

# Working Together to Work Smarter to Provide Health Informatics Education

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## Abstract

*Working Together, Working Smarter is the theme of this conference, and evidence of working collaboratively to achieve pre-determined goals can occur in multiple ways. This paper describes an educational example where a New Zealand nurse informatician worked together with a nurse lecturer from a North American university to provide an intensive health informatics course. Faculty with informatics knowledge are in short supply, and co-teaching is one method of working smarter, by both meeting immediate demand, as well as building capacity. The course and learning objectives are described, along with assessment criteria, before presenting outcomes that were demonstrated by the cohort of nursing and allied health students who completed the course.*

## 1. Introduction

Information and communication technology (ICT) is present in every aspect of life, including the personal, work, education, and health care spheres [1, 2]. The increase in the pervasiveness of ICT in healthcare means that health professionals need to be prepared to work in a changing and increasingly technological world [3]. The field of health informatics has been recognized for over thirty years and has evolved with the increase in the use of computers and other technologies. The International Medical Informatics Association (IMIA) is the world body for health informatics and as the umbrella organisation for constituent groups provides leadership and expertise to the multidisciplinary, health focused community and to policy makers. The IMIA helps, to enable the transformation of healthcare in accord with the world-wide vision of improving the health of the world population [4]. IMIA describes informatics as “the application of information science and technology in the fields of healthcare and research in medical, health and bio-informatics” [4]. Often IMIA’s constituent organisations have their own definition of informatics. For example, the Nursing Informatics group developed the following definition in 1998, and it was ratified again in 2009: “Nursing Informatics science and practice integrates nursing, its information and knowledge and their management with information and communication technologies to promote the health of people, families and communities worldwide” [5]. Health informatics involves the use of ICT for health care.

## 2. The future health professional

There are many advantages in the increased use of technology in health care because of the storage, organising, presentation, processing, analysis and communication capabilities [6]. However, one of the key issues identified internationally is having a workforce prepared to work with technological advancements [7]. The US have set a goal of electronic health records by 2014 yet recognise that “a work force capable of innovating, implementing, and using health communications and information technology will be critical to healthcare’s success” [8]. The Institute of Medicine report titled “Health Professions Education: A bridge to quality”, identified five core competencies for all health professionals. These are to provide patient centred care, work in interdisciplinary teams, use evidence-based practice, apply quality improvement and to utilize informatics [9]. However, how these core competencies are to be specifically achieved are less clear. The Technology Informatics Guiding Education Reform (TIGER) initiative started in the US in 2004, focuses on nurses and identifies actions needed to improve nursing practice, education and delivery of health care through the use of health information technology [10].

**Table 1 – TIGER Nursing Informatics Competencies Model**

<b>Component of the model</b>	<b>Standard</b>	<b>Source (Standard setting body)</b>
Basic computer competencies	European Computer Driving License	European Computer Driving License Foundation
Information literacy	Information Literacy Competency Standards	American Library Association
Information Management	Electronic Health Record Functional Model – Clinical Care Components	Health Level Seven (HL7)
	International Computer Driving License - Health	European Computer Driving License Foundation

TIGER have identified broad informatics competencies which seem to apply equally well to other health professionals and these are presented in Table 1 [7]. A strength of this competencies model is that it utilises existing sets of competencies maintained by standards of the development organisations. Greiner and Knebel [9] state that “without a basic education in informatics, health professionals are limited in their ability to make effective use of communication and information technology in their practice”.

### **3. Barriers to incorporating informatics into education**

Given the imperative to include informatics in all health professional education the question of how to ensure this occurs needs to be addressed. As recently as 2004 a US University Dean reported there were students “graduating today who are fairly ignorant about the technology that’s out there” [11]. Furthermore, although most health care employers expect health professionals to be proficient in basic health informatics, new nursing graduates have been reported as having limited knowledge about informatics acquired from their nursing schools [12]. The barriers to incorporating health informatics into health professional programmes have been identified as including a lack of recognition of health informatics as a discipline [9], a lack of suitably qualified faculty [6, 13, 14] and insufficient time and resources allocated for staff development for up-skilling existing faculty [11]. It has been suggested that health professional schools need encouragement to overcome the barriers and support to ensure the incorporation of essential health informatics competencies into their programmes [15].

### **4. The health informatics course**

The present case study built on an existing relationship as two of the authors had worked together successfully on another project. The idea was raised of inviting the New Zealand nurse as visiting scholar at the North American university and alongside other teaching and speaking engagements a health informatics course would be jointly taught. Planning and development of the course was collaborative using ICT (email and virtual meetings). The course itself was designed for on-campus delivery with use of supportive educational technology, such as the organisational learning management system (Blackboard), on-line discussion and links to on-line resources. The course was designed with the forethought of how we might share faculty across two continents.

This course was offered to students taking courses in nursing, health information management and other health courses and was presented as a one credit ‘Healthcare Informatics’ intensive. An intensive course is made up of the same hours, but rather than have for example, one class a week over the entire semester, this course was offered on a Saturday from 8 to 4; and on the two following Thursday afternoons from 4 to 8pm. The recommended textbook was selected with the mix of students in mind: Hebda, T., & Czar, P. [16]. Handbook of informatics for nurses & healthcare professionals (4th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.

#### **4.1. Course details**

The course was designed to provide students with an overview of current concepts in healthcare informatics. Examples of concepts included were the role of informatics in dataflow, human factors, informatics in the clinical care process, legal and ethical issues, and future trends in the field. Students were expected to be engaged in online and live learning sessions involving lectures, website exploration, and panel discussions.

**Table 2 – Timetable outline**

Overview of health informatics <ul style="list-style-type: none"><li>• What is ‘Health Informatics’?</li><li>• Role of health informatics in today’s healthcare</li><li>• Global developments in health informatics</li></ul>
Role of informatics in healthcare dataflow <ul style="list-style-type: none"><li>• Sources of data generation in a health care facility</li><li>• Evolution of information systems – from administrative to clinical to patient-centric</li><li>• Explain the difference between data and information</li><li>• Label the stages of the information processing cycle of a human being and a computer and discuss the similarities and differences.</li><li>• Explain the purpose of information and discuss how it can be used.</li></ul>
Human factors in health informatics <ul style="list-style-type: none"><li>• Identify key human factors for health informatics</li><li>• Describe elements of the user interface that impact on usability</li><li>• Identify ergonomic and safety factors in relation to hardware and device designs.</li></ul>
Health informatics in the clinical care process <ul style="list-style-type: none"><li>• Conceptualize the role of health informatics in practice settings</li></ul>
Safeguarding the patient: legal and ethical issues <ul style="list-style-type: none"><li>• What are the important legal and ethical issues facing health professionals?</li><li>• What impact does health information technology have on such issues?</li><li>• What strategies are needed to safeguard patients?</li></ul>
Future trends in health informatics <ul style="list-style-type: none"><li>• Identify local and international trends in health informatics</li><li>• Electronic Health Record and paper records - advantages and disadvantages</li><li>• Personal Health Record – is it achievable?</li><li>• Discuss the implications for these trends in relation to education, research and practice.</li></ul>

The learning objectives of the course were that at the end of the course students would be able to:

- Define health informatics
- Describe the potential benefits of informatics to practice.
- Discuss issues that impact on health informatics.
- Identify future trends in health informatics

An outline of the timetable is presented in Table 2 to give an indication of the flow of topics.

## **4.2. Assessment**

This course had a ‘Pass/Fail’ criterion; students were not given a letter or numerical grade. Requirements to achieve a pass were attendance at classes, active participation in class and on-line discussions, and to complete and present a poster. As part of the preparation for the on-line discussion component of the course students were reminded about the expected standard of behaviour in the on-line environment. This was achieved by including the following paragraph in their course materials.

Discussion via Blackboard is closed to anyone not enrolled in this course. All communication between students and faculty should remain professional and courteous. This is true of both Blackboard and email communications. Language and grammar matters so be careful on how you phrase your communication. Simplicity and directness are helpful in getting your message across (directness does not mean rudeness or angry responses to either students or faculty). It is possible to receive a failing grade (‘F’) for the Class Participation portion of the course if rude and unseemly communications via Blackboard and email become an issue and are not corrected. The following is a link on Net Etiquette: <http://www.albion.com/netiquette/corerules.html>.

Students were expected to maximize their interaction with the course content by participating in online course discussion. Students were required to login to the online course site three to four times a week to view the content presented and comment on the material or on a comment made by a peer. Six or more posts were required for the two

week course. Material that was posted to this site included short video lectures, informatics resources, and websites to visit and evaluate, so in this way additional course content was provided.

The poster that students presented either individually or in a group of two or three could either be electronic, audio-visual or paper based. The instructions included that students were expected to research and present a poster or a short video related to the course. The short video was required to be less than 6 minutes and posted on YouTube, and it was planned to play it in class. The objectives behind this assessment were that it would provide students the opportunity to analyze a single topic related to healthcare informatics, develop the content required to teach their topic to their peers in a poster or video session format, hence demonstrating effective and respectful visual and verbal communication using appropriate technologies. In addition, it was envisaged that students would participate in professional relationships with inter-professional teams because of the student mix, and that the learning would contribute to self-development.

