Computer literacy in nursing: developing the information technology syllabus in nursing education

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SARANTO K. & LEINO-KILPI H. (1997) *Journal of Advanced Nursing* **25**, 377–385
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This study has two main purposes: first, to identify and describe the computer skills required in nursing; and second, to find out what should be taught about information technology in nursing education. A three-round Delphi survey was carried out with a panel of experts representing nursing practice, nursing education, nurse students and consumers. The panel showed a consensus of opinion on 71% of the items included in the questionnaire designed for the study. The experts agreed that nurses must know how to use the computer for word-processing purposes, for accessing and using the hospital information system, and for emailing. Nurses must also be aware of system security and show a positive attitude towards computers. It is concluded that hospital information systems and nursing informatics should be integrated into laboratory and hospital training.

INTRODUCTION

Computers were initially introduced in the Finnish health care system in the 1960s for administrative and research purposes. Computers are now more powerful and more compact and are widely used in everyday patient care for the input, retrieval, manipulation and distribution of nursing data.

One of the concepts that came into being with the proliferation of computers was 'computer literacy', i.e. the ability to read and write with computers. Several studies have highlighted the importance of good computer literacy in nursing (e.g. Grobe 1988a, Bryson 1991, Carty 1993). There are also programmes which aim to facilitate learning about information technology in health care (e.g. Romano & Heller 1990, McGonicle & Eggers 1991, Carter & Axford 1993).

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In Finland, there has been continuing research since 1987 to monitor and evaluate education in computer use. However, computer-assisted instruction and general educational applications remain scarce. A further difficulty is that student nurses on hospital wards are usually denied access to the hospital information system.

This paper describes one component of a research project that is concerned with improving and developing the teaching of nursing informatics. The specific concerns here are the skills related to computer use in nursing and how information technology should be taught in basic nursing education. The data were collected using the Delphi technique, which has not been previously used in information technology studies in Finland.

LITERATURE REVIEW

The literature on the use of information technology in health care comprises a number of studies on computer use in nursing administration, practice and education

since 1980. Nurses' attitudes towards computers have also been evaluated. Grobe (e.g. 1988a, 1988b) has discussed the informatics competencies of nurses, stressing that nurses need to accept the computer as a tool of their profession.

Bryson (1991) says that the computer-literate nurse must have a basic knowledge about computers; be able to use computer-assisted instruction programs and use the computer as a tool in the practice of nursing. The role of the nursing information systems (NIS) specialist has been described by Romano & Heