Seven years experience in nursing informatics education: part 1

William T.F Goossen RN BSN Cert.Ed, Senior Lecturer in Nursing Informatics
Gerrit Jeuring, RN, BSN, Cert. Ed, Senior Lecturer in Nursing School of Nursing,
Noordelijke Hogeschool Leeuwarden Leeuwarden, The Netherlands
Theo W.N. Dassen, RN, PhD, Nurse Researcher, Dept. of Nursing Science,
University of Groningen

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Summary

The first of three articles.

In 1989, after an intensive search for content, development and learning materials, the
Noordelijke Hogeschool Leeuwarden, started the development and implementation of
courses on Nursing Informatics (NI). The work has been published in several Dutch
journals and conference proceedings and is now made available to an international
audience. The first of three articles defines the subject, identifies target groups, and
describes the initial motives and the developmental approach.

There obviously is a need for education in the use of automated information systems
in nursing. Protti stated: "There is no doubt that by the year 2000 every nurse must be
capable of using information systems". To date, these words hold their value, since
the use of computerised systems in health care is ever increasing. Also, proper
education of professionals in this area is still not very well addressed.

In the Netherlands in 1989, there were few courses in basic computer skills for nurses
and one nursing informatics course for nurse administrators. A specialist education in
nursing informatics started in September of that year. There were neither special
courses available about nursing informatics for the baccalaureate level of professional
nursing education, nor for the education of nurse teachers. Therefore, we started the
development of special courses on NI for the Leraren Opleiding Verpleegkunde 2e
graad or LOV (education for nurse teachers), at Leeuwarden Polytechnic C. Later,
this material was used for the baccalaureate programme at Leeuwarden and at Leiden
6 and, as a spin-off project, for the nurse scientists programme at Groningen
University.

The leading question for this endeavour was: how to assure that a nurse, who will
become a teacher of nursing, is properly prepared to teach the subject of nursing
informatics in a way that meets the needs of the profession in the future? Proper
preparation was defined as: to be computer literate in nursing and teaching
applications and to have the skills to use and to give instructions in computer
applications in health care and nursing. A derived question was whether the material
developed for the LOV programme could be transformed to other formal education in
nursing.
In this article we will first define the topic to be taught and try to justify its place in a usually overloaded nursing curriculum, and then describe the developmental process that started with the identification of target groups. The issues related to selected content, educational materials that were developed for the LOV, and details of the material for the baccalaureate and for the nurse scientists programme will appear in the following issue of ITIN.

What is nursing informatics and why should we teach it?

Nursing informatics is defined in several ways. During the past years, based on intensive reading and discussion with leaders in the field, a definition of NI arose. In the descriptions of several experts the main items were: acquiring and using information to formulate patient problems, decision making, information management and use of information and communication technologies to assist in these processes. For a detailed analysis the reader is referred to Goossen. The current definition is: Nursing informatics is the multidisciplinary scientific endeavour of analysing, formalising and modelling how nurses collect and manage data, process data into information and knowledge, make knowledge-based decisions and inferences for patient care, and use this empirical and experiential knowledge to broaden the scope and enhance the quality of their professional practice. The scientific methods central to nursing informatics focus on:

1. using a discourse about motives for computerised systems;
2. analysing, formalising and modelling nursing information processing and nursing knowledge for all components of nursing practice: clinical practice, management, education, and research;
3. investigating determinants, conditions, elements, models and processes to design, and implement as well as test the effectiveness and efficiency of computerised information, telecommunication and network systems for nursing practice, and
4. studying the effects of these systems on nursing practice.

One issue at this early stage was to justify the incorporation of nursing informatics into nursing education, which was not so obvious at that time. Van der Kooij in 1988 had stated that the development of a body of knowledge is of greater importance to nursing than the development of information technology and the learning of computer skills for nurses. On the other hand, others found that practising nurses wanted more education about nursing informatics content and wanted to become informed about projects in their own situation and they wanted to have influence in the decision making of the administrators about these projects.

Another reason for involvement with information technology is that nursing knowledge is growing fast. Nurses have to look for systems that keep their knowledge up to date and that are easily accessible. Also, education is growing towards an activity that enables the student to get desired information, instead of bringing content to the learner. For nurse teachers this influence of computer technology on learning behaviours is another reason to incorporate the topic of information technology into the LOV programme. Currently, the fast growth of the use of Internet, and the huge amount of Webpages about health and nursing related topics available, accelerates this need enormously. Today, in this overwhelming surrounding, finding the information and knowledge is not the issue, but determining
the relevance, quality, and correctness of all available knowledge is. Selection of information has become the most important topic to be taught. A dramatic change since the development of the first NI courses for the LOV in 1989.

**Identification of target groups**

Since the course development had to take place for different target groups, the first issue was the identification of the different groups and of the learning domains that have to be addressed in the courses. Tallberg states that teaching informatics to nurses should include cognitive, affective and psychomotor competencies. Peterson and Gerdin-Jelger differentiate three levels for different roles in nursing: beginner, advanced user, and modifier. These levels can be augmented with a fourth level of education; the nursing informatics scientist, who does research in nursing informatics and who is prepared at the doctorate level.

In our work, because of limited contact hours and for principal reasons, basic computer skills are not considered content for the nursing informatics courses and therefore defined as level zero competencies. In fact, the student would have acquired such skills in high school and equivalent education. However, according to Schwirian and colleagues, expectations of nursing teachers in the US about the computer knowledge and skills of several groups of students were too high, students didn't have all the expected knowledge and skills. For the Dutch situation it proved to be effective to be cautious with such assumptions about computer skills of students, and this still is, although the exposure to computers has increased during the years. Therefore, level zero is defined for the basic computer content and skills, and can be taught as an elective course. The different levels, learning domains, and target groups are depicted in Figure 1. The advanced courses are meant for special roles in nursing such as nurse manager, nurse teacher, nurse researcher, and clinical nurse specialist. Level four education for nursing informatics scientist is not available in the Netherlands at this stage.

![Figure 1. Levels of nursing informatics competencies in the Netherlands](image)

**Systematic course development**

To develop the courses about Nursing informatics, the 1987 framework of Ronald and Skiba for NI course or module development was taken as the baseline. Due to the specific situation in our country and school, we added to this initial framework items such as an implementation and investments plan and grant application. The
framework is illustrated in figure 2. Relevant steps that can be taken to develop an NI course for existing educational (degree) programmes are set out in table 1.

![Figure 2. The modified flowchart for course development about Nursing Informatics](image)

<p>| | |</p>
<table>
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<tr>
<td>1</td>
<td>Decide to incorporate nursing informatics content into the programme.</td>
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<tr>
<td>2</td>
<td>Decide whether the content is required or elective and whether to develop a special course / module, to integrate the content in existing courses, or to develop combinations.</td>
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<tr>
<td>3</td>
<td>Identify learning objectives.</td>
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<td>4</td>
<td>Determine level of education and target group (see figure 1).</td>
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<tr>
<td>5</td>
<td>Define operational learning objectives or outcomes.</td>
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| 6 | Assess:  
- administrative support,  
- faculty support, knowledge skills and attitudes,  
- computer and software resources,  
- students previous knowledge, skills & attitudes, and learning styles. |
| 7 | Select the content or subjects to be taught. |
| 8 | Choose learning activities and teaching strategies. |
| 9 | Check level, objectives, content students starting point and learning activities on internal and external congruency. |
| 10 | Make an investments and implementation plan and apply for |
11 Place the course/module or the specific content in the educational programme.

12 Do detailed resource assessments (e.g. practicalities, test software, scheduling).

13 Implement the course / module / content.

14 Evaluate the course and student results.

15 Make changes where appropriate.

Table 1. steps to incorporate nursing informatics into an existing course

**Conclusion**

There obviously is a need for nursing informatics education at different levels in the nursing profession. The Leeuwarden Polytechnic started such a development in 1989, based on a structured approach. A definition and justification for the topic, the identification of target groups, and the developmental approach are discussed here in some detail. The model of Ronald and Skiba proved to be a useful tool in curriculum development, although small modifications may be needed to use it in specific countries or situations and to update it to new trends in informatics.1, 14 It needs to be stressed that this is not a linear process: the feedback loops were gone through many times. The modifications of the flowchart towards the situation in our school were limited and included:

a) looking at the existing educational programme to see where the NI course(s) should be inserted;

b) specific assessment of starting points

c) investment and implementation plan.

At the start, hardware was available in one classroom with ten stand-alone XT dual drive MSDOS PC’s. Available software were standard packages for word-processing, databases and spreadsheet. Implementation and investments for improvements and increase of computer labs at the Leeuwarden Polytechnic were spread over several years, which allowed for a suitable pace of development, and for buying the latest equipment. We now can update every one or two years one classroom with new technology, instead of having to buy complete new material at once for five classrooms. The use of state of the art technology is not necessary for all teaching software and this policy of continuously upgrading allows us to offer new software where it is appropriate against reasonable costs per year.

In the next issue of ITIN a description of four courses that have been developed with the approach described here, will be presented.

**References**

** Indicates in Dutch.


3. Goossen WTF. Developing courses about nursing informatics.** In: Hofdijk J,


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