching and learning in the majority of schools (~3/4), fewer schools (~1/2) have a vision or strategic plan with goals and supportive policies for the integration of ICT and NI in nursing education or a committee to address this issue. However, several faculty noted that while NI and ICT have obvious advantages, they appear to run counter to the philosophical underpinnings upon which the curriculum is based.

Less than 1/3 of the schools consider that they have an adequate nursing budget specifically allocated for technology, but approximately 1/2 of the schools have membership on campus ICT committees that address resource issues. Collaboration for the integration of ICT and NI into schools of nursing and their programs is rare. It is almost non-existent with ICT industry, and rarely occurs between disciplines or with public organizations. Over 2/3 of the faculty respondents believe that their school administrator's position on ICT and NI is moderate to high priority.

There were no statistically significant differences in organizational culture or strategic planning by type of program.

CURRICULUM

Curriculum characteristics

Approximately 3/4 of the schools of nursing integrate nursing informatics throughout the undergraduate curriculum and thus it is impossible to accurately determine the number of hours allocated to the subject. Estimates were either 0 –9 hours or 30 – 100 hours throughout the nursing program. However, for most (~2/3) the curriculum vision or design includes informatics competencies. The specific details of these competencies were not explored in this study. Nurse educators are most likely to be the teachers, supplemented by computer support specialists and librarians. The only statistically significant difference between program types was that university programs more frequently have, to some extent or extensively, a curriculum vision/design that includes NI competencies. However, non-university programs are more likely to have a NI component/unit/subject or course titled nursing informatics in the undergraduate nursing (trend, not statistically significant).

While use of ICT for teaching and learning experiences in the classroom is the norm, that is not so for the clinical area. Distance education and online learning opportunities are increasing, but currently less than 1/2 of the schools have these available. There is variability in the use of educational applications, with computer assisted learning the most common and interactive video the least common. Use of simulated clinical applications is limited, primarily due to limited school resources. There are no statistically significant differences by type of program. Moreover, the commercial availability of good quality computer-based training resources for nurses remains limited.

In the clinical area, students have the greatest access to nursing informatics related clinical applications

in acute care settings and least access in home care settings. However, student access, regardless of setting, is quite limited. They may have more access if working as RNs (i.e. in the post-basic program) or with an RN. Faculty noted that student and instructor access to ICT systems in agencies is important, but that these systems have been underdeveloped and their access has been guarded. There are no statistically significant differences by type of program.

In general computer literacy is not a requirement for students on enrollment, yet more than 3/4 of the schools require students to work on-line, connecting with classmates and instructors. Fortunately, the majority of the faculty respondents consider students to be computer literate on enrollment. There are no statistically significant differences by type of program, but non-university programs are more likely to have NI in their curricula.

Curriculum objectives

The schools of nursing rarely address the following objectives, “extensively”, but do so “at least to some extent” with the following frequencies:

- *Computer Literacy*: Demonstrate computer literacy in applications such as word processing, spreadsheets and databases, presentations and graphics, e-mail, World Wide Web and Internet. (90%)
- *Access – evaluate – use*: Effectively and efficiently access information, evaluate accessed information and determine appropriate uses of information by using both automated and non-automated information resources. (72%)
- *Confidentiality*: Protect the security, confidentiality and privacy of clients in relation to the use of health care and information technologies. (69%)
- *Ethical – legal*: Demonstrate appreciation of the ethical, moral, cultural and legal aspects of informatics with regard to nursing practice, education, administration and research. (69%)
- *Nursing information systems*: Understand nursing information systems and their potential for enhancing the nursing process. (64%)
- *System information flow*: Understand the flow of information through the health care environment and ways in which ICT can facilitate this flow. (62%)
- *Benefits – limitations*: Appreciate the benefits and limitations of ICT and NI (including nursing classification systems/taxonomies) to the decision-making process. (51%)
- *Apply clinically*: Use ICT to assess and monitor clients, document and evaluate client care, advance client education and enhance the accessibility of care. (46%)
- *Historical trends*: Discuss historical perspectives and trends of ICT in nursing practice, education, administration and research. (<25%)

There are no statistically significant differences in the degree of attention to NI curriculum objectives by type of program.

Suggested Entry level practitioner nursing informatics competencies

1. *Computer literacy*: Includes competent use of word processing, data bases, spread sheets, presentations, graphics, bibliographic retrieval, e-mail, WWW and Internet.
2. *Confidentiality*: Implement public and institutional policies related to privacy, confidentiality and security of information – client care information, confidential employer information and other information gained in the nurse’s professional capacity

3. *Communication*: Use ICT to collaborate, publish and interact with faculty and colleagues.
4. *Nursing Information Systems*: Use existing health and nursing information systems, nursing classification systems/taxonomies and available information to manage practice (i.e. identify, collect and record data relevant to the nursing care of clients)
5. *Assess – evaluate – use*:
 - a. Locate information using ICT, evaluate it, and apply it to support evidence-based learning and professional practice
 - b. Knowledgeable consumer – able to assess, in an informed manner, the value of new, emerging technologies (e.g. telenursing/telehealth, clinical decision support systems, electronic global health conferencing, virtual education, health information networks and devices)
 - c. Effectively search on-line information sources – including internet/intranet-based materials and bibliographic databases
6. *Clinical Application*:
 - a. Use ICT to manage aggregate nursing healthcare data and information, including the entry, retrieval and manipulation of data; interpretation and organization of data into information to affect nursing practice
 - b. Teach clients/colleagues with the support of computer based instructional materials
 - c. Understand the application of nursing workload data to clinical productivity management
 - d. Employ technology in the development of strategies for solving problems in the clinical / practice environment
7. *Historical Trends*: Have a positive attitude toward ICT uses that support lifelong learning, collaboration, personal pursuits, and productivity.

The entry-level competencies are aligned with curricula objectives; however, they cannot be obtained given the current level of attention to the curriculum objectives. As one faculty respondent commented, there is a need to not only address NI/ICT from a theoretical perspective but also to ensure students can apply the learning – emphasizing the significance of effectively using these tools for the practice of nursing.

FACULTY PREPAREDNESS AND EXPERTISE

Two thirds of the respondents held tenure track positions as professor, associate professor or assistant professor. Other respondents were instructors, nurse educators, or lecturers. They represented the schools of nursing responding to the two program questionnaires. Almost all had teaching responsibilities in the classroom and clinical areas and had earned at least a masters degree, with almost 1/3 of the respondents having a doctorate degree. They represent experienced nurses with the average number of years since initial registration 25.5 years.

Computer literacy

The majority of faculty (>50%) are most skilled in using common software programs (e.g. word processing, graphics, presentations and databases) and integrate these into their teaching but to a lesser extent than they are skilled in their use. Faculty are less skilled (i.e. <50%) in using statistical software programs and educational applications such as Computer Assisted Instruction (CAI) and simulated and real clinical applications, WEB-CT or similar online education and systems/courses, CD-ROMs, and Interactive Video (IVD). They tend to integrate these applications into their teaching to a lesser extent than they are skilled in their use. Faculty commented that there are limited or no resources to develop

skills or integrate their use in teaching-learning experiences. There are no statistically significant differences in computer literacy by type of program.

Nursing informatics knowledge

Between 1/2 to 2/3 of the faculty respondents have “at least fair knowledge” about each of the five educational requirements for undergraduate nursing education (frequencies in brackets).

- Principles of computer hardware and software (63%)
- Necessary NI content for undergraduate nursing programs (61%)
- Principles of information management in nursing (i.e. clinical, administration, education and research) (61%)
- NI competencies required for new graduates/entry level practitioners (56%)
- Role of information and communication technology (ICT) to facilitate information management (55%)

Only about 1/3 of faculty respondents have “good” to “very good” knowledge of the five identified Nursing Informatics requirements. Somewhat more than 1/3 has poor or no knowledge at all with respect to the NI education requirements. There were significant program differences with respect to non-university faculty feeling more competent than university faculty to: teach and evaluate NI competencies for providing nursing care and review, select and operate computer assisted learning materials and internet-based materials.

Nursing informatics competencies

Except for discussing ethical and legal issues and teaching with computer-based instructional materials, almost 1/2 of the faculty respondents note they lack the necessary competencies for teaching and evaluating the required nursing informatics competencies for providing *nursing care* and using ICT in education. Less than 1/4 of the faculty respondents consider themselves competent in teaching and evaluating the informatics competencies required for *nursing administration/management*; defining new informatics competencies with practicing nurses, nurse administrators, and nurse researchers; designing, developing and implementing hardware and software for CAI, internet based materials or student assessment and evaluation; and using ICT to enter, retrieve and manipulate data. Faculty noted their lack of competencies is related to lack of accessibility of ICT and time to gain the competencies. As well some question the relevancy of NI and ICT to quality patient care and nursing requirements.

Non-university faculty were significantly more likely than university faculty to have good knowledge of the content necessary in undergraduate programs and feel at least somewhat competent of teach nursing informatics, define new competencies and use ICT appropriately for teaching.

Access and experience

In general faculty respondents considered they had very good (universal) access to personal computers, technical support, and Internet access at work and home. They have less access to general, health and nursing informatics courses and instructional development programs. There is limited access to databases for research purposes and to information systems in the clinical setting. The most common NI and ICT opportunities and supports available to faculty respondents are workshops, with some access mentoring and tutoring. It is uncommon to have release time, stipends, or internal grants.

While approximately 1/3 of the faculty respondents have taken general informatics courses, very few have taken health or nursing informatics courses. Several noted that they had either taken or are completing university courses/programs in health or nursing informatics or workshops such as WINI (Weekend Immersion in Nursing Informatics); all of which are largely US-based offerings.

The most common faculty NI responsibilities are to integrate NI concepts in nursing course(s) and plan curriculum to include NI. Approximately 1/3 of the respondents gave an occasional lecture in NI, but only 4% had responsibilities for teaching a course in NI. In general no one teacher is responsible for an “informatics course” or overseeing competency attainment in the program.

ICT/NI committee involvement is not common, but it occurs more frequently within the school than on a centralized campus basis. There is limited support to individuals from the faculty at large (e.g. interest groups, networking, mentor) for NI and ICT. Involvement in research related to nursing informatics and/or information and communication technology is primarily at an individual level, with collaboration within nursing more common than multidisciplinary collaboration.

There were no statistically significant differences in access and experience by program type.

Attitudes and values

The two most agreed upon values relate to NI/ICT competencies being essential to practicing nurses and using ICT to teach about NI and ICT. However, there is little or no agreement that web-based instruction and learning is of the same quality as on-site instruction and learning for undergraduate students. However, one faculty noted that web-based instruction could be just as effective as face-to-face instruction if the course is conceptualized appropriately, and has the necessary technical and instructional supports.

There is “guarded” valuing by faculty of the potential for NI to contribute significantly to improving the quality of nursing care; uncertainty of the culture of the school being well informed of NI/ICT in education; and hesitancy about faculty’s ability to incorporate NI and ICT in the nursing program.

Respondents noted that their colleagues are beginning to recognize the need to increase their own competencies in NI and ICT and that educating students to be leaders in nursing must recognize that NI is invaluable in the process. However, the use of technology should support, not drive the education.

There were no statistically significant differences in attitudes and values by program type.

Referent Group Discussions and Feedback

There was agreement that the survey findings corroborated the reality of Referent Group participants’ experiences in both clinical, administration and education contexts, that the findings could be considered reliable and valid to form the basis of decision making, and that the findings extended those of the 1999 National Nursing Informatics Project and other local and national studies. (See references to Ferguson, Carty and Austin). Analysis of the discussions and feedback formed the basis for the conclusions and recommendations presented below.

Conclusions

1. Evidence-based practice: The link between nursing informatics and evidence-based practice needs to be made and valued.

Nursing informatics and use of information and communication technology has the potential for contributing to evidence-based practice; accountability; access to current information at point of care and time of need; and consistency in meeting standards for quality nursing care. Validating, synthesizing and generating new knowledge is the *raison d'être* for adopting informatics and information and communication technology into nursing (Bakken, 2001).

Nursing has a responsibility to use NI to improve the quality of care and decision-making and to drive technology and its appropriateness for nursing education and practice. A regulatory body states: “The lack of agreement amongst faculty re: the potential of NI to improve the quality of nursing care...may hinder faculty and educational facility willingness to incorporate additional NI initiatives into curricula.”

2. Faculty – clinician education and preparation: There is a need to have concurrent education and capacity building of educators, clinicians and students.

There is a lack of understanding of nursing informatics in undergraduate education programs, as well as lack of preparedness of faculty to teach NI, compounded by the lack of NI courses. Clinical teachers are often the younger educators, with less experience, and who don't have consistent clinical placements to get oriented to the various systems. Clinicians, who are often preceptors for students, frequently lack computer literacy and NI competencies. Nursing informatics competency components of knowledge, skills, attitudes and judgments are spotty for both academic and clinical staff. A nursing professional regulatory body notes implications this has for employers: “New graduates may present to the employment setting with minimal knowledge of NI/ICT. The employment setting must recognize the need for specific NI/ICT employment orientation sessions and continuing education opportunities.” Nonetheless, dealing with the preparation of nurses to work in computerized health care environments needs to be a partnership between academia and employers.

Academic and clinical staff members, as well as nursing students, require a holistic understanding of nursing informatics and use of information and communication technology in education and health care. While there is a general awareness of informatics in nursing, it is specifically related to the use of the Internet and other technologies such as databases for research and does not encompass a broad based understanding of the full scope of nursing informatics or its impact on nursing care.

Clarity needs to be brought to identifying who should teach and shape the nursing informatics curriculum – nurses, librarians, IT staff – both in the short and long term.

3. Closing the gap between education and clinical expectations and reality: There is a danger of practice outpacing academia as ICT and HIS become commonplace in health care settings.

The gap between education and clinical settings will increase because of the rapid changes and progress in HIS and ICT in clinical settings, while changes in education curricula move less rapidly, with less flexibility, and responsiveness to these changing environments and application of NI and ICT.

Health care organizations lack of and/or variability of health information systems and supporting ICT make it difficult to design generic orientations, continuing education and undergraduate NI curricula. If students cannot have access to health information systems – or the clinical settings do not use nursing informatics, faculty may question why nursing informatics (or at least some parts of it) should be included in the curriculum. The requirement for students to have access to information systems in the clinical practice setting has been limited to date. Rather than reticence, this limited access can be largely explained by the lack of relevant functionality in many clinical practice settings (e.g., online documentation tools) until recent years. In addition, there is a lack of resources within health care organizations to provide training and orientation to trainees from all health disciplines.

A board member writes: “I had the opportunity to offer a final practicum in Clinical Informatics for a graduating nursing student as a test case. They did not have any informatics courses nor lectures in their program. Despite the fact that this student is very much interested in informatics, the transition period is very resource intense on my part since we have to start with the ABC's of informatics. It was a positive experience for the student but lots to learn due to the education gap.”

A professional nursing regulatory association notes: “Need to move quickly, taking a proactive approach to ensure a graduate who can meet ethical and practice standards that will be driven by ICT advances in clinical settings.”

One CNIA Board member notes: “Less access [to school ICT] for students is a big issue and may place some students at an academic disadvantage (part of Negroponte’s “digital divide) ”.

4. Schools of nursing – faculty and curriculum: There is a need to identify where nursing informatics is in the curriculum, identify core objective, competencies and outcomes.

When NI objectives and content are not specifically identified within an integrated curriculum, it tends to get lost. It is invisible.

Since faculty and students entering the program require certain basic computer competencies, these should be requirements of hiring and acceptance into the program. When hiring faculty consideration might be given to NI and ICT competencies.

The lack of nursing leadership that values NI’s contribution to the quality of care is associated with the lack of planning and executing responsive curricula that include NI. Nurse leaders are needed who have a good understanding of NI knowledge, nursing classification systems and nomenclature, information flow and data requirements in nursing, and how information is accessed, evaluated and used.

There are no nationally agreed upon entry-level NI competencies. There is a need to develop these on a national basis and then have them refined and required by nursing regulatory bodies and national exams.

The lack of courses in health and nursing informatics compounds the problem of lack of preparedness to teach NI in the undergraduate program and preceptor in the clinical area. In addition notes a nursing professional regulatory body “...many students may perceive that the courses lack importance or relevance to nursing practice or to a comprehensive nursing knowledge base.”

While most faculty agree on the need for NI and ICT competencies, they agree less that NI has the potential to significantly improve quality of nursing care. This, coupled with the finding that faculty are not comfortable with their ability to integrate NI and ICT in the nursing program severely limits the integration of NI into existing programs and development of accredited programs within current nursing education. The prevalence of information systems in the broader community makes the implications of this finding even more significant. Non-university programs may be considered a resource or model for integrating NI in nursing curriculum, as well as a resource of faculty expertise.

5. Infrastructure: There is a lack of supportive infrastructure (human, material and financial) in both educational and clinical settings – for faculty, staff and students.

This lack of supportive infrastructure limits important experiences for students. While there is a need to improve access and connectivity to the tools for nursing informatics, that is not sufficient. Access and connectivity do not necessarily translate into understanding or use of the tools. For that knowledgeable human resources to assist with the application are required. Adequate funding for the necessary ICT infrastructure in educational and practice settings is essential to ensure student and faculty access to necessary learning experiences.

Partnering with private industry is rarely done, and only rarely is there collaboration with other faculties or public organizations (e.g. health care agencies). This lack of proactive partnering and collaboration has consequences of limited quantity and quality of resources – material resources (e.g. hardware, software and health information systems) and human resources (e.g. nurses with expertise to drive the development of relevant e-learning tools and clinical applications).

A school of nursing states that: “there is a need to lobby for support for resources and infrastructure for faculty and students.”

A CNIA Board member writes “Can’t stop thinking that NI and ICT becomes second nature for students when exposed to it early on. There are a couple of places in [province] where hospitals have adopted some nursing information systems and these hospitals have worked with the colleges close-by so that the students would know how to use the computer system when they come to the practicum. These students see first hand that this is useful and important. They come to their practicum not being afraid of the computer system but having integrated them. They can then be brought to a higher level, which is to analyze how these systems can contribute to good care.”

A member of the Academy of Canadian Executive Nurses notes: “It is not just those entering the practice that will need NI recognized in competencies but this will also need to be reflected in continuing competencies. Nurses must have quick and easy access to ICT and the skills to be able to utilize the ICT.”

6. Follow-up: There is a need to follow-up this study to 1) identify what the health care system’s expectations are for new graduates; and how to influence NI and ICT development; 2) look for ways of partnering to increase resources in clinical and educational settings; and 3) demonstrate to nurses and educators that adding NI to nursing knowledge has significant benefit to patient care and outcomes.

A professional nursing association notes that “Although work needs to continue in nursing education,
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there needs to be a similar focus on the situation in practice settings to better understand what strategic initiatives could be taken there.”

A CNIA board member states, on behalf of a provincial nursing informatics group: “The use of technology, the internet is becoming and will continue to be integral to the delivery of healthcare in the next century.” Without a comprehensive plan and strategies at the local, regional and provincial levels nurses will not be adequately prepared for the demands that will be placed upon them. Clinicians are needed to provide leadership in the design and implementation of new technologies and information management practices in order that the systems capture the idiosyncratic nature of health care delivery and the full value of the technology is realized.

A school of nursing suggests, “We need to do research and disseminate findings around differences between classroom and web-based education and educate faculty about differences in any quality of instruction via the two modes (if any). We need good criteria to judge effectiveness of each mode.”

7. General conclusions: Partnerships are needed within and across settings and with the private sector.

These are common overarching issues across the country that cannot be solved or resolved by nursing alone. Non-university schools of nursing may be a source of faculty expertise and potential models of NI integration in undergraduate education.

The response rates attest to external validity and generalizability to the population of Canadian Schools of Nursing undergraduate nursing education programs. The findings are consistent with those of the 1999 National Nursing Informatics Project. We can no longer ignore nursing informatics and the use of information and communication technology as an essential component of nursing practice in all its domains – clinical, education, management, research and policy.

As one professional nursing association notes: “The findings indicate that there is a lack of consistency in the degree to which nursing informatics is included in undergraduate education and the infrastructure available to support nursing informatics (NI) in education and the preparedness of faculty to teach NI. There is still much work that must be done with faculties of nursing and nursing students to have a consistent integration of NI into nursing curriculum.” The professional nursing association believes that the nursing profession must be actively involved in the development of health information systems and registered nurses must have the opportunity to develop competencies and expertise in NI so that ICT systems will be developed that capture information on nursing practice and its relationship to patient outcomes.

A member of the Academy of Canadian Executive Nurses agrees that there is a “[n]eed for a clear strategic goal/plan of where nursing should be at in the area of NI and what targets should be set to meet this in the areas noted in the report ... the strategic plan should be aligned with entry to practice competencies as mentioned in the original study [National Nursing Informatics Project, 1999].

8. Other reports: The findings, conclusions and recommendations from this and other Canadian reports of studies on nursing informatics can be no longer ignored. It is time to take action.

Several recent Canadian and international reports on nursing informatics education and the use of information and communication technology in education corroborate the findings, conclusions and

recommendations of this study “Educating tomorrow’s nurses – Where’s nursing informatics?”

The *National Nursing Informatics Project* (1999) with an Advisory Committee comprised of organizational representation similar to the current project, except there was no Office for Nursing Policy at that time. The purposes of the project were to:

- Develop consensus on definition of NI;
- Recommend NI competencies - entry level, specialists, managers, educators, researchers;
- Identify curriculum implications - basic and continuing education; and
- Determine priorities in national agenda

There was agreement with the proposed definition and taxonomy of competencies (similar to the definition and competencies that were used in this current study). Key factors to facilitate integration of NI in undergraduate curriculum remain current factors:

- NI competencies be graduating requirement
- Funding for faculty preparation
- Community partners, including public and private partners
- Collaboration among schools of nursing and other health care professionals

The key barriers are also still the key barriers:

- Human resources – lack of well prepared educators and informatics programs;
- System issues – lack of infrastructure support, culture, funding, and continuing education; and
- Technology – unsuitable software, limited access, rate of change, lack of funding.

The project’s recommendations are echoed in this report – development and implementation of a national agenda for nursing informatics education, including:

- Core curriculum content and competencies for students and staff nurses;
- Faculty preparation in nursing informatics;
- Informatics projects developed to demonstrate the contribution of NI to quality nursing care;
- Collaboration among schools of nursing, other health professionals, and public and private organizations;
- Advanced skill preparation at the graduate level; and
- Identification of opportunities for funding, partnership and education.

Fougere (1991) and Carty and Rosenfeld (1998) report similar findings and recommendations from their US-based studies.

In 2000, the *Ontario Nursing Informatics Information Group* (ONIG) was commissioned by the Registered Nurses Association of Ontario to address the need for informatics content in basic nursing curricula. The basis of this need was embodied in one of the recommendations in *Ensuring the Care Will Be There: Report on Nursing Recruitment and Retention in Ontario*, a report submitted to the Ontario Ministry of Health and Long-Term Care (RNAO, April, 2000) - . “Delivering increasingly complex care requires more sophisticated knowledge and skills, and the educational environment should respond to these challenges. We need to address long-standing issues related to entry level and ongoing nursing education that are essential to attract and retain nurses within the system” (p.7). ONIG curriculum task force developed a competency framework for nursing informatics, as well as specific competencies, examples of how they might be integrated into an existing curriculum and an overview of

a comprehensive plan to do so (Nagle, 2001). The six components of the competency framework are consistent with those suggested in this report and in the 1999 National Nursing Informatics Project, as are the challenges identified. Components of the competency framework are:

1. Basic concepts and operations
2. Social, ethical and human issues
3. Technology productivity tools
4. Technology communication tools
5. Technology research tools
6. Technology problem-solving and decision-making tools.

Many of the findings from our current study are similar to those of Ferguson (2002) who reports significant barriers to increased *use of ICT in nursing education programs in Canada*. These barriers include:

- Faculty reluctance to use their teaching strategies and technology, related to their own lack of expertise and computer skills.
- Lack of educational opportunities to develop the requisite skills, along with a lack of valuing of these skills → mitigate against increased use with students
- Limited computer skills of students on entry to programs
- Limited financial resources

Ferguson (2002) states: "...the infrastructure must be addressed in many facilities in order to provide adequate and up-to-date equipment and information technology support personnel for both students and faculty."P.8 Her recommendations are consistent with many of those presented in the next section.

In addition, the findings from our current study are similar to those found in the first of the three-phase Quebec M.Î.S.T.I.C. project on the integration of ICT into the teaching/learning environment (Cloutier & de Montingy 2000). The needs assessment findings of faculty beliefs, values and competencies in the use and integration of ICT in their teaching parallel those in this national study. Faculty teaching in the Masters of Nursing Science program in the University of Quebec network reported greater competencies and experience in use of common ICT (e.g. word processing, e-mail etc) than in more sophisticated ICT (e.g. creating websites, computer and library sciences, data bases etc.). Time, valuing, cost and availability of ICT, as well as believing it is important to integrate ICT in teaching were similar to the national study. Recommendations included developing an overall plan, prioritizing the components and developing, implementing and evaluating pilot projects (Phases 2 and 3 – 2001 – 2003).

The Aboriginal Nurses Association of Canada recommends that the Association, in collaborative relationship with Canada's professional nursing organizations, provincially and federally, take an active role in the development of telehealth and health care technology (ANAC, 2001). The main challenge for Aboriginal people including those is government, in health professional, and especially nursing is noted to be ensuring an equitable, affordable and sustainable telecommunication infrastructure and network. To this end, ANAC recommends that basic nursing education programs address telehealth technology and standards of nursing care.

Recommendations

Recommendations

Broad recommendations are made in one over-arching category (National Strategy) and nine subcategories that in total relate to a National Strategy. Within each category and subcategory are more specific recommendations. It is understood that these recommendations can only be achieved through the collaborative efforts of the following stakeholders:

- Canadian Nurses Association
- Provincial and territorial regulatory bodies
- Canadian Association of Schools of Nursing
- Individual Schools of Nursing
- Canadian Nursing Informatics Association
- Office of Nursing Policy, Health Canada
- Academy of Canadian Executive Nurses
- Public bodies (e.g. government, educational institutions, health care organizations, etc.)
- Private industry (e.g. software and hardware industry, health information consultants, etc.)

A lead organization has been suggested for taking responsibility for each of the recommendations and/or sub-recommendations as appropriate, with the intent that the lead organization would engage other stakeholders and partners in addressing the recommendation.

1. Recommended that a comprehensive national nursing informatics strategy be developed.

LEAD: Office of Nursing Policy, Health Canada, and Canadian Nursing Informatics Association

- i. The national strategy should build on the findings from the 1999 National Nursing Informatics Project and address nursing education (undergraduate, graduate and continuing), use of information and communication technology in all domains of practice, capacity building of academic and clinical educators, and funding.
- ii. The Canadian Health Infoway should be engaged in discussion of developing the national agenda and various components of it.
- iii. Funding strategies need to include educational activity support through scholarships, fellowships and grants, as well as improving educational and clinical infrastructure.

2. Recommended that specific messages about nursing informatics be developed for specific audiences. LEAD: Canadian Nursing Informatics Association

- i. The link between nursing informatics and evidence-based practice needs to be made explicit for all nurses and stakeholders (e.g. policy and decision makers).
- ii. A holistic approach to nursing informatics and use of information and communication technology is required in education, health care, research and policy development.

3. Recommended that national entry-level nursing informatics competencies be established and

reflected in the Canadian Registered Nurse Examination. **LEAD:** Canadian Nurses Association

- i. National entry-level nursing informatics core competencies need to be validated by provincial and territorial regulatory bodies. **Provincial and territorial nursing regulatory bodies** should be encouraged by the project partners to take this research study under advisement and include the needs of entry level practitioners for their nursing informatics competencies in their feedback to the work of the Canadian Registered Nurse Examination Competencies Review Committee.
- ii. **National nursing groups** and other **stakeholders** should also be encouraged to respond to the Validation Survey with respect to the need for nursing informatics competencies for entry level practitioners (July – August).

4. Recommended that nursing curricula include specific nursing informatics outcomes objectives. **LEAD:** Canadian Association of Schools of Nursing (CASN)

- i. Standardized indicators for expected NI outcome objectives in undergraduate nursing curriculum should be developed on a national basis. **LEAD:** CASN
- ii. Schools of nursing should develop a NI strategic plan and clearly identify where and how in the curriculum nursing informatics components (e.g. outcome objectives) are being addressed. **LEAD:** Schools of Nursing
- iii. Consideration should be given to the development of a nationally applicable core e-NI curriculum with components that can be accessed remotely, including manuals for students and teachers (which would include ideas about how to teach, integrate into curriculum etc.)¹. **LEAD:** Canadian Nursing Informatics Association
- iv. An inventory of current resources for informatics education, including general, health and nursing informatics should be developed and disseminated. **LEAD:** Canadian Nursing Informatics Association

5. Recommended that addressing educator capacity building and learning opportunities is a priority in a national strategy. **LEAD:** Canadian Association of Schools of Nursing

- i. A national strategy that includes graduate education opportunities and funding strategies is needed for building the capacity of current and future academic and clinical educators to gain the necessary nursing informatics competencies for teaching undergraduates. **LEAD:** CASN
- ii. Schools of nursing should also develop and implement a strategic plan for faculty development in the area of nursing informatics. **LEAD:** Schools of Nursing
- iii. A data base and development of national education/presentation materials and experts is required to facilitate NI/ICT education in all areas of nursing practice and all levels of nursing education. **LEAD:** Canadian Nursing Informatics Association
- iv. A model and resources for mentoring could be developed using expertise that currently exists. **LEAD:** Canadian Nursing Informatics Association

6. Recommended that education and clinical use and development of information and

¹ Note: A report by the Ontario Nursing Informatics Group to the Registered Nurses Association of Ontario identifies core curriculum <http://www.onig.on.ca/modules.php?op=modload&name=Sections&file=index&req=listarticles&secid=1> and a CNIA board member has drafted a curriculum proposal <http://www.quicktopic.com/19/D/bSgFGhBg5StE.html>.

communication technology be addressed on both national and jurisdictional bases. LEAD: Academy of Canadian Nurse Executives (ACEN)

- i. National standards or principles are needed to address legal, ethical, security and logistic issues regarding faculty and students using clinical agency health information systems. As well there is a need for considering licensing an additional site that is different from a healthcare agency site.

LEAD: ACEN

- ii. Nurses in partnership with technicians and industry should be supported to develop relevant multi-use interactive, simulated software and other e-learning tools. **LEAD: Canadian Association of Schools of Nursing AND Schools of Nursing**
- iii. Clinical and academic staff needs to meet on a regular basis (at least annually) to discuss trends, changes, opportunities and needs for nursing informatics competencies for new graduates, as well as other staff (clinical and academic). **LEAD: Canadian Association of Schools of Nursing AND Schools of Nursing**

7. Recommended that the culture and expectations of schools of nursing embrace nursing informatics and appropriate use of information and communication technology in teaching and learning. LEAD: Canadian Association of Schools of Nursing

- i. Values, principles and expectations of faculty and students should be clarified with respect to nursing informatics and use of information and communication technology to support teaching and nursing care. **LEAD: Schools of Nursing**
- ii. Schools should do a self-study of their needs and resources with respect to NI learning and infrastructure. **LEAD: Schools of Nursing**
- iii. A resource inventory should be developed of schools of nursing that can be considered exemplars or models of consciously and systematically integrating nursing informatics and relevant outcome objectives in their curriculum. **LEAD: Canadian Association of Schools of Nursing**
- iv. Partnering with other campus facilities to share resources and expertise, participate in decision-making, and develop strategic plan for integrating informatics into nursing education is encouraged. **LEAD: Schools of Nursing**
- v. When hiring faculty consideration might be given to NI and ICT competencies. **LEAD: Schools of Nursing**
- vi. Computer skills should be an entry requirement of students for undergraduate nursing education programs. **LEAD: Schools of Nursing**
- vii. A mechanism within each school is needed to promote the role of ICT and NI in nursing education and practice. **LEAD: Schools of Nursing**

8. Recommended that school of nursing infrastructure requirements (human, material and financial) and strategies for addressing them be developed on national, provincial/territorial and local levels. LEAD: Canadian Association of Schools of Nursing

- i. Collaboration should be developed among and between education and practice settings for faculty educators and clinical preceptors with NI competencies and for schools of nursing to hire

such people or collaborate with other faculties that have informatics experts. **LEAD: Schools of Nursing**

- ii. Partnerships and collaboration need to be developed between and among schools of nursing, private industry and public institutions, including other faculties, health care agencies and government. **LEAD: Schools of Nursing**

9. Recommended that follow-up to this study be undertaken. LEAD: Canadian Nurses Association (CNA) and Canadian Association of Schools of Nursing (CASN)

- i. There is a need to a) identify what the health care system's expectations are for new graduates; b) how to influence NI and ICT development; c) look for ways of partnering to increase resources in clinical and educational settings; and d) demonstrate to nurses and educators that adding to our body of knowledge is a significant payoff. **LEAD: CNA and CASN**
- ii. As follow-up to this study a teleconference will be held to with partners of this project in one year to hear back about actions taken to implement the findings and to determine next steps for follow-up. **LEAD: CNA**
- iii. A conference/symposium should be held to share innovative ways in which educational facilities have incorporated NI into their curriculum and to encourage the development of curriculum strategies. **LEAD: CASN**

Lessons Learned - Limitations

- It is possible to carry out a research project using the World Wide Web and Internet, however, messages and attachments have to be in "bite size" pieces with simple instructions. The complexity of this project not only involved three questionnaires, cover letters and definitions in both official languages, but required separate instructions for the program-relevant questionnaires (Undergraduate Learning Opportunities and Information and Communication Technology Infrastructure Support) and the faculty questionnaire on preparedness and expertise.
- Personal appeal through personalized information about gaps in the school responses had a positive effect on the response rate.
- An advisory committee comprised of representatives from key stakeholder groups is key to providing an entrée to their organization's infrastructure that was critical for gaining a presence on their websites, using their electronic and conference services, and gaining expertise and support for developing conclusions and recommendations with lead responsibilities.
- Referent group discussions were an effective means of obtaining a variety of perspectives on the findings' interpretations and quality. The project's findings were validated and expanded with Referent Group input. As well, such involvement increased the likelihood of uptake of findings and acting as a champion for the issue.
- While providing the reference questionnaires was intended to help prepare respondents for completion of the online questionnaires, there was some confusion about completing the reference or completing the online questionnaire. Several respondents tried to use the reference documents as the actual questionnaires – and of course that was impossible because the actual responses weren't provided in the English MSWord documents and there were no responses to the French pdf documents.
- The expectation that one School of Nursing contact be identified for the distribution of all three

questionnaires streamlined project coordination of communications and follow-up; however, it placed considerable onus on the school of nursing contact person to be available and able to carry out the requests in a timely manner.

- The data collected was subjective – from the perspective of perhaps only one person. There was no validation of the data with site visits or the collection of statistical data; nor was the respondent requested to substantiate the validity of the data with others. However, there was agreement between program and infrastructure findings with faculty findings.
- Faculty respondents were most likely to be those who already possessed better competencies and had greater experience with nursing informatics than their colleagues. Thus the findings might be considered inflated and not generalizable to all faculty members. The general competency and experience levels can be considered to be lower than those reported.
- There was no student perspective and this may explain, in part, findings that students had less access than faculty to educational and clinical ICT and NI courses.

Dissemination

The findings from the three questionnaires were posted on the CNIA website, with a feedback form eliciting suggestions for implications, recommendations, target audience, and dissemination strategies. Subsequently the recommendations and dissemination information will be posted, with a link to the electronic OHIH full final report.

A “School of Nursing Report”, a synthesis of the this OHIH report will be sent to each Canadian School of Nursing Undergraduate Program, the Advisory Committee and their respective organizations, and other stakeholders (Canadian provincial/ territorial professional nursing organizations and chief nursing officers, First Nations and Inuit Health Branch Chief Nursing Officer, Canadian Institute for Health Information, Canadian College of Health Services Executives, Canadian Healthcare Association, Health Canada Infoway, Canadian Nursing Student Association).

In addition, an announcement of the report’s availability at www.cnia.ca will be sent to:

- CNIA Board of Directors
- CNA affiliates and Provincial Nursing Informatics Groups, e.g. Ontario Nursing Informatics Group (<http://www.onig.on.ca>)
- Canadian Health Services Research Foundation E-watch on innovation in health services online (<http://kuuc.chair.ulaval.ca/english/master.php?url=bulletin.php>),
- University of Victoria, School of Health Information Sciences (<http://hinf.uvic.ca/index1.htm>)
- American Nurses Informatics Association (<http://www.ania.org>), Nursing Informatics Working Group of the American Medical Informatics Association (<http://www.amia.org/working/ni/main.html>),
- Experts who contributed to the project pilot testing, referent discussion groups, resources etc.

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Evaluation

The project evaluation consisted of four components:

1. Referent group discussions – faculty and stakeholders – evaluation of validity of findings and interpretation, development of next steps, draft and give feedback recommendations, inform dissemination.
2. Solicited feedback on findings (implications and recommendations) from provincial/territorial professional nursing organizations, schools of nursing, nursing informatics experts, CNIA Board of Directors
3. General feedback via the Canadian Nursing Informatics Association website
4. Assessment by the CNIA Board of Directors – evaluation of process and outcomes
5. Assessment by the Advisory Committee – evaluation of process and outcomes

Findings

Survey component

Survey questionnaire findings from the faculty corroborate those of the two program-focused survey questionnaires – curriculum and infrastructure. The respondents for all questionnaires were the people most responsible for the area and thus can be considered reliable and valid informants.

Referent Groups and others providing feedback

Many participants commented on the accessibility of the project's progress and findings posted on the CNIA website and praised the study for using technology to implement and evaluate this project. While there were no negative comments about the use of ICT in the project, several participants commented on the need to be more experienced in this respect to feel comfortable and take advantage of the opportunity. Participants of the referent discussion groups, schools of nursing, professional associations and CNIA board members positively commented on the process of personal communication and continual feedback through both e-mail and via the CNIA website. The iterative process of soliciting feedback, using the feedback, providing data, and soliciting and using feedback was appreciated and commented upon in personal contact.

The Referent Groups comprised of educators, clinicians, administrators, researchers and policy-makers corroborated the study findings with what they experienced in their practice. Their discussion of the implications of the findings provided the reality-check that was needed. Content for the Referent Group discussions built on not only the survey questionnaire findings, but also the findings from the previous discussions and feedback.

Rather disappointing, there was no feedback via the CNIA website. This may be due to the extensive communication with a wide network of those interested in the project. However, the project manager has been contacted by four undergraduate and graduate nursing students who have chosen to do academic work, including a master's thesis, on nursing informatics. The project manager has advised them throughout their project.

The CASN Board of Directors was briefed on the project and reviewed the report and

recommendations. They are fully supportive of getting the report out to all schools via CASN web site or hot link to the CNIA website. The Association will include the recommendations in the work of the Taskforces on Accreditation and Data Bases and the Education. As well, CASN will continue to encourage member schools to follow-up on the results and recommendations.

Canadian Nursing Informatics Association Board of Directors

1. Each member of the Board of Directors (N=14) was sent, via e-mail, a project evaluation form to complete. Seven responses were received for a response rate of 50%. There was strong agreement that the project objectives had been met. Comments were made suggesting that because nursing informatics is not well understood, a qualitative component would have been helpful. However, given the number of schools surveyed, the response rates, and the involvement of referent groups, the Board members thought that the findings were generalizable to the Canadian context. They concluded that this was “a fine beginning; educating nursing leaders and policy makers is essential.
2. Aspects of the project process they considered to add strength to the project included:
 - Multiple methods of data collection and strength and scope of the survey tools;
 - Survey design and the web access, with web updates;
 - Researcher with well established background in the field;
 - Country wide participation and response rates; and
 - Quantification of what is already well known in the nursing informatics community.
3. Aspects of the project process recommended for change for another time included:
 - Collect more objective data and include student population and
 - Have a longer time frame for implementing the study.

Advisory Committee

Each member of the Advisory Committee (N=5) was sent, via e-mail, a project evaluation form to complete and/or discuss in conference calls. There was strong agreement that the project objectives had been met and that a clear picture of the current situation needs emerged. It was agreed that the following project components all contributed to the success of the project: online surveys; continuous feedback to schools of nursing; updates posted on the web; and referent group discussions.

There was less agreement about the extent to which the Advisory Committee met their responsibilities. This was primarily due to time conflicts and constraints some members had in being available for conference calls and the fact that the principal investigator and project manager were competent in the project requirements. However, the advisory committee was invaluable as a sounding board to ensure that the project remained relevant to decision maker needs. It was agreed that there is still much work to be done in engaging senior decision-makers in health and nursing education systems in follow-up of the recommendations and their implications. In the future it was recommended that students be sampled and that both teachers and students be involved in the planning.

Members of the project advisory committee have agreed to continue in partnership as an ad hoc group – keeping each other informed on an “as necessary” basis when they have new initiatives or taken action pertaining to the project; and that on a quarterly basis, Lynn Nagle, on behalf of CNIA will arrange a

conference call to bring everyone up to date and plan next steps.

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Appendix A – Background Details

National Nursing Informatics Project Findings

In 1999 the Canadian Association of University Schools of Nursing (CAUSN – now Canadian Association of Schools of Nursing - CASN), Canadian Nurses Association (CNA), Registered Nurses Association of British Columbia (RNABC), Academy of Canadian Executive Nurses (ACEN) and the Nursing Informatics Special Interest Group of COACH sponsored the National Nursing Informatics Project (NNIP). This was to be phase one of a project to focus on competencies and education requirements in nursing informatics in Canada. The objectives of the project's phase one were to:

- Develop consensus on a definition for Nursing Informatics for Canada;
- Recommend nursing informatics competencies for entry level nurses and specialists, managers, educators and researchers;
- Identify curriculum implications and strategies for both basic and continuing nursing education; and
- Determine priorities for implementing national nursing informatics education strategies.

Members of the Project Steering Committee developed a discussion paper from a review of the literature and expert critique. Feedback on questions arising from the discussion paper was received from 17 CAUSN members and 28 non-academic settings.

Definition

There was general agreement on the proposed definition of nursing informatics:

Nursing Informatics (NI) is the application of computer science and information science to nursing. NI promotes the generation, management and processing of relevant data in order to use information and develop knowledge that supports nursing in all practice domains.

However, there were also comments that it needs to:

- be global, visionary, and congruent with literature;
- reflect evidence-based practice, i.e. use and management of information to improve practice of nursing and patient outcomes; and
- include reference to nursing minimum data sets.

Taxonomy of Competencies

There was general agreement that the taxonomy of competencies was useful. From the perspective of CAUSN members, most useful were those related to direct care and management at core level; while non-academics were in greatest agreement with those competencies related to direct care, management and educators, especially at the advanced level. These differences between educators and managers are most likely a reflection of their needs and responsibilities.

Supports and barriers for improving nursing informatics education

Supports:

- Nursing Informatics Competencies are graduating requirements.
- There is funding for faculty preparation.
- Community partnerships are built between education and practice.

- Nursing schools collaborate.
- Health care professions collaborate.
- There are graduate education programs in nursing informatics
- Nursing Informatics specialists are in provincial nursing associations, unions and government.

Comment: It is essential to have graduate level nursing informatics courses in Canada. Schools of nursing collaborating would move NI education forward much more quicklyNI competencies as graduating requirements is critical in motivating nurse educators

Barriers:

- There is a lack of educators and programs in nursing informatics – human resource issues.
- There is a lack infrastructure support, culture, funding, and training – system issues.
- There is unsuitable software, limited access, rate of change, and lack of funding – technology issue.

Comment: Distance education opportunities are needed for nurses who live and work away from major centers. Limited incentive to ask for training opportunities when NI's not part of the culture or seen as a critical competency to have. Culture is not well developed because NI is not seen as an important part of nursing work. Often nurses just enter data but do not get to use it

National Agenda Priorities

- Core content - education of students and staff nurses with core NI competencies
- Faculty preparation in NI
- Informatics projects to enhance nursing education and practice
- Collaboration within and beyond nursing
- Advanced competencies preparation
- Identify opportunities and resources for nursing informatics education and practice

Comment: For education to be effective, advances in workplace application must parallel advancement in the education agenda. Education must be seen to be relevant to reality. Opportunities need to be sought out in rural and remote practice settings not just the easily accessible urban.

Next Steps

- Take national responsibility for continuing
- Allocate specific responsibilities to appropriate organizations
- Develop coordinated approach for funding
- Determine when to include in RN exam
- Involve jurisdictions with regulatory responsibilities

Canadian Nurses Association – Health Information: Nursing Components initiative

In the early 1990's the Canadian Nurses Association (CNA) facilitated a national Working Group on Health Information: Nursing Components (HI:NC). The Working Group, comprised of representatives from provincial and territorial professional nursing associations that were members of CNA, were charged with developing national consensus on a standardized minimum data set for nursing. Working within in jurisdiction and then coalescing at the national level, it was agreed that information is key to effective decision-making and integral to quality nursing practice. Advances in information technology over the last quarter century have:

- Created significant opportunities for nurses to be aware of current information when making decisions;
- Accelerated efforts to implement information systems such as the electronic health record;
- Created new roles for nurses;
- Emphasized the need for all nurses to become more knowledgeable about the health information concepts and technology that is designed to manage and process information

Consensus

National consensus was developed on the kinds of nursing care data elements required in health information systems. These are:

- Client status
- Nursing intervention
- Client outcome

As well, it was recognized that at least two other data elements were required.

- Resource intensity – amount of care and skill level at which the care is provided
- Unique nurse identifier – currently under development

It was recommended that next steps include:

- Developing consensus on a foundational nursing language that is standardized with common definitions for common terms that can be used in all practice settings and
- Increased nursing informatics awareness and knowledge among RNs in all positions (clinicians, managers, educators, researchers, policy experts)

Health Canada's Office of Health and the Information Highway

The creation of the Office of Health and the Information Highway (OHIH) in 1997 recognized the growing importance of Information and Communications Technology (ICT) in all aspects of the health sector. OHIH is responsible for coordinating, facilitating and managing health information related to activities both within Health Canada and with external stakeholders in the development of a Canadian Health Infostructure. Areas of responsibility include developing and implementing major network systems, managing incentive programs, policy development, knowledge exchange and consultative and collaborative efforts with key stakeholders, including provincial and territorial ministries of health.

Vision 2020 Workshop on Information and Communication Technologies in Health Care from the Perspective of the Nursing Profession – Ottawa:

March 21, 2000

A one-day workshop on the vision of the ideal health system in the year 2020 and the role that information and communications technologies (ICTs) will play in that system was organized by OHIH with the collaboration of CNA. Thirty registered nurses (RNs) with a strong interest in ICT use in health care across all domains of nursing attended. They agreed that if RNs are to participate fully in an ICT-supported health care system, the single biggest challenge is the creation of a positive information technology culture in nursing.

Overall, there was a clear message that the nursing vision of an ICT-supported health care system will be realized through the collaboration of many groups. Actions necessary to achieve the nursing vision include education, celebration of successes, initiation of demonstration projects, sharing of information, forming partnerships with key stakeholders, and ensuring the voice of nursing is heard at all decision-making levels.

One of the five recommendations related “Impact of an ICT-support health care system on the role of RNs”. Action is required to create an ICT culture in nursing and is the responsibility of CNA, Canadian Association of Schools of Nursing (CASN – formerly Canadian Association of University Schools of Nursing), Academy of Chief Executive Nurses (ACEN) and nursing informatics special interest groups (now formalized as the Canadian Nursing Informatics Association (CNIA). Recommended actions were:

- Develop entry level competencies for nursing informatics (NI);
- Integrate NI studies into basic nursing program curricula;
- Promote continuing education/organizational in-service in NI;
- Celebrate successes; and
- Initiate demonstration projects that show the benefit of ICT use to RNs and consumers.

OHIH-University of Victoria Summit – Toronto: May 13-14, 2002

A two day Summit was held to work with key stakeholders across the country to develop a coordinated action plan as the basis for a pan-Canadian education and change management strategy to increase health informatics (HI) competencies for health and information technology (IT) professionals. The stakeholders included representatives from professional associations and colleges, government ministries, educational institutions and health organizations.

Two of the 6 strategies and action plans are directly related to education of health care professionals, including nurses at the undergraduate level and in faculty positions.

1. Establish comprehensive HI education and training programs (Nurture community of practice (health, IT, Management))

- 1.1. Articulate basic literacy, skills, knowledge, attitudes, experiences and core competencies in HI for health and IT professionals (work in teams, across functional boundaries).
- 1.2. Embed/integrate HI and HIM into current curriculum to train health and IT professionals
- 1.3. Promote the value of undergraduate and graduate education programs and advanced practice in HI (recruit - attracting people to field, organizations, faculty).

- 1.4. Audit and encourage practice reflective (re: HI utilization) - how do we bring this into training (pre & post learning).
- 1.5. Influence professional licensing (e.g. Colleges) and standard setting bodies (e.g. ACMC, CAUSN) to incorporate HI competency as part of professional practice.

2. Nurture HI leaders/champions to influence change

- 2.1. Help to pave paths for those in facility/organization leadership roles (administration, politically).
- 2.2. Develop teachers, faculty leaders to carry forward above education/training items (University commitment).
- 2.3. Encourage and reward proactive advocacy in HI by health and IT professionals
- 2.4. Formalize mentorship programs (e.g. HEALNet).

Appendix B – Preparation Documents for Deans/Directions

First Flyer



To the School of Nursing Nearest You

A NATIONAL NURSING INFORMATICS PROJECT
Assessing the Informatics Education Needs of Canadian Nurses

Sponsored by
The Canadian Nursing Informatics Association

AND

Funded by
Health Canada Office of Health and the Information Highway

What? The goal is to promote the development of nursing informatics competencies required now and in the future for nursing clinical practice and education.

Why? The rapid growth and expectations of health care information systems and technology in practice settings requires nurses who have the necessary informatics competencies to effectively meet their responsibilities and standards for nursing practice.

How? Survey methods and focus groups will be used with deans/directors and faculty members of all undergraduate nursing programs in Canadian Schools of Nursing.

When? September 2002 to March 2003.

Who? The Board of Directors of the Canadian Nursing Informatics Association is the steering committee, with Dr. Lynn Nagle, President and Chief Information Office, Mount Sinai Hospital, Toronto, as the leader. Dr. Heather F. Clarke is the project coordinator.

For more information:

Contact: Heather Clarke – heather.Clarke@shaw.ca (604) 733-9329

Visit: The Canadian Nursing Informatics Association Web Site www.cnia.ca

Letter to Deans/Directors



August 30, 2002

Dear Colleagues

I do not need to emphasize to you, **leaders in nursing education** in Canada, that nursing is evolving within a societal context of shifting paradigms and pervasive technology. Daily we are faced with untold possibilities to enhance health care delivery through information and communication technology (ICT) solutions. While the interface between nursing and information and communication technology provides an opportunity to expand the boundaries of nursing knowledge and practice and creates new leadership roles for nurses, it also requires special competencies for safe and effective nursing practice. There is a growing recognition of the need for nurses to be knowledgeable about the potential of information and communication technology to support their work in clinical practice, administrative/management, research and education roles.

The Canadian Nursing Informatics Association (CNIA) has received a grant from Health Canada, Office of Health and the Information Highway, to describe the current situation of undergraduate nursing informatics education in Canada. The findings will be used to inform education decision makers and funders of information and communication technology of the needs related to enhancement of nursing curricula and faculty preparedness in nursing informatics and of information and communication technology (ICT) requirements in Canadian schools of nursing. On July 24, 2002, Dr. Heather Clarke, Project Coordinator, sent you an announcement of the study by e-mail. Further information about this project is provided in the attached document: "Educating tomorrow's nurses: Where's nursing informatics?"

I am writing to you today to request your support and participation in this groundbreaking study. The timeframe is tight, as the project must be completed by March 31, 2003 (See "timeframe" in "Educating tomorrow's nurses: Where's nursing informatics?"). Participation will take place primarily in October and November 2002 (web-based surveys) and February 2003 (focus groups). We are aiming for 100% response rate! We hope you are too. The Canadian Association of Schools of Nursing supports this project and encourages your participation.

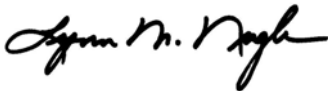
CNIA is pleased that Heather has agreed to be Project Coordinator. She led the team in the 1998/99 National Nursing Informatics Project and has been involved provincially and nationally in nursing informatics. Through the National Nursing Informatics Project (1999), a group of Canadian nurse leaders offered recommendations regarding a definition of nursing informatics, basic informatics competencies for all nurses and a national agenda.

In preparation for implementing the surveys, it would be helpful to know a little about your Faculty/School of Nursing's preferences and potential for participation. Please complete the attached

form: "Participation in Educating tomorrow's nurses: Where's nursing informatics?" and return by **September 16 2002** to Dr. Heather F. Clarke.

In anticipation of your support and participation in this national project on nursing informatics undergraduate education, I thank you. If you have any questions, do not hesitate to get in touch with Heather or myself. Heather can be reached at (604) 733-9329 or heather.clarke@shaw.ca and I can be reached at (416) 586-4800, ext. 2808 or lnagle@mtsinai.on.ca.

Sincerely,



Lynn Nagle, RN, PhD
President, Canadian Nursing Informatics Association
Chief Information Officer, Mount Sinai Hospital



Le 30 août 2002

Chère collègue, Cher collègue,

À titre de **chef de file de l'enseignement des sciences infirmières** au Canada, vous savez que les soins infirmiers évoluent dans un contexte social marqué par la mouvance des paradigmes et l'omniprésence des technologies de l'information et de la communication (TIC). Chaque jour, de nouvelles solutions technologiques ouvrent des avenues inédites d'amélioration de la prestation des soins de santé. La convergence des sciences infirmières et des TIC élargira assurément les frontières du savoir et de la pratique des sciences infirmières, tout en créant de nouveaux rôles de leaders pour le personnel infirmier. Sa mise en œuvre sécuritaire et efficace repose toutefois sur la maîtrise de compétences particulières. De plus en plus, on reconnaît que les infirmières et infirmiers doivent apprendre à utiliser les TIC pour soutenir leurs activités de pratique clinique, de gestion, de recherche et d'éducation.

Le Bureau de la santé et l'Inforoute de Santé Canada a octroyé une subvention à la Canadian Nursing Informatics Association (CNIA) pour lui permettre d'analyser l'état actuel de l'enseignement de l'informatique infirmière au premier cycle. Les résultats de l'étude serviront à renseigner les autorités responsables de l'éducation et les organismes qui financent des projets de TIC sur les besoins des établissements d'enseignement en matière d'informatique infirmière (mise à niveau du curriculum, perfectionnement du corps professoral, infrastructure de TIC et de soutien). Le 24 juillet dernier, Heather F. Clarke, Ph. D., qui coordonne ce projet, vous a annoncé cette étude par courriel. Le document ci-joint, intitulé *L'avenir de la formation en sciences infirmières : le point sur l'informatique infirmière*, vous fournit de plus amples renseignements sur ce projet.

Je vous écris aujourd'hui pour vous demander de soutenir cette étude novatrice. Nous disposons de peu de temps puisque le projet doit être terminé 31 mars 2003 (voir le calendrier dans le document ci-joint). Nous solliciterons principalement votre collaboration en octobre et novembre 2002 (sondages sur le Web) et en février 2003 (groupes de discussion). Nous visons un taux de réponses de 100 p. 100 et espérons que vous partagerez cet objectif! L'Association canadienne des écoles de sciences infirmières soutient ce projet et vous encourage à y participer.

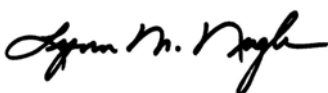
La CNIA est ravie que M^{me} Clarke ait accepté de coordonner ce projet. Elle a dirigé le Projet national d'informatique infirmière (PNII) en 1998-1999 et porté le flambeau de l'informatique infirmière à l'échelle provinciale et nationale. Dans le cadre du PNII, un groupe de leaders des sciences infirmières au Canada a formulé des recommandations touchant la définition de l'informatique infirmière, les compétences de base en informatique visant l'ensemble du personnel infirmier, ainsi que l'établissement d'un programme national.

Préalablement à la diffusion des sondages, nous avons besoin de certains renseignements sur les préférences et possibilités de participation de votre école ou faculté. Nous vous prions donc de remplir le formulaire ci-joint : « Participation à l'étude *L'avenir de la formation en sciences infirmières : le point sur l'informatique infirmière* », et de le retourner à Heather Clarke au plus tard le **16 septembre 2002**.

Nous vous remercions à l'avance de l'appui que vous accorderez à cet important projet. Si vous avez des questions, n'hésitez pas à communiquer avec Heather Clarke [(604) 733-9329; heather.clarke@shaw.ca] ou avec moi [(416) 586-4800, poste 2808; lnagle@mtsinai.on.ca].

D'ici là, veuillez agréer, Chère collègue, Cher collègue, l'expression de mes sentiments amicaux.

La présidente, Canadian Nursing Informatics Association
et chef de l'information, Hôpital Mount Sinai,



Lynn Nagle, inf. aut., Ph. D.

Participation Response Form

“Educating tomorrow’s nurses: Where’s nursing informatics?” Participation Response Form

Study Contact Information:

Name of School/Faculty of Nursing:

Name of Dean/Director/Chair of Program:

Person to be contacted for this study, if not the dean/director/chair:

E-mail address & telephone number of contact person for the study

E-mail: _____ Phone: (____) _____

Potential for Participation

1. The intent of the project is to carry out the survey component using web-based technology. To what extent do undergraduate faculty members have access to the Internet? (mark the appropriate box)

- Very limited access – only a small proportion of undergraduate faculty have access
 Somewhat limited access – approximately 50% of undergraduate faculty have access
 Good access – approximately 75% of undergraduate faculty have access
 Excellent access – all undergraduate faculty have access

2. Approximately how many undergraduate faculty are there who would be potential participants in the faculty preparedness survey (i.e. they have teaching responsibilities that would include nursing informatics – in the classroom, clinical area, learning centre etc.)? _____

3. When and where possible site or regional visits with faculty are desirable. However, not every school of nursing can be visited. Therefore we would like to know if you are planning or aware of meetings, conferences, workshops, events etc that bring together undergraduate faculty and/or deans/directors/chairs from a number of schools of nursing in your area between September 2002 and March 31, 2003. If so, please complete the following:

Name of Event And Location	Date	Contact person and contact information

Important questions for the project to ask:

You have probably thought about the importance of nursing informatics as a component of undergraduate education and faculty competencies, as well as the type of infrastructure your school of nursing requires. Perhaps your experiences have raised important questions that we should consider

asking in the surveys. Please let us know what these questions are, for each of the three survey questionnaires.

1. *Undergraduate Education Opportunity Questionnaire* to assess and describe nursing informatics education opportunities currently available to undergraduate students

e.g. Does the current curriculum design includes a vision and plan for the inclusion of informatics competencies?

2. *Infrastructure Assessment Questionnaire* to assess and describe information and communication technology infrastructure and support for providing the education opportunities

e.g. How available is technical connectivity between educational and clinical service settings – e.g. clinical assignment bookings, preceptor arrangements etc.?

3. *Faculty Preparedness and Expertise Questionnaire* to assess and describe the level of preparedness and expertise of nursing faculty to provide necessary education opportunities in nursing informatics for undergraduate nursing students

e.g. How confident are undergraduate nursing faculty in their abilities to incorporate nursing informatics and ICT in the nursing program? What learning experiences do you need?

Thank you for completing and returning this form by September 16, 2002 to

Heather F. Clarke, RN, PhD, Project Coordinator

heather.clarke@shaw.ca; (604) 733-9329 (fax)

1575 Trafalgar Street, Vancouver, BC, V6K 3R4

Participation à l'étude

L'avenir de la formation en sciences infirmières : le point sur l'informatique infirmière

Renseignements sur la personne à joindre dans le contexte de l'étude

Nom de l'école ou de la faculté des sciences infirmières :

Nom de la dirigeante ou du dirigeant du programme (doyenne, doyen, directrice, directeur) :

Personne à joindre dans le contexte de cette étude (s'il ne s'agit pas de la personne indiquée ci-dessus) :

Coordonnées de la personne à joindre :

Courriel : _____ Téléphone : (____) _____

Possibilités de participation

1. *Dans le cadre du projet, nous prévoyons diffuser les questionnaires du sondage sur le Web. Dans quelle mesure les professeures et professeurs du premier cycle de votre école ou faculté ont-ils accès à Internet? (Cochez la case appropriée.)*

- [] Accès très limité – peu d'entre eux ont accès à Internet
- [] Accès plutôt limité – environ 50 p. 100 d'entre eux ont accès à Internet
- [] Accès répandu – environ 75 p. 100 d'entre eux ont accès à Internet
- [] Accès complet – tous ont accès à Internet

2. Combien de professeures et professeurs du premier cycle, environ, seraient susceptibles de participer au sondage sur le degré de préparation en enseignement de l'informatique infirmière? (Nous visons celles et ceux qui participent à l'enseignement de l'informatique infirmière – en classe, en milieu clinique, dans des centres de formation etc.) _____
3. Nous aimerions rencontrer personnellement tous les membres des écoles et facultés. Néanmoins, nous ne pourrions pas rendre visite à chacun des établissements d'enseignement. Nous désirons donc savoir si vous êtes au courant de réunions, de colloques, d'ateliers ou d'autres activités qui réuniront les professeures et professeurs du premier cycle ainsi que les dirigeantes ou dirigeants de plusieurs écoles ou facultés des sciences infirmières de votre région entre septembre 2002 et le 31 mars 2003. Si oui, veuillez remplir le tableau suivant.

Titre et lieu de l'activité	Date	Nom et coordonnées de la personne à joindre

Questions importantes à poser

Vous avez probablement déjà réfléchi à l'informatique infirmière dans l'optique de la mise à niveau de votre curriculum du premier cycle, des compétences du corps professoral et des infrastructures dont votre établissement aurait besoin. Vos expériences ont peut-être soulevé des questions importantes qu'il serait intéressant d'inclure dans nos sondages. Veuillez nous indiquer la nature de ces questions, pour chacun des trois sondages.

1. *Possibilités de formation en informatique infirmière au premier cycle* – Ce questionnaire vise à mesurer et à décrire les possibilités de formation en informatique infirmière qui sont présentement offertes aux étudiantes et étudiants du premier cycle.
P. ex. : A-t-on formulé une vision et une stratégie d'intégration des compétences en informatique infirmière au curriculum?
2. *Évaluation des infrastructures* – Ce questionnaire vise à mesurer et à décrire l'infrastructure de TIC des écoles et facultés, ainsi que leur infrastructure de soutien à l'enseignement de l'informatique infirmière.
P. ex. : Quel est le degré de connectivité entre les systèmes de l'établissement d'enseignement et ceux du milieu clinique (affectation du personnel clinique, ententes de préceptorat, etc.)?

3. *Degré de préparation en enseignement de l'informatique infirmière* – Ce questionnaire vise à mesurer et à décrire le degré de préparation des membres du corps professoral en ce qui a trait à l'enseignement des compétences de base en informatique infirmière au premier cycle.

P. ex. : Jusqu'à quel point les professeures et professeurs du premier cycle estiment-ils avoir la capacité d'incorporer l'informatique infirmière et les TIC à leur enseignement? De quelles expériences d'apprentissage ont-ils besoin?

Nous vous remercions de remplir et de retourner ce formulaire au plus tard le 16 septembre 2002 à :

Heather F. Clarke, inf. aut., Ph. D., coordonnatrice de projet
heather.clarke@shaw.ca; (604) 733-9329 (télécopieur)
1575, rue Trafalgar, Vancouver, Colombie-Britannique V6K 3R4

Appendix C – Advisory Committee Terms of Reference and Membership

Terms of Reference

Educating tomorrow's nurse: Where's nursing informatics?

A National Nursing Informatics Nursing Education Project

Advisory Committee Terms of Reference

Project Overview

The Canadian Nursing Informatics Association with funding from Health Canada, the Office of Health and the Information Highway (OHIH), is carrying out the project.

The overall goal of the national study is to promote the development of nursing informatics competencies required now and in the future for nursing clinical practice and education. As well, faculty will increase their awareness and understanding of the relevance and importance of nursing students developing core competencies in the use of information and communication technology. The findings will be used to inform education decision makers and funders of information and communication technology of the needs related to enhancement of undergraduate nursing curricula and faculty preparedness in nursing informatics and of information and communication technology (ICT) requirements in Canadian schools of nursing.

The national study will assess and describe:

- The nursing informatics education opportunities currently available to undergraduate students in schools of nursing across the country;
- The level of preparedness and expertise of nursing faculty to provide necessary education opportunities in nursing informatics for undergraduate nursing students;
- The information and communication technology infrastructure and support for providing the education opportunities; and
- Opportunities and needs, including policy, for enhancing nursing curricula, faculty preparedness and ICT infrastructure and support in Canadian schools of nursing.

Advisory Committee Membership – Membership will include representatives from the following associations:

- Canadian Association of Schools of Nurses
- Canadian Nurses Association
- Academy of Canadian Executive Nurses
- Canadian Nursing Informatics Association
- Office of Nursing Policy – Health Canada

Advisory Committee Facilitation – Dr. Heather F. Clarke, Project Coordinator, will facilitate the Advisory Committee, with logistical assistance of Ingrid Smith, Mount Sinai Hospital Staff.

Advisory Committee Responsibilities – The responsibilities of the Advisory Committee will include advising on and reviewing as necessary:

Project G3-6B-DP1-0054

Canadian Nursing Informatics Association

- Communication/marketing plan to ensure an excellent response rate;
- Project design with respect to feasibility, acceptability and adequacy;
- Survey instruments to enhance their reliability, validity and relevancy;
- Dissemination to promote effective uptake of findings and national action; and
- Networking opportunities to engage senior decision-makers in health and nursing education systems in follow-up of findings and their implications.

Advisory Committee Accountability – The Advisory Committee is advisory to the Project Coordinator, Heather Clarke, and the Board of Directors (steering committee) of the Canadian Nursing Informatics Nursing Association.

Advisory Committee Meetings – Meetings will occur via teleconference with the use of e-mail between meetings. It is anticipated that teleconference calls will occur on a regular basis – approximately once a month – with others planned as needed. The calls will be limited to one hour or less. Cost will be covered by the project.

Arrangements will be made for a face-to-face meeting in Ottawa at the Nursing Leadership Conference – February 2003

Acknowledgements – Members of the Advisory Committee will be acknowledged in reports to OHIH and dissemination of findings, as appropriate.

Discussed and approved September 24, 2002

Committee Membership

- Lynn Nagle, Chair, President, Canadian Nursing Informatics Association
- Wendy McBride, Executive Director, and Kathleen Whittle, Director, Data & Communications, Canadian Association of Schools of Nursing
- Pat Griffin, Scholar in Residence, Health Canada, Office of Nursing Policy
- Nora Hammell, Policy Consultant, Canadian Nurses Association
- Francine Girard, Member Academy of Canadian Executive Nurses
- Heather Clarke, Project Manager and Recorder

Appendix D –Cover Letters, Definitions and Survey Questionnaires2

Cover Letters – Program and Faculty

***Educating Tomorrow’s Nurses – Where’s Nursing Informatics?* A National Nursing Informatics Education Project**



Dear Colleague:

PROGRAM LETTER

In September 2002 you received information about this national project. Approximately 25% of the Canadian Schools of Nursing with undergraduate programs responded to the “Participation Response Form.” You will see some of your suggestions reflected in the questionnaires now ready for completion. We are looking for 100% response rate to this phase of the project. ***Please make that a reality!***

Background

I do not need to emphasize to you, ***a leader in nursing education*** in Canada, that nursing is evolving within a societal context of shifting paradigms and pervasive technology. Daily we are faced with untold possibilities to enhance health care delivery through information and communication technology (ICT) solutions. Clinical decision support systems, electronic health records, telehealth, distance education and the Internet are just a few of the ways that ICT is changing how health care education and services are accessed, delivered, and managed. These changes have made evident the acute need to ensure that health care professionals, including nurses, are educated in the use of ICT and informatics. Nurses must be knowledgeable about the potential of ICT and competent in nursing informatics (NI) to support their work in clinical practice, management, research and education roles.

The Project

The Canadian Nursing Informatics Association (CNIA) received a grant from Health Canada, Office of Health and the Information Highway, to describe the current situation of undergraduate nursing informatics education in Canada. The Canadian Association of Schools of Nursing supports the project. Background information and further details of the project *Educating Tomorrow’s Nurses – Where’s Nursing Informatics?* are available from www.cnia.ca. Findings will be made available through focus groups at selected local, regional and/or national meetings and conferences, and through a final report to each school of nursing. They will also be used to inform education decision makers and funders of ICT of the needs related to enhancement of nursing curricula and faculty preparedness in NI and of ICT requirements in Canadian schools of nursing.

This national project includes all undergraduate schools of nursing and consists of three questionnaires – two to be completed by each school of nursing (*Undergraduate Education Opportunity Questionnaire* and *Information and Communication Technology Infrastructure Questionnaire*) and one to be completed by faculty members teaching in the undergraduate program (*Faculty Preparedness and*

2 Questionnaires are the reference questionnaires from which were then formatted for the online surveys. These reference documents were sent to the schools of nursing so they could prepare for the online ones.

Expertise Questionnaire).

Completion and submission of the each questionnaire is requested by November 13, 2002.

Request

As the contact person for the school of nursing you are asked to have the two school questionnaires completed. The *Undergraduate Education Opportunity Questionnaire* <http://www.hownow.ca/cnia-ueo.htm> is organized according to three undergraduate curriculum elements: 1) curriculum characteristics; 2) curriculum objectives; and 3) entry level practitioner nursing informatics competencies. The *Information and Communication Technology Infrastructure Questionnaire* <http://www.hownow.ca/cnia-ict.htm> is organized according to seven infrastructure elements found to be important in the integration of ICT and NI in undergraduate nursing education. Please use the definitions in the “Definitions Document” which is attached. *Each online questionnaire will take approximately 20 minutes to complete.*

Instructions

Completing the survey online must be done at one sitting. For security reasons, the server does not save any data. Therefore, a word file of the questionnaire questions is attached. You should print this document and gather the data required prior to completing the online questionnaire. You should also have the definitions document (attached).

Instructions for completing and submitting the questionnaire online are found in the web-based survey. Ethics approval has been received by the University of British Columbia.

All information will be held confidential. Data will be stored in a locked cabinet or on a secure project Internet site, not the server. Only the project manager and survey consultant will have access to the data. Reporting of findings will be done at the aggregate level. No individual or school of nursing will be identified in any report without permission. There will be no individual identifying information.

We are anticipating 100% response rate – we hope you will help us reach that target.

Please complete and submit the questionnaires online by November 13, 2002.

If you have technical questions or difficulty, please contact:

Stephen Hanson (604) 877-6098, local 2505 or shansen@bccancer.bc.ca

Other questions should be addressed to Heather F. Clarke, RN, PhD, Adjunct Professor, University of British Columbia School of Nursing and Project Manager: (604) 733-9329 (phone/fax) or heather.clarke@shaw.ca. If you have any concerns about your treatment or rights as a participant in this study, you can contact the Director of Research Services at the University of British Columbia (604) 833-8598.

Thank you for your participation.



Heather F. Clarke, RN, PhD
Project Manager

Educating Tomorrow's Nurses – Where's Nursing Informatics? **A National Nursing Informatics Education Project**



Dear Colleague:

FACULTY LETTER

I do not need to emphasize to you, ***a leader in nursing education*** in Canada, that nursing is evolving within a societal context of shifting paradigms and pervasive technology. Daily we are faced with untold possibilities to enhance health care delivery through information and communication technology (ICT) solutions. Clinical decision support systems, electronic health records, telehealth, distance education and the Internet are just a few of the ways that ICT is changing how health care education and services are accessed, delivered, and managed. These changes have made evident the acute need to ensure that health care professionals, including nurses, are educated in the use of ICT and informatics. Nurses must be knowledgeable about the potential of ICT and competent in nursing informatics (NI) to support their work in clinical practice, management, research and education roles.

The Project

The Canadian Nursing Informatics Association (CNIA) received a grant from Health Canada, Office of Health and the Information Highway, to describe the current situation of undergraduate nursing informatics education in Canada. The Canadian Association of Schools of Nursing supports the project. Background information and further details of the project *Educating Tomorrow's Nurses – Where's Nursing Informatics?* are available from www.cnia.ca. Findings will be made available through focus groups at selected local, regional and/or national meetings and conferences, and through a final report to each school of nursing. They will also be used to inform education decision makers and funders of ICT of the needs related to enhancement of nursing curricula and faculty preparedness in NI and of ICT requirements in Canadian schools of nursing.

This national project includes all undergraduate schools of nursing and consists of three questionnaires – two to be completed by each school of nursing (*Undergraduate Education Opportunity Questionnaire* and *Information and Communication Technology Infrastructure Questionnaire*) and one to be completed by faculty members teaching in the undergraduate program (*Faculty Preparedness and Expertise Questionnaire*).

Completion and submission of your questionnaire is requested by November 13, 2002.

Request

As a faculty member with responsibilities in the undergraduate nursing education program, you are requested to complete the *Faculty Preparedness and Expertise Questionnaire* <http://www.hownow.ca/cnia-fpe.htm>. The questionnaire is organized according to five elements relevant to the preparedness of faculty to integrate nursing informatics/information and communication technology into nursing education: 1) computer literacy skills; 2) nursing informatics knowledge; 3) nursing informatics competencies; 4) access/experience; and 5) attitudes/values. Demographic questions

are found in the final section. Please use the definitions in the “Definitions Document” which is attached. ***Completing the online questionnaire will take approximately 20 minutes.***]

Instructions

Completing the survey online must be done at one sitting. For security reasons, the server does not save any data. Therefore, a word file of the questionnaire questions is attached. You should print this document and gather the data required prior to completing the online questionnaire. You should also print the definitions document.

Instructions for completing and submitting the questionnaire online are found in the web-based survey. Ethics approval has been received by the University of British Columbia.

All information will be held confidential. Data will be stored in a locked cabinet or on a secure project Internet site, not the server. Only the project manager and survey consultant will have access to the data. Reporting of findings will be done at the aggregate level. No individual or school of nursing will be identified in any report without permission. There will be no individual identifying information.

While faculty members are asked to provide the name of their school of nursing, this is for data analysis purposes only. Data will be aggregated at the school level. Individual faculty responses to the *Faculty Preparedness Questionnaire* are anonymous.

We are anticipating 100% response rate – we hope you will help us reach that target.

Please complete and submit the questionnaire online by November 13, 2002.

If you have technical questions or difficulty, please contact:

Stephen Hanson (604) 877-6098, local 2505 or shansen@bccancer.bc.ca

Other questions should be addressed to Heather F. Clarke, RN, PhD, Adjunct Professor, University of British Columbia School of Nursing and Project Manager: (604) 733-9329 (phone/fax) or heather.clarke@shaw.ca. If you have any concerns about your treatment or rights as a participant in this study, you can contact the Director of Research Services at the University of British Columbia (604) 833-8598.

Thank you for your participation.



Heather F. Clarke, RN, PhD

Definitions

Client: term used to denote a recipient of RN services and may encompass an individual, a group of related or unrelated individuals, and communities (of any size).

Clinical applications: clinical information systems for client care delivery either simulated in a lab setting or actual clinical setting.

Competencies: the integrated knowledge, skills, attitudes and judgment expected of the entry-level practitioner (National Nursing Competence Project, June 1997)

Curriculum (Undergraduate): comprises all learning and other experiences that each school plans for its students in each phase of their undergraduate education – including objectives, courses, learning opportunities, clinical expectations and outcome requirements.

Distance education: a teaching method that involves a separation between the learner and the instructor/facilitator. E-learning, a component of distance education that employs a form of technology usage (e.g., Internet or other information and communication technology), can be used to enhance learning experiences associated with both campus-based and distance training. Program delivery is not limited to a single format, any combination of lecture, print-based, e-learning and workplace practicum, can be used to enrich the learning experience.

Entry-Level Practitioner - beginning R.N. at the point of registration or licensure following graduation from a nursing education program (adapted from the National Nursing Competence Project, June 1997)

Information and communication technologies (ICT): encompass all those digital and analogue technologies that facilitate the capturing, processing, storage and exchange of information via electronic communication. ICTs are computer hardware, software and peripherals, the Internet and its applications like e-mail, e-commerce and e-conferencing, Intranets, satellite broadcasting networks, wireless communication devices, including mobile phones, PDAs and voice mail, DVDs, CD-ROMs, digital and analogue radio, television, video, telephones and fax machines.³

Infrastructure: the essential elements of a system or structure to support specific activities (e.g. integration of ICT and NI in nursing education).

Nursing Informatics (NI): integrates nursing science, computer science, and information science to manage and communicate data, information, and knowledge in nursing practice. Nursing informatics facilitates the integration of data, information, and knowledge to support clients, nurses, and other providers in their decision-making in all roles and settings. This support is accomplished through the use of information structures, information processes, and information technology. The goal of nursing

³ Definition used by the Office of Health and the Information Highway http://www.hc-sc.gc.ca/ohih-bsi/help_aide/thesaurus/thesaurus_alpha_e.html#1.

informatics is to improve the health of populations, communities, families, and individuals by optimizing information management and communication. This includes the use of information and technology in the direct provision of care, in establishing effective administrative systems, in managing and delivering educational experiences, in supporting lifelong learning, and in supporting nursing research⁴.

Nursing Informatics Competencies – the integration of knowledge, skills, and attitudes in the performance of various nursing informatics activities within prescribed levels of nursing practice.

⁴ Stagers, N, & Bagley Thompson, C. (2002). The evolution of definitions for nursing informatics: A critical analysis and revised definition. *Journal of the American Medical Informatics Association*, 9, 3, 255 – 262.

Curriculum Questionnaire – document for reference

Educating tomorrow's nurses: Where's nursing informatics? *Undergraduate Education Opportunity Questionnaire*

The following information is being requested in the online questionnaire. This document is for reference so you can obtain the information needed to complete the online questionnaire.

Element: Curriculum Characteristics

Question	Response
1. The undergraduate nursing curriculum has a component/unit/subject or course titled Nursing Informatics (NI) (see definition)	yes/no
2. The total number of hours allocated to Nursing Informatics in the undergraduate program is: _____ hours	# hours
3. These hours are: 1 = integrated throughout the undergraduate program; 2 = one or more stand-alone required courses; 3 = an elective course(s) (non compulsory) only; 4 = core component or incorporated into one unit e.g. research	choose one
4. The undergraduate nursing program uses information and communication technology (ICT) (see definition) for teaching and learning experiences in the classroom:	Rating scale 1 → 4
5. The undergraduate nursing program uses ICT for teaching and learning experiences in the clinical area:	Rating scale 1 → 4
6. The person(s) most responsible for teaching NI is/are: 1 = nurse educator(s); 2 = computer specialist(s); 3) other (please specify)	Choose one
7. Computer literacy is: 1 = a requirement for enrollment into the nursing program; 2 = not a requirement for enrollment; 3 = offered as a remedial course, as necessary; 4 = taught as part of the nursing informatics hours.	Choose one
8. The current curriculum design includes a vision and plan for the inclusion of informatics competencies into the nursing curriculum:	Rating scale 1 → 4
9. The following educational applications are used in teaching the undergraduate program: 1) computer-assisted instruction (CAI); 2) interactive video (IVD); 3) CD-ROM for quizzes and tests; 4) WEB-CT; 5) other (please specify)	yes/no
10. The following simulated clinical applications (see definition) are utilized in the program of learning: 1) assessment data; 2) client documentation – electronic health records; 3) medication administration; 4) clinical decision support systems; 5) other (specify)	yes/no
11. Students have access to clinical applications in the following clinical settings: 1) acute care; 2) public health; 3) home care; 4) extended care; 5) other (specify)	yes/no
12. Students are required to do work on-line, connecting with classmates and the instructor	yes/no
13. Distance education (see definition) courses are available	yes/no
14. Other curriculum characteristics related to nursing informatics or ICT	specify

Element: Curriculum Objectives

Extent to which the following nursing informatics/information and communication technology outcome

objectives are included in the undergraduate nursing curriculum: (4 point rating scale) (**Note:** this is not necessarily a comprehensive list of possible objectives)

1. Discuss historical perspectives and trends of ICT in nursing practice, education, administration and research
2. Demonstrate appreciation of the ethical, moral, cultural and legal aspects of informatics with regard to nursing practice, education, administration and research
3. Understand the flow of information through the health care environment and ways in which ICT can facilitate this flow.
4. Understand nursing information systems and their potential for enhancing the nursing process.
5. Appreciate the benefits and limitations of ICT and NI (including nursing classification systems/taxonomies) to the decision-making process
6. Effectively and efficiently access information, evaluate accessed information and determine appropriate uses of information by using both automated and non-automated information resources
7. Use ICTs to assess and monitor clients, document and evaluate client care, advance client education and enhance the accessibility of care
8. Protect the security, confidentiality and privacy of clients in relation to the use of health care and information technologies
9. Demonstrate computer literacy in applications such as word processing, spreadsheets and databases, presentations and graphics, e-mail, World Wide Web and Internet.
10. Other (please specify) _____

Element: Entry level practitioner nursing informatics competencies

Extent to which graduates from your undergraduate nursing program are required to demonstrate the following nursing informatics competencies: (4 point rating scale) (**Note:** this is not necessarily a comprehensive list of potentially required competencies)

1. Computer literacy – including competent use of word processing, data bases, spread sheets, presentations, graphics, bibliographic retrieval, e-mail, World Wide Web and Internet.
2. Implement public and institutional policies related to privacy, confidentiality and security of information – client care information, confidential employer information and other information gained in the nurse’s professional capacity
3. Use ICT to collaborate, publish and interact with faculty and colleagues.
4. Use existing health and nursing information systems, nursing classification systems/taxonomies and available information to manage practice (i.e. identify, collect and record data relevant to the nursing care of clients)
5. Locate information using ICT, evaluate it, and apply it to support evidence-based learning and professional practice
6. Use ICTs to manage aggregate nursing healthcare data and information, including the entry, retrieval and manipulation of data; interpretation and organization of data into information to affect nursing practice
7. Knowledgeable consumer – able to assess, in an informed manner, the value of new, emerging technologies (e.g. telenursing/telehealth, clinical decision support systems, electronic global health conferencing, virtual education, health information networks and devices)
8. Effectively search on-line information sources – including internet/intranet-based materials and bibliographic databases
9. Teach clients/colleagues with the support of computer based instructional materials

10. Understand the application of nursing workload data to clinical productivity management
11. Employ technology in the development of strategies for solving problems in the clinical / practice environment
12. Have a positive attitudes toward ICT uses that support lifelong learning, collaboration, personal pursuits, and productivity
13. Other (please specify)

Comments:

Contact Information

1. Name and contact information (e-mail, phone, fax) of person completing form:
2. Position:
3. Name of school of nursing
4. Type of program – 1) university; 2) college/technical institute in collaboration with a university; 3) college/technical institute only, 4) Other (please specify)

Information and Communication Technology Infrastructure Questionnaire

Educating tomorrow's nurses: Where's nursing informatics?
Document for reference

The following information is being requested in the online questionnaire. This document is for reference so you can obtain the information needed to complete the online questionnaire.