## **5. Outcomes**

The outcomes of the course are considered using the assessment criteria above. Fourteen students enrolled and met the attendance criteria. A summary of the on-line discussion, examples of posters created and also feedback from the student evaluations of the course are provided below.

### **5.1. On-line discussion**

Students were asked to post and respond to a total of four discussion board prompts during the course. The first was to review a site on informatics competencies and take a self assessment inventory related to informatics. Then they were to post goals and strategies for increasing their informatics competencies. Second, students were to read the summary from the Institute of Medicine report "To Err is Human" (1999) and discuss the role of technology to reduce errors. Next students were to read about state governance models for health information exchange, watch a video clip from the United States Idaho Health Data Exchange direct and identify key issues. Finally, students were to watch video links on health literacy in informatics.

During the course 14 students posted 99 times to the four discussion board prompts. Significant discussion centred on the role of informatics to use and manage data and how the nurse balances the use of technology with the interpersonal skills of caring for the patient. For example, students discussed the positioning of the computer to maximise eye contact with the patient while taking a history. Further discussion focused on the use of informatics to enhance safety, specifically citing systems to alert the health professional to critical values and the potential uses of barcode scanning. Different examples of ICT seen during their clinical placements were compared; and later discussion contrasted ICT in health with non-healthcare industries. In addition, the challenges of health data exchange related to the enormity of the task, security issues, the basic differences in systems and how they might be able to share data were discussed. Finally, students discussed implications of health literacy when working with patients who may be scared stressed, and trying to understand complicated new information.

### **5.2. Posters**

Students were asked to select a single topic related to health informatics and develop content in a poster or short video format to teach their peers about their topic, either individually or in small groups of two or three. The posters were presented by the students at the last class. An excellent range of topics were selected and the presentations were well received by the class, with some showing excellent depth and thought. Three examples have been chosen to include here: computer hygiene, competencies to become an informatics nurse specialist and telemedicine in rural areas (Figures 1-3) and students have given permission for their work to be published.



**Table 3 – Summary of Course Evaluations**

Question	Number of Responses	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Course goals and objectives were clearly presented	14	10 (71%)	4 (29%)	0	0	0
Course was well organized	14	12 (86%)	2 (14%)	0	0	0
Course was intellectually challenging	14	11 (79%)	2 (14%)	1 (7%)	0	0
Textbook and/or course materials aided understanding of material	14	5 (35%)	4 (29%)	4 (29%)	0	1 (7%)
I learned a great deal from this course - new knowledge, awareness and/or skills	14	11 (79%)	3 (21%)	0	0	0
There were adequate opportunities for interaction among instructor and students	14	12 (86%)	2 (14%)	0	0	0
Evaluation methods were fair	14	13 (93%)	1 (7%)	0	0	0
Overall quality of this course was effective	13	12 (92%)	1 (8%)	0	0	0

## 6. Discussion

Offering an intensive Health Informatics course was successful in that it resulted in positive learning outcomes and all students passed. Students particularly enjoyed the variety of speakers and the different perspectives of health informatics they provided. There were an adequate number of students enrolled for a new course, which met organisational requirements. Collaborative teaching was effective in that it provided a way to provide a new course and support existing teaching staff. This therefore addressed the need for having suitably experienced teachers in the subject which overcame one of the barriers to providing health informatics education [6, 13, 14]. In addition, collaborative teaching demonstrated the international nature of health informatics through the similarity of core concepts. However, having teachers from two different countries also highlighted differences, specifically between the healthcare systems related to funding of services; and in professional practice with regard to statutes, accountability and liability. This course was designed to be delivered with faculty on two continents and we look forward to trialling it again. Another barrier identified from the literature concerned supporting existing staff to upskill [11]. Collaborative teaching supported existing faculty and improved immediate capacity and there is university commitment to continue this by providing time and resources for the ongoing education of staff.

Recommendations for the course include offering it again and in the intensive format. In relation to the content, no major changes are required, and the guest speakers should be retained, but an alternative textbook should be considered. The mix of students, with most from nursing and some from other health courses also seemed to work well. Ongoing evaluation is also suggested to ensure the course continues to meet students' needs. A follow up of students, at one year after the course would be of interest to provide information about the ongoing impact of the learning from the course when students have completed their programmes of study.

Desjardins et al. [15] emphasise the need to ensure the incorporation of essential health informatics competencies into health professional educational programmes. To achieve this it is recommended that the curriculum be assessed for where informatics is currently integrated into courses. Mapping of informatics concepts throughout the curriculum may help to ensure graduates have the essential informatics skills required for their future nursing roles and deficiencies can be addressed and remedied. Additionally, the competencies within the Tiger Model [7] should be considered.

## 7. Conclusion

The case study presented here exemplifies how nurses from New Zealand and North America can work together and therefore work smarter to achieve educational goals. By describing an intensive health informatics course, including the learning objectives, timetable, assessments and the outcomes achieved by students demonstrates effective learning. Further courses for nurses and allied health professionals are recommended in the future, along with examination of the curriculum to ensure core informatics competencies are embedded into health professional educational programmes. This will ensure health professionals will be prepared for a future where technology will play an increasingly important role.

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## 9. References

- [1] Steventon A, Wright S, editors. *Intelligent spaces: The application of pervasive ict*. London: Springer-Verlag, 2006.
- [2] Statistics New Zealand Wellington: Statistics New Zealand; 2011 [May 18 2011]. Information and communication technology supply survey 2009/10. Available from: [http://www.stats.govt.nz/browse\\_for\\_stats/industry\\_sectors/information\\_technology\\_and\\_communications/ictsupplysurvey\\_hotp09-10.aspx](http://www.stats.govt.nz/browse_for_stats/industry_sectors/information_technology_and_communications/ictsupplysurvey_hotp09-10.aspx)
- [3] Ministry of Health. *Connected health a quantitative study: Survey of information and communication technology usage in the health and disability sector*. Wellington: Ministry of Health 2009.
- [4] International Medical Informatics Association 2011 [May 18 2011]. Welcome to imia. Available from: <http://www.imia-medinfo.org/new2/node/1>.
- [5] IMIA-NI 2010 [cited 2010 August 25]. Imia ni -the nursing informatics special interest group Available from: <http://www.imiani.org/>
- [6] Thede LQ, Sewell JP. *Informatics and nursing competencies and applications*. 3rd ed. Philadelphia: Wolters Kluwer, 2010.
- [7] Technology Informatics Guiding Education Reform (TIGER). The tiger initiative: Collaborating to integrate evidence and informatics into nursing practice and education: An executive summary 2009 Available from: [http://www.tigersummit.com/uploads/TIGER\\_Collaborative\\_Exec\\_Summary\\_040509.pdf](http://www.tigersummit.com/uploads/TIGER_Collaborative_Exec_Summary_040509.pdf)
- [8] American Health Information Management Association, American Medical Informatics Association. *Building the work force for health information transformation*. Chicago: American Health Information Management Association (AHIMA) 2006.
- [9] Greiner AC, Knebel E, editors. *The institute of medicine committee on the health professions education summit: Health professions education: A bridge to quality*. Washington DC: The National Academies Press, 2003.
- [10] DuLong DB, Ball MJ. Tiger: Technology informatics guiding educational reform - a nursing imperative. In: Weaver CA, Delaney CW, Weber P, Carr RL, editors. Chicago: Healthcare Information and Management Systems Society, 2010; pp. 17-24.
- [11] Weber D. Transforming the students nurses experience: A university integrates e-health technology into the nursing curriculum. *Patient Care Staffing Report*. 2004;4(2):1-3.
- [12] Ornes LL, Gassert CA. Computer competencies in a bsn program. *Journal of Nursing Education*. 2007;46(2):75-8.
- [13] McNeil BJ, Elfrink VL, Bickford CJ, Pierce ST, Beyea SC, Averill C, Klappenbach C. Nursing information technology knowledge, skills, and preparation of student nurses, nursing faculty, and clinicians: A u.S. Survey. *Journal of Nursing Education*. 2003;42(8):341-9.
- [14] Borycki EM, Kushniruk AW, Joe R, Armstrong B, Otto T, Ho K, Silverman H, Moreau J, Frisch N. The university of victoria interdisciplinary electronic health record educational portal. *Studies in Health Technology and Informatics*. 2009;143:49-54.
- [15] Desjardins KS, Cook SS, Jenkins M, Bakken S. Effect of an informatics for evidence-based practice curriculum on nursing informatics competencies. *International Journal of Medical Informatics*. 2005;74(11-12):1012-20.
- [16] Hebda T, Czar P. *Handbook of informatics for nurses & healthcare professionals*. 4th ed. Upper Saddle River, NJ: Pearson Prentice Hall, 2009.