Element: Information and communication technology

A. Use 5 point rating scale to indicate faculty and student access to:

1. School of nursing/campus computers (desktop and laptop)
2. School of nursing/campus software
 - Word processing, spreadsheets, presentations etc
 - Internet – World Wide Web
 - E-mail address
 - Bibliographic or library reference databases such as MEDLINE and CINAHL
 - Research data bases
3. Collaborating clinical institutions' technological infrastructure
 - Clinical information systems
 - Telecommunication systems
 - Library systems/clinical information resources

B. Available technology in your school of nursing.

1. What types of computers are available in the school of nursing? IBM/PC; MAC; both but primarily IBM/PC; both but primarily MAC
2. Local Area Network (LAN)
3. LAN connection to a Wide Area Network (WAN)
4. Percent of classrooms equipped with the appropriate information and communication technology (ICT)

Element: Education opportunities

Degree of availability (5 point scale) your school of nursing or campus affords to 1) faculty and 2) students to:

1. Continuing education/workshops/programs in the basic use of computers
2. Continuing education programs/workshops/programs in the use of computers for the nursing profession
3. Credit courses in nursing informatics (NI) (see definition)
4. Computer learning laboratory located within the nursing department
5. Instruction development programs that address issues of teaching/learning using technology

Element: Human Resources

Adequacy of resources for the integration of NI/ICT (see definition) in undergraduate nursing education in your school of nursing. (3 point rating scale)

1. Competencies (see definition) of faculty

2. Graduate students to assist faculty with teaching NI or using ICT
3. Students enrolling with sufficient or advanced computer skills and value technology
4. Competencies of clinical staff/preceptors
5. Ergonomics consultation
6. LAN manager/administrator
7. Computer lab technician
8. Learning resource director

Element: Organizational Culture

Your level of agreement to each of the following statements (4 point rating scale)

In our school of nursing.....

1. Faculty colleagues are mutually supportive in using ICT in teaching
2. The dean/director/chair is supportive in using ICT in teaching
3. There is an *esprit de corp* which values expertise and knowledge of ICT skills, NI, web-based learning and Internet use
4. There is a vision, as well as goals and supportive policies about the integration of ICT and NI in nursing education.
5. E-mail is the norm for intra-school communication
6. There is a web-site for program courses and/or materials
7. There is high use of ICT in teaching

Element: Plan

Presence of:

1. Strategic educational plan for development, implementation and management of NI/ICT in nursing
2. An individual or group/committee that examines the role of NI/ICT in nursing education and practice
3. Nursing department membership on campus committees that control financial and personnel resources to develop and maintain the technology
4. Nursing budget with adequate funds/resources (financial and personnel) specifically allocated for technology

Element: Connectedness

Degree of availability (5 point rating scale) your school of nursing/campus affords to both 1) faculty and 2) students to:

1. Information systems relevant to nursing in the health care/clinical setting
2. Programs and electronic services from home (e.g. access to LAN)
3. Information technology department/centre/help desk to troubleshoot computer and system problems
4. Connection with libraries, World Wide Web links
5. Technical connectivity between educational and clinical service settings – e.g. clinical assignment bookings, preceptor arrangements etc.

Element: Collaboration

Degree to which collaboration exists in your school of nursing/campus (5 point rating scale)

1. Between disciplines (e.g., nursing, computer science) for the integration of NI/ICT in education

2. With public organizations (e.g., universities, governments, health agencies) for the integration of NI/ICT in education
3. With ICT industry.
4. For shared facilities (e.g. intranets and LANs, networked applications such as databases, spreadsheets, graphics and group software)

Comments or additional infrastructure elements that you consider to be essential for integrating ICT and NI in undergraduate nursing education.

Demographics

1. Name and contact information (e-mail, phone, fax) of person completing form:
2. Position:
3. Name of school of nursing
4. Type of program – 1) university (baccalaureate); 2) college/technical institute (collaborative baccalaureate); 3) college/technical institute (diploma), 4) other (specify)
5. Number of faculty in undergraduate nursing program – tenure track _____; sessional _____; clinical _____
6. Number of undergraduate students on-site enrolled in – 1) first year _____; 2) second year _____; 3) third year _____; 4) fourth year _____

Faculty Preparedness and Expertise Questionnaire

Educating tomorrow's nurses: Where's nursing informatics?
Document for reference

The following information is being requested in the online questionnaire. This document is for reference so you can obtain the information needed to complete the online questionnaire.

Element: Computer literacy – skills

Use 4 point rating scale to indicate your skill in two contexts: personal use and integration into your teaching.

1. Word processing software
2. Database software
3. Graphics/presentations software
4. Spreadsheet/statistical software
5. Education games software
6. Bibliographic/library retrieval systems
7. Clinical application systems
8. Computer-assisted instruction (CAI)
9. Interactive video (IVD)
10. CD-ROM, testing applications
11. Simulated computer-based clinical applications
12. Web-based CT courses
13. E-mail to communicate with students
14. World Wide Web and Internet search capabilities
15. Assessment of World Wide Web sites and Internet resources
16. Other (please specify)

Element: Nursing Informatics Knowledge

Use 5 point rating scale to indicate your knowledge of:

1. NI competencies (see definitions) required for new graduates/entry level practitioners
2. Necessary NI content for undergraduate nursing programs
3. Principles of computer hardware and software
4. Principles of information management in nursing (i.e. clinical, administration, education and research)
5. Role of information and communication technology (ICT) to facilitate information management
6. Other (please specify)

Element: Nursing Informatics competencies (see definitions)

Use 5 point rating scale to indicate your competency in :

1. Teaching and evaluating the required NI competencies for providing nursing care
2. Teaching and evaluating the informatics competencies required for nursing administration/management

3. Participating with practicing nurses, nurse administrators, and nurse researchers to define new informatics competencies
4. Discussing ethical and legal issues and concerns relating to information processing in health care
6. Integrating NI and ICT into the curriculum
7. Teaching with computer-based instructional materials
8. Preparing instructional materials using ICT tools
9. Evaluating strengths and weaknesses of ICT tools and resources to support teacher preparation of instructional materials
10. Reviewing, selecting, and operating computer-assisted learning materials, CAI systems and internet-based materials
11. Designing, developing and implementing hardware and software for CAI and internet based materials
12. Performing student assessment and evaluation functions using informatics tools
13. Designing, developing and implementing informatics tools for student assessment and evaluation
14. Using information and communication technologies to enter, retrieve and manipulate data, including clinical, student, administrative and research data
15. Other (please specify)

Access and experience

Degree of access or experience **you** have for each of the following.

Access – Experience	Response
1. Primary access to computer at work – 1) personal desktop/laptop, 2) share with other faculty member, 3) share with student, 4) computer/learning lab	
2. Access to computer and software technical support	Rating scale 1 → 4
3. Access to information systems in the clinical setting	Rating scale 1 → 3
4. Access to Internet 1) school of nursing – no fee; 2) school of nursing – fee; 3) school/campus library; 4) home	yes-no
5. Access to informatics courses 1) none; 2) general informatics, 3) health informatics, 4) NI	yes-no
6. Access to instruction development programs that include teaching using technology	Rating scale 1 → 4
7. Access to data bases for research purposes	Rating scale 1 → 3
8. Taken informatics courses 1) general informatics, 2) health informatics, 3) nursing informatics; 4) other (please specify)	yes-no
9. Responsibilities for NI 1) occasional lecture, 2) curriculum planning, 3) integrating concepts in nursing course(s), 4) teaching a NI course, 5) other (please specify)	yes-no
10. Approximate number of hours per week you use a computer	categories

11. Participation on group/committee that examines the role of technology in nursing education and practice	yes/no
12. Participation on a centralized committee within your institution that controls financial, and personnel resources to develop and maintain the technological education systems	yes/no
13. Support for NI/ICT from faculty (e.g. interest groups, networking, mentor)	Rating scale 1 → 4
14. Involvement in research related to NI/ICT	Type
15. Other relevant experiences	Specify

Attitudes and values

Degree to which you agree with the statement. (5 point rating scale)

1. NI/ICT competencies are absolutely necessary for entry-level practicing nurses.
2. Undergraduate nursing programs should focus on using ICT to teach students about NI and ICT.
3. Web-based instruction and learning is the same quality as on-site instruction and learning for undergraduate students.
4. Using ICT is scary for me.
5. I feel comfortable in my ability to incorporate NI and ICT in my teaching.
6. Our undergraduate nursing faculty believe that NI has the potential to contribute significantly to improving the quality of nursing care
7. Our faculty value the importance of ICT in nursing education
8. Our undergraduate nursing faculty feel uncomfortable in their abilities to incorporate NI and ICT in the nursing program
9. The culture of our school of nursing, with respect to NI/ICT in nursing education is one of being well informed.
10. Other values important to you or your school of nursing with respect to NI and use of ICT (please specify)

Comments:

Demographics

Please answer each of the following:

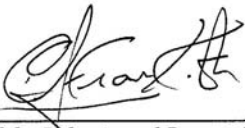
1. Faculty position (check only one) – 1) professor, 2) associate professor, 3) assistant professor, 4) clinical faculty, 5) other (please specify)
2. Undergraduate teaching responsibility 1) classroom and clinical, 2) classroom only, 3) clinical only
3. Name of school of nursing
4. Highest degree 1) baccalaureate in nursing, 2) masters (nursing), 3) masters (other), 4) doctorate (nursing) 5) doctorate (other)
5. Specialty education/certification in NI (yes/no)
6. Year of initial registration as RN
7. What is your school's administration's position on NI/ICT? (1 = low priority, 2 = moderate priority, 3 = high priority, 4 = no priority)
8. Are your students generally computer literate on enrollment? (yes/no)
9. What opportunities and support are available to you with respect NI/ICT? 1) workshops, 2)

tutoring, 3) mentoring, 4) released time, 5) case-by-case basis, 6) internal grants, 7) stipend with specified parameter, 8) stipend with no strings attached – (yes/no)

Appendix E – Ethics Approval Certificate



Certificate of Approval

PRINCIPAL INVESTIGATOR Clarke, H.F.	DEPARTMENT Nursing	NUMBER B02-0527	
INSTITUTION(S) WHERE RESEARCH WILL BE CARRIED OUT			
CO-INVESTIGATORS: Nagle, Lynn,			
SPONSORING AGENCIES Health Canada			
TITLE: Assessing Informatics Education Needs of Canadian Nurses-Educational Institution Component-"Education Tomorrow's Nurses-where's nursing informatics?"			
APPROVAL DATE OCT -4 2002	TERM (YEARS) 1	AMENDMENT: Oct. 1, 2002, Revised questionnaires	AMENDMENT APPROVED: OCT -4 2002
<p style="text-align: center;">CERTIFICATION:</p> <p style="text-align: center;">The protocol describing the above-named project has been reviewed by the Committee and the experimental procedures were found to be acceptable on ethical grounds for research involving human subjects.</p> <div style="text-align: center; margin: 20px 0;">  <hr style="width: 30%; margin: 0 auto;"/> <p style="margin: 0;">Approval of the Behavioural Research Ethics Board by: Dr. James Frankish, Chair</p> </div> <p style="text-align: center; margin-top: 20px;">This Certificate of Approval is valid for the above term provided there is no change in the experimental procedures</p>			

Appendix F – Sample Referent Discussion Group Invitation



YOUR INVITATION

to participate in a referent discussion group

MONDAY, FEBRUARY 10, 2003

1715 – 1830 hours or 1900 – 2000 hours

International Ballroom

(light snack and beverages will be served)

PURPOSE

To discuss the findings of and suggest recommendations for the national nursing informatics education project

**Educating Tomorrow's Nurse –
Where's Nursing Informatics?**

FORMAT

Findings will be presented from the 2002 on-line questionnaires

- Undergraduate Education Opportunity Questionnaire
- Information and Communication Technology Infrastructure Questionnaire
- Faculty Preparedness and Expertise Questionnaire

Discussion will focus on:

- What are the implications of these findings?
- What recommendations should be made? To whom?
- How should the findings and recommendations be disseminated?

Follow-up feedback will be encouraged through e-mail

(heather.clarke@shaw.ca) and the CNIA website www.cnia.ca

The overall goal of the national study is to promote the development of nursing informatics competencies required now and in the future for nursing clinical practice and education. The findings will be used to inform education decision makers and funders of the needs related to enhancement of nursing curricula and faculty preparedness in nursing informatics and of information and communication technology requirements in Canadian schools of nursing. The project is funded through CNIA by Health Canada, Office for Health and the Information Highway. Heather F. Clarke, RN, PhD is managing the project.

Appendix G – Detailed Descriptive and Correlation Findings

Descriptive Analyses Findings

Response Rates

There were four schools of nursing that deemed themselves not appropriate to be included in the population of undergraduate nursing programs (N=81) for reasons that included: phasing out the school without replacement; integrated with a university school of nursing that has overall responsibility; and only post-RN program and too few faculty to respond. The final population was 77 schools of nursing with undergraduate programs. However, this may be a slight over-estimation, as some schools of nursing, identified as individual schools of nursing in the Canadians Association of Schools of Nursing data base, later indicated that they did not respond because the collaborative program the school was in with a university school of nursing was such that it was appropriate for only the university school to respond to the questionnaires.

The final response rates, based on a population of 77 Schools of Nursing with undergraduate programs, were as follows:

- Infrastructure: - n = 37 – 48%
 - Curriculum – n = 39 – 51%
 - Faculty – n = 130 faculty responded representing 29 known schools of nursing – which is at least a 38% response rate. However, approximately 15% (n=21) responses did not indicate their school of nursing. Seven schools had \geq five faculty responses (3 university; 4 college/collaborative programs). Faculty responses ranged from 0 – 17 per school.
 - All three questionnaires – 26 schools of nursing had responses to all three questionnaires = 34%
- These calculated response rates can be considered conservative, as some non-responding schools in collaborative programs later indicated their program responses were included their collaborative university school of nursing responses.

National distribution: eight of the ten provinces had at least one school of nursing response. There were no responses from schools of nursing in the territories.

Infrastructure results – Information and Communication Technology Infrastructure

Questionnaire

The *Information and Communication Technology Infrastructure Questionnaire* was organized according to seven infrastructure elements: Information and communication technology; Connectedness; Education opportunities, Human resources; Organizational culture; Plan; and Collaboration. Definitions of relevant terms were provided in the “Definitions Documents” (Appendix D)

Respondents

The majority of respondents (51%) held the position of dean/director/chair of the nursing program or school. Other respondents held positions of assistant dean (8%); curriculum coordinator/chair (11%) or

5 Terms defined in the “Definitions Document” are indicated with an asterisk (*)

other (30%) which included assistant professor, lecturer, coordinator learning resource centre. Thus it can be concluded that the respondents had the knowledge and authority to be providing credible (reliable and valid) the information on behalf of the school of nursing.

The majority of the responding programs were university (baccalaureate) programs (51%); while 1/3 were college or technical institute programs in collaboration with a university baccalaureate program. The other types of programs (14%) were essential university college programs or collaborative programs with a technology institute. There were no diploma program respondents.

Element: Information And Communication Technology

Faculty and student access to the school of nursing computers and software and to collaborating clinical institutions' ICT

Except for access to research databases, almost 100% of the schools provide the faculty with free universal access to essential ICT, including computers, software, Internet and libraries. In general, schools provide greater accessibility to ICT for faculty than students and students more frequently have a fee levied for access.

Availability of the technology in the school of nursing.

Almost of schools of nursing have IBM/PC computers – either exclusively (73%) or both IBM and MAC but primarily IBM (24%). Most (94%) have a Local Area Network and for 2/3 of the schools of nursing the LAN is connected to a Wide Area Network.

Classrooms equipped with the appropriate information and communication technology are not the norm. Less than half of the schools of nursing (41%) perceive the school is appropriately equipped.

Faculty and student access to collaborating clinical institutions' technological infrastructure

There is little access for faculty, and less so for students, to collaborating clinical institutions' ICT. This is particularly so for access to clinical information systems* and telecommunication systems. Over 1/3 of schools of nursing have neither faculty nor student access to clinical information systems (38%). However at least limited access, if not universal access, is available to more than half the schools of nursing faculty and students (59%). Only about 1/3 of the schools of nursing report universal access to clinical institution's telecommunication systems. Students are more likely to experience no access than faculty (41% vs 19%). Library systems and clinical information resources are more accessible to school of nursing faculty than students (68% vs 41%).

Element: Connectedness

To clinical/health care settings

Faculty, in general, has more access than students to information systems relevant to nursing in the health care/clinical setting. More than 1/3 (38%) schools report that faculty have universal access but only slightly more than 1/4 (30%) report similar access for students. Limited access is available to faculty (27%) and students (24%) in about 1/4 of the schools. In almost 1/3 of the schools faculty and students have no access to clinical information systems.

From home

In all schools of nursing, faculty have some degree of access to programs and electronic services from

home. Limited access is reported by 1/4 (24%) of the schools; while almost 2/3 (62%) report universal availability without a fee and 14% universal availability with a fee. Programs and electronic services from home are less available to students, with 8% of the schools reporting no availability for students. Approximately 1/2 (51%) provide universal access for the students, but in 21% of the schools a fee is levied. Otherwise, students have limited access with (11%) or without a fee (30%)

To help

A no-fee universal availability of an information technology department/centre/help desk to troubleshoot computer and system problems is the norm among the schools. However, this is more available to faculty 89% than to students 62%. In 30% of the schools students have limited access with and without a fee.

To libraries and World Wide Web

Essentially all schools of nursing report universal availability of connections with libraries and World Wide Web for both faculty (100%) and students (92%). No schools reports not having access to these resources.

Between educational and clinical service settings

Less than half the schools report some degree of availability of technical connectivity between educational and clinical service settings – e.g. clinical assignment bookings, preceptor arrangements etc. – either for faculty (51%) or students (65%). Approximately 1/4 of the schools report having universal access for faculty, but in one school there is a fee for this access. On the other hand, only 14% of the schools report this access available to students. Seven schools (19%) report limited availability for both faculty and students.

Summary

While faculty and students are very likely to universal access, without a fee, to the World Wide Web and links, faculty have greater access to a help desk, although this not universal, and at times there may be a fee for both students and faculty. Both faculty and students have limited availability of clinical nursing information systems for the purposes of arranging clinical assignments, making preceptor arrangements etc.

Element: Education Opportunities

Continuing education/workshops/programs

While approximately 2/3 (65%) of the schools have no-fee universal availability of continuing education, workshops and programs in the *basic use of computers* for faculty, only 14% have such for students. While slightly over 1/4 of the schools provide universal access with a fee to students, another 30% provide limited access without a fee. Limited access, with or without a fee, is available to faculty in 30% of the schools.

Availability of continuing educations, workshops, and programs in the use of computers *for the nursing profession* is very limited for both faculty and students. Limited access, with or without a fee, is provided to faculty in almost 1/3 (33 %) of the schools and somewhat more to students (41%). While almost 1/4 of the schools have universal, no fee access for faculty, only one school has the same for students. There is no availability for faculty in more than 1/3 (38%) of the schools and none for student

in almost 1/2 (49%) of the schools.

Credit courses in nursing informatics* (NI)

In general, credit courses in nursing informatics are not available – for faculty this is the situation in almost 2/3 (62%) of the schools, and for students this is the situation in almost 3/4 (73%) of the schools. Faculty have universal availability, with and without a fee, at 22% schools; while students only have universal access with a fee in 14% of schools.

Learning supports

A computer learning laboratory located within the nursing department is universally available for faculty and students in approximately 1/3 (35%) of the schools. However, almost an equal number of schools do not have this resource available for either faculty or students (40%; 35%). For the remaining schools, there is limited availability.

Faculty has greater access than students to instruction development programs that address issues of teaching/learning using technology. In more than 1/3 (38%) of the schools faculty have limited, not fee, access; while in 46% schools, there is universal, no fee, availability for faculty. For students, this resource is generally unavailable (49% of the schools) or limited (41% of the schools).

Summary

With the exception of basic computer continuing education for faculty and some access to instruction development that addresses issues of teaching and learning using technology, there are few education opportunities for students or faculty to gain competencies in computer skills, computer applications in nursing, or nursing informatics.

Element: Human Resources

Competencies

Almost 2/3 (62%) of the schools consider their *faculty* teaching in undergraduate nursing programs to have “somewhat adequate” competencies to do so. Only 30% consider their faculty to have adequate competencies. Few schools have *graduate students* to assist faculty with teaching nursing informatics or using information and communication technology (5%).

Slightly more than 1/4 (30%) of the schools feel that *students* enrolling are adequately sufficient or have advanced computer skills and value technology. More than 2/3 (68%) consider students to be “somewhat adequate” prepared in this area on enrollment.

The competencies of *clinical staff/preceptors* is not felt to be at all adequate by 1/4 schools; somewhat adequate by 1/2 and adequate by 1/4.

Consultation

Less than 1/4 (22%) of the schools consider *ergonomics consultation* to be adequate. It is not at all adequate for 43% schools and only somewhat adequate for 1/3 of the schools.

Over 1/2 (57%) of the schools have adequate *LAN manager/administrator* resources. Approximately 1/4 (27.0% - n=10) of the schools consider this to be somewhat adequate and the remainder (16%) this

resource is not at all adequate.

The resources of a *computer lab technician* are not generally adequate. Less than 1/2 (46%) of the schools report that this resource is adequate, while 1/3 report that it is somewhat adequate. For the others (22%) this resource is not at all adequate.

Slightly more than 1/3 (38%) of the schools report having adequate resources of a *learning resource director*. For more than 1/3 (35%) this resource is not at all adequate, while for 1/4 the resource is somewhat adequate.

Summary

In general the schools of nursing do not consider their human resources to be adequate for the integration of nursing informatics and information and communication technology in their undergraduate education program. The competencies of faculty, clinical staff/preceptors and students on entry are only somewhat adequate for the majority of schools. There are more likely to be adequate human resources for a computer lab, learning resource centre and LAN administration. Few schools of nursing have resources of graduate students to assist faculty in their NI responsibilities or of ergonomics consultation.

Element: Organizational Culture

Almost 3/4 of the schools agree there is support among their colleagues (68%) and dean/director/chair (89%) for using ICT in teaching/learning and that indeed there is an *esprit de corp* which values expertise and knowledge of ICT skills, NI, web-based learning, and Internet use (68%). This is evidenced in the high use of e-mail as the communication norm (92%) and having a website for courses and program materials (78%). Almost 1/2 agree there is a vision, as well as goals and supportive policies for the integration of ICT and NI in nursing education (49%), reflected somewhat in lower agreement of using ICT in teaching (43%).

Element: Plan

Approximately 1/2 (51%) of the schools have a strategic educational plan for development, implementation and management of NI/ICT in nursing; while 401% (n=15) do not. Less than 1/3 (30%) of the schools have a nursing budget with adequate funds/resources (financial and personnel) specifically allocated for technology.

Almost equal numbers of schools have (49%) or do not have (43%) an individual or group/committee that examines the role of NI/ICT in nursing education and practice. More than 1/2 (51%) of the schools have nursing department membership on campus committees that control financial and personnel resources to develop and maintain the technology; while 41% do not.

Element: Collaboration

Less than 1/4 (24%) schools report a high degree of collaboration *between disciplines* (e.g., nursing, computer science) for the integration of NI/ICT in education. The majority of schools (54%) report little collaboration and 22% report there is no interdisciplinary collaboration. More than 1/4 (27%) schools of nursing report there is no collaboration *with public organizations* (e.g., universities, governments, health agencies) for the integration of NI/ICT in education; while about 1/2 (56%) report at least some collaboration. Only 19% report that such collaboration is the norm. In general, there is

little (43%) or no (54%) collaboration *with the ICT industry*.

Approximately 3/4 (76%) of the schools collaborate at least to some degree for *sharing facilities* (e.g. intranets and LANs, networked applications such as databases, spreadsheets, graphics and group software). However, only 19% report that this occurs at least very often. The majority (57%) report this happens very little.

Summary

Collaboration for the integration of information and communication technology and nursing informatics into schools of nursing and their programs is not the norm. It is almost non-existent with ICT industry.

Comments.

Themes in the comments include:

- There's a goal to further develop ICT services, but limited financial and human resources for doing so.
- Institutional focus is on information systems to deal with student systems such as admissions not in instructional supports.
- Strong will on the part of faculty to use ICT and to enhance the content about NI in the curriculum, but limited by our institutional constraints and the fact that practice areas do not have fully integrated information systems.

Curriculum results – Undergraduate Education Opportunity Questionnaire

The *Undergraduate Education Opportunities Questionnaire* was organized according to two elements: Curriculum characteristics and Curriculum objectives. Definitions of relevant terms were provided in the “Definitions Document⁶” (Appendix D). Components are suggested for the element: Entry level practitioner nursing informatics competencies.

Respondents

The majority of respondents (52%) held the position of dean/director/chair of the nursing program or school. Other respondents held positions of assistant dean (18%); curriculum coordinator/chair (8%) or other (23%) which included assistant professor, lecturer, coordinator learning resource centre. Thus it can be concluded that the respondents had the knowledge and authority to be providing credible (reliable and valid) the information on behalf of the school of nursing.

The majority of the responding programs were university (baccalaureate) programs (56%); while 1/3 were college or technical institute programs in collaboration with a university baccalaureate program. The other types of programs (10%) were essentially university college programs or collaborative programs with a technology institute. There were no diploma program respondents.

Element: Curriculum Characteristics

Nursing Informatics as a component of the curriculum

Over 1/2 of the schools of nursing (56%) reported that there was no specific Nursing Informatics* component, unit or subject in their undergraduate curriculum. Most of the schools (74%) integrated Nursing Informatics throughout the undergraduate; while equal numbers (5%) offered it as an elective, non-compulsory course or as a core component incorporated into another unit such as research. Close to 1/4 of the schools (23%) reported that it was impossible to determine the hours allocated to Nursing Informatics in the undergraduate program curriculum, either because it was integrated, or they just did not know. About 1/3 (31%) indicated that a total of 0 – 9 hours were allocated and the other 21% allocated from 30 – 100 hours.

Over 1/2 of the schools (64%) report having, at least to some extent, a current curriculum design that includes a vision and plan for the inclusion of informatics competencies into the nursing curriculum. Three of these schools (8%) indicated that there is extensive attention to this in their vision.

The persons most responsible for teaching Nursing Informatics are nurse educators (90%). However comments suggested that key roles are played by computer support specialists in the orientation of both faculty and students to any new acquisition; librarians in both the orientation and ongoing support needs of students regarding ICT; and technicians who orient students to the different data bases and the Internet about how to access information.

Use of ICT* in teaching

Most of the schools (85%) use information and communication technology (ICT) for teaching and learning experiences in the classroom at least occasionally, with almost half of these using it most of the time. No school reported not using ICT for teaching and learning experiences in the classroom.

⁶ Terms defined in the “Definitions Document” are indicated with an asterisk (*)

However, only slightly more than half the schools (58%) use ICT for teaching and learning experiences in the clinical area at least occasionally. Some (10%) never use ICT for teaching and learning in the clinical area, and almost 1/3 (31%) use it rarely.

Less than 1/2 of the schools (47%) reported having distance education* courses available. A few schools report that Distance Education and on-line learning are components in a few nursing courses, but predominantly in the support courses such as physiology, pathology etc. or determined by course teacher ability. Others report that nursing courses are in the planning stage.

Computer assisted learning is the most common educational applications used in teaching the undergraduate program – 82% report using it; while interactive video is least commonly used application (46%). More than half the schools use CD-ROMs for such applications as testing, course content (59%) and WEB-CT (69%). Other applications in the planning or implementing stages include: online course development, video-conferencing, electronic examinations, and use of other applications such as Blackboard and Learnlink Web library.

In general there is limited use of simulated clinical applications* in the program of learning. The most frequently used simulation is for gaining assessment data (48%) and the least frequently used simulation is for clinical decision support systems (28%). Approximately 1/3 of the schools report using simulated clinical applications for medication administration and for clinical documentation – electronic health record. Several schools commented that they have limited software, are in process of researching and obtaining software to use in nursing lab e.g. bedside documentation, that students learn in the clinical area, or using demo products.

The greatest access to nursing informatics related clinical applications for students is in acute care settings (69%); with home care providing the least access (18%). One third of the schools report students having access to clinical applications in public health settings and 1/4 in extended care settings. Some students may have access to clinical applications if they are working as RNs (i.e. in the post-basic program) – however students very rarely are given access to hospital information system but can access patient info online by asking the RN/unit clerk to pull it up for them. Other clinical areas that may provide access are mental health and other community-based settings (e.g. professional organizations, community access centre/programs etc. “Our agencies do not have fully integrated information systems although they are making an effort to do so in the context of budgetary constraints.”

Student Requirements

In general, computer literacy is not a requirement for students to enroll in undergraduate nursing programs (72%). Less than 1/4 of the schools (21%) require computer literacy for enrollment. Few schools offer computer skills in the nursing program (8%). Yet, more than 3/4 of the schools (77%) require students to work on-line, connecting with classmates and the instructors. However, 18% do not require this.

Element: Curriculum Objectives

- *Historical trends*: Discuss historical perspectives and trends of ICT in nursing practice, education, administration and research
- *Ethical – legal*: Demonstrate appreciation of the ethical, moral, cultural and legal aspects of

informatics with regard to nursing practice, education, administration and research

- *System information flow*: Understand the flow of information through the health care environment and ways in which ICT can facilitate this flow
- *Nursing information systems*: Understand nursing information systems and their potential for enhancing the nursing process
- *Benefits – limitations*: Appreciate the benefits and limitations of ICT and NI (including nursing classification systems/taxonomies) to the decision-making process
- *Access – evaluate – use*: Effectively and efficiently access information, evaluate accessed information and determine appropriate uses of information by using both automated and non-automated information resources
- *Apply clinically*: Use ICTs to assess and monitor clients, document and evaluate client care, advance client education and enhance the accessibility of care
- *Confidentiality*: Protect the security, confidentiality and privacy of clients in relation to the use of health care and information technologies
- *Computer Literacy*: Demonstrate computer literacy in applications such as word processing, spreadsheets and data bases, presentations and graphics, e-mail, World Wide Web and Internet.

The only curriculum objective related to nursing informatics that is included, **at least to some extent**, by almost all the schools in their undergraduate nursing programs is *Computer Literacy* - (90%). However, slightly more than 1/2 (54%) of the schools address this objective in an **extensive** manner.

Between 2/3 and 3/4 of the schools address the following four curriculum objectives, **at least to some extent**:

- *Access – evaluate – use* - (72%). However, only 1/3 (33.3%) do so extensively.
- *Confidentiality* - (69%). Almost 1/2 (49%) of the schools do so extensively.
- *Ethical – legal* - (69%). However, more than 1/2 (54%) of the schools do so only to some extent, rather than extensively (15%).
- *Nursing information systems* - (64%). However, most (56%) address this objective only to some extent, while only 8% do so extensively.

Between 1/3 and 2/3 of the schools address the following three curriculum objectives, **at least to some extent**:

- *System information flow* - (62%). However, more than 1/2 (54%) do this to some extent only; while 8% do so extensively.
- *Benefits – limitations* - (51%). The majority (46%) of the schools address this curriculum objective only to some extent.
- *Apply clinically* - (46%). One third of the schools do this to some extent and 13% do so extensively.

The only curriculum objective that is **rarely addressed** is:

- *Historical* - only 1/4 of the schools do so at least to some extent – rarely extensively.

Element: Entry Level Practitioner Nursing Informatics Competencies

Suggested Competencies:

1. *Computer literacy*: Includes competent use of word processing, data bases, spread sheets,

presentations, graphics, bibliographic retrieval, e-mail, World Wide Web and Internet.

14. *Confidentiality*: Implement public and institutional policies related to privacy, confidentiality and security of information – client care information, confidential employer information and other information gained in the nurse’s professional capacity
15. *Communication*: Use ICT to collaborate, publish and interact with faculty and colleagues.
16. *Nursing Information Systems*: Use existing health and nursing information systems, nursing classification systems/taxonomies and available information to manage practice (i.e. identify, collect and record data relevant to the nursing care of clients)
17. *Assess – evaluate – use*: Locate information using ICT, evaluate it, and apply it to support evidence-based learning and professional practice
18. *Assess – evaluate – use*: Knowledgeable consumer – able to assess, in an informed manner, the value of new, emerging technologies (e.g. telenursing/telehealth, clinical decision support systems, electronic global health conferencing, virtual education, health information networks and devices)
19. *Assess – evaluate – use*: Effectively search on-line information sources – including internet/intranet-based materials and bibliographic databases
20. *Clinical Application*: Use ICTs to manage aggregate nursing healthcare data and information, including the entry, retrieval and manipulation of data; interpretation and organization of data into information to affect nursing practice
21. *Clinical Application*: Teach clients/colleagues with the support of computer based instructional materials
22. *Clinical Application*: Understand the application of nursing workload data to clinical productivity management
23. *Clinical Application*: Employ technology in the development of strategies for solving problems in the clinical / practice environment
24. *Historical Trends*: Have a positive attitudes toward ICT uses that support lifelong learning, collaboration, personal pursuits, and productivity

Faculty results – Faculty Preparedness and Expertise Questionnaire

The Faculty Preparedness and Expertise *Questionnaire* was organized according to five elements: Computer literacy; Nursing informatics knowledge; Nursing informatics competencies; Access and experience; and Attitudes and values. Definitions were provided in the “Definitions Document⁷” (Appendix D).

Respondents

130 faculty members responded, representing 29 schools (38% of the schools). Seven schools had five or more faculty respondents. Approximately 1/4 of the respondents held the position of professor, while another 1/4 were assistant professors. The other half of the respondents was equally divided among positions of associate professor, clinical faculty and other. Included in “other” positions were those of instructor, nurse educator, lecturer. Two thirds of the respondents held tenure track positions.

Almost half of the faculty responding were from university (baccalaureate) programs; while slightly more than 1/3 were college or technical institute programs in collaboration with a university baccalaureate program. The rest of the faculty responding did not provide the name of their school of nursing. Almost 3/4 had teaching responsibilities in both the classroom and clinical areas of the undergraduate nursing program*; while another 19.2% had classroom teaching responsibilities only. Very few had clinical teaching responsibilities only (5 = 4%).

The most common highest degree of the respondents was a masters degree (68%), with a masters degree in nursing being the most prevalent. Almost 20% of the respondents had a doctorate degree, primarily in a discipline other than nursing. Only 12% had a baccalaureate in nursing as their highest degree. Two-thirds of the respondents are experienced faculty, having become initially registered 23 to 43 years ago. Another 1/4 had on average been registered for 13 – 22 years. The average number of years since initial registration was 25.5 years.

Element: Computer Literacy – Skill And Integration

The majority of faculty (>50%) are most skilled in:

- using word processing, graphic, presentation and database software;
- communicating with students by e-mail ;
- searching the World Wide Web and Internet and assess the sites and resources; and
- using bibliographic and library retrieval systems.

Faculty tend to integrate these software programs into their teaching to a lesser extent than they are skilled in their use. However, the degree of integration follows the same trend as the skill – that is – faculty are most skilled in the use of word processing software and using e-mail to communicate with students and these are the two most frequent applications integrated into their teaching. Just 50% of faculty respondents are skilled in the use of data base systems and only about 1/3 integrate such use in their teaching.

Faculty are least skilled (i.e. <50% of faculty) in using the following computer applications:

- Computer Assisted Learning (CIA) and simulated computer-based clinical applications

⁷ Terms defined in the “Definitions Document” are indicated with an asterisk (*)

- WEB-CT or similar online education systems/courses
- CD-ROM applications – e.g. testing, assessment
- Interactive video (IVD) and clinical application systems
- Spreadsheets, statistical and education games software

They tend to integrate these applications into their teaching to a lesser extent than they are skilled in their use. However, the degree of integration follows the same trend as the skill – that is – faculty are least skilled in using clinical application systems and this is the application that is least integrated into their teaching.

Comments indicate that there are limited or no resources for faculty to develop skills or integrate their use in teaching-learning experiences. While other comments indicate that some faculty have been involved in web development, web-based forums (e.g. newsgroups, bulletin boards, conferencing), as well as the use of qualitative analytic tools.

Element: Nursing Informatics Knowledge

Approximately 1/2 to 2/3 of the faculty respondents have at least fair knowledge about each of the five educational requirements:

- NI competencies* required for new graduates/entry level practitioners (56%)
- Necessary NI content for undergraduate nursing programs (61%)
- Principles of computer hardware and software (63%)
- Principles of information management in nursing (i.e. clinical, administration, education and research) (61%)
- Role of information and communication technology (ICT) to facilitate information management (55%)

Only about 1/3 of faculty respondents have good to very good knowledge of the five identified Nursing Informatics requirements for undergraduate nursing education. This ranges from a high of 35% having “good to very good” knowledge in principles of computer hardware and software to 29% in principles of information management in nursing (i.e. clinical, administration, education and research).

Somewhat more than 1/3 of faculty respondents indicate that they have poor or no knowledge at all with respect to the NI education requirements. This ranges from a high of 42% having little or no knowledge of the role of information and communication technology (ICT) to facilitate information management to 35% knowing little about the principles of computer hardware and software.

Element: Nursing Informatics Competencies

Somewhat more than 1/4 of the faculty respondents indicated that they were quite or very expert in competencies related to:

1. Teaching and evaluating the required NI competencies for providing nursing care (27%);
2. Discussing ethical and legal issues and concerns relating to information processing in health care (36%);
3. Integrating NI and ICT into the curriculum (29%);
4. Teaching with computer-based instructional materials (CAI) (36%);
5. Preparing instructional materials using ICT tools (33%);

6. Evaluating strengths and weaknesses of ICT tools and resources to support teacher preparation of instructional materials (29%);
7. Reviewing, selecting, and operating computer-assisted learning materials, CAI systems and internet-based materials (29%); and
8. Performing student assessment and evaluation functions using informatics tools (26%)

However, except for discussing ethical and legal issues and teaching with computer-based instructional materials, almost 1/2 lack competencies in these areas. This is especially evident in the ability to teach and evaluate the required NI competencies for providing nursing care (52% little or no competency).

Less than 1/4 of the faculty respondents report being quite or very competent in:

1. Teaching and evaluating the informatics competencies required for nursing administration/management (15%);
2. Participating with practicing nurses, nurse administrators, and nurse researchers to define new informatics competencies (19%);
3. Designing, developing and implementing hardware and software for CAI and Internet based materials (9%);
4. Designing, developing and implementing informatics tools for student assessment and evaluation (13%); and
5. Using information and communication technologies to enter, retrieve and manipulate data, including clinical, student, administrative and research data (22%)

Comments about these competencies related to lack of accessibility of ICT and time to gain the competencies and questioning the relevancy of NI and ICT to quality patient care and nursing requirements.

Element: Access And Experience

Access

The majority of faculty respondents (88%) have as their primary access to a computer a personal desktop or laptop computer. The rest share a computer with another faculty member. Over 3/4 of the faculty respondents (77%) consider their access to computer and software technical support to be pretty or very good. For the rest it is limited access. Internet access at work is for the majority (86%) free at the school of nursing and for another 10% within the school or campus library. Almost all faculty respondents (92%) have Internet access at home as well.

Two thirds of the faculty respondents (65%) have access to general informatics courses. Slightly more than 1/3 of the respondents (38%) have access to health informatics courses, while less than 1/2 of the faculty respondents (40%) have access to nursing informatics courses. For more than 1/2 the faculty respondents (54%) access to instruction development programs that include teaching using technology is pretty or very good. For 1/3 (37%) there is limited access.

Approximately 1/3 of the faculty respondents (32%) have unlimited access to databases for research purposes and another 55% have limited access. Half the faculty respondents (51%) have only limited access to information systems in the clinical setting and another 1/3 (33%) have not access.

Experience

Approximately 1/3 of the faculty respondents (35%) have taken general informatics courses. However, very few have taken health informatics courses (14%) or nursing informatics courses (19%).

The most common faculty teaching responsibilities for nursing informatics were integrating NI concepts in nursing course(s) (57%), while 47% were involved in curriculum planning that included NI. Approximately 1/3 (31%) gave an occasional lecture in NI and only 4% had responsibilities for teaching a course in NI. Several respondents noted that nursing informatics is integrated throughout the curriculum across all years and no one teacher is responsible for an “informatics course”. While another respondent noted that a nursing informatics course that was taught previously is no longer offered due to curriculum changes and decreased demand. Others noted their attempts to increase use of ICT and NI in their teaching – assignments, online learning, and communication.

Approximately 1/3 of the faculty respondents (35%) participate on a group or committee that examines the role of technology in nursing education and practice, but few faculty respondents (14%) participate on a centralized committee that controls financial, and personnel resources to develop and maintain the technological education systems within the institution.

Support from faculty (e.g. interest groups, networking, mentor) for NI and ICT is only there for approximately 1/3 of the faculty respondents (39%). For the other 2/3 it is either not available or limited. Involvement in research related to Nursing Informatics and/or information and communication technology is primarily at an individual level, with almost 1/3 of the respondents (31%) indicating some individual involvement. Collaborative involvement in such research is reported by less than 1/4 of the respondents – with more indicating collaboration within nursing than multidisciplinary collaboration.

Comments:

Several of the faculty respondents have either taken or are completing university courses/programs in health or nursing informatics or workshops such as WINI (Weekend Immersion in Nursing Informatics). A few respondents indicate they are working with others on the development of web-based courses and websites. One respondent notes that while s/he has completed classes on web design and Web CT, the school neither has the equipment nor support to facilitate the use of such.

Element: Attitudes And Values

The attitudes and values in which there was greater agreement than disagreement were:

1. NI/ICT competencies are absolutely necessary for entry-level practicing nurses (90% agreement).
2. Undergraduate nursing programs should focus on using ICT to teach students about NI and ICT (82% agreement).
3. Our faculty value the importance of ICT in nursing education (55% agreement).
4. Our undergraduate nursing faculty believe that NI has the potential to contribute significantly to improving the quality of nursing care (52% agreement).
5. Our undergraduate nursing faculty feel uncomfortable in their abilities to incorporate NI and ICT in the nursing program (50% agreement).
6. I feel comfortable in my ability to incorporate NI and ICT in my teaching (49% agreement).
7. The culture of our school of nursing, with respect to NI/ICT in nursing education is one of being well informed (37% agreement).

The attitudes and values in which there was greater disagreement than agreement were:

1. Using ICT is scary for me (60% disagreement).
2. Web-based instruction and learning is the same quality as on-site instruction and learning for undergraduate students (41% disagreement).

The attitudes and values in which 1/3 or more of the faculty respondents neither agreed or disagreed were:

1. Our undergraduate nursing faculty believe that NI has the potential to contribute significantly to improving the quality of nursing care (37%).
2. Our undergraduate nursing faculty feel uncomfortable in their abilities to incorporate NI and ICT in the nursing program (37%).
3. The culture of our school of nursing, with respect to NI/ICT in nursing education is one of being well informed (35%).
4. Web-based instruction and learning is the same quality as on-site instruction and learning for undergraduate students (32%).

The two most agreed upon values related to NI/ICT competencies being essential to practicing nurses and using ICT to teach about NI and ICT. However, there was little or no agreement that web-based instruction and learning is the same quality as on-site instruction and learning for undergraduate students. There was “guarded” valuing by faculty of the potential for NI to contribute significantly to improving the quality of nursing care; uncertainty of the culture of the school being well informed of NI/ICT in education; and hesitancy about faculty’s ability to incorporate NI and ICT in the nursing program.

Comments and other values and attitudes include:

- Faculty beginning to recognize the need to increase their own competencies in NI and ICT.
- Educating students to be leaders in nursing must recognize that NI is invaluable in the process.
- Believe that student and instructor having access to ICT systems in agencies are important. These systems have been underdeveloped and their access has been guarded.
- There is a need to not only address the issues from a theoretical perspective but to also ensure students can apply the learning – emphasizing the significance of effectively using these tools for the practice of nursing.
- Use of technology should support the education, and that the technology should not DRIVE the education.
- Web-based instruction can be just as effective as face-to-face instruction if the course is conceptualized appropriately, and has the necessary technical and instructional supports.
- While NI and ICT have obvious advantages (distance ed, one-to-many communication, etc.), they appear to run counter to the philosophical underpinnings upon which our curriculum is based.
- Newer ‘younger’ teachers use ICT more and are comfortable with it, understand its potentials. Many of the ‘older’ teachers are not familiar with it and don’t trust it.
- Over 2/3 of the faculty respondents (69%) believe that their school administrator’s position on ICT and NI is moderate to high priority.

- The majority of the faculty respondents (82%) consider the students to be computer literate on enrollment.

Opportunities And Support Are Available With Respect NI/ICT

The most common NI and ICT opportunities and supports available to faculty respondents are workshops (70%) and individual, case-by-case opportunity (62%). Other available supports are mentoring (51%) and tutoring (44%). It is uncommon to have release time (15%), stipends, with or without obligations (10% & 4% respectively), or internal grants (19%).

Correlational Analysis by Program Type

Infrastructure – there were no statistically significant differences between program types –one trend emerged:

- Non-university programs are more likely than university programs to have universal access to basic computer education and use of computers in nursing education.

Curriculum – there was one statistically significant difference between program types and one trend:

Difference:

- University programs more frequently have to some extent or extensively a curriculum vision/design that includes NI competencies – with (p=.04)

Trend:

- Non-university programs are more likely to have a NI component/unit/subject or course titled nursing informatics in the undergraduate nursing

Faculty Preparedness – there were two statistically significant differences between types of programs and eight trends:

Differences:

- Non-university faculty feel more competent than university faculty to:
 - Teach and evaluate NI competencies for providing nursing care (p=.02) and
 - Review, select and operate computer assisted learning materials and internet-based materials (p=.05)

Trends:

- Non-university faculty were more likely than university faculty to:
 - Have good knowledge of the content necessary in undergraduate programs;
 - Assess themselves as being somewhat or very competent to teach and evaluate the competencies required for nursing administration/management; define new informatics competencies in conjunction with other nurses; teach with computer assisted instructional aids; prepare instructional materials using ICT tools; and evaluate strengths and weaknesses of ICT tools and resources to support teacher preparation of instructional materials.
 - Agree that they feel comfortable in integrating NI and ICT in my teaching.

Summary:

In general, there were few statistically significant differences between university and non-university programs, although a few trends emerged. The only statistically significant difference found between university and non-university programs was having curriculum objectives related to NI (more likely in university programs) and for non-university faculty to feel more competent in teaching nursing informatics and using computer assisted learning and internet technology in teaching. The trends were for non-university programs to provide better access to education opportunities and have a nursing informatics component in the curriculum and for non-university faculty to feel more competent in teaching nursing informatics and using ICT in teaching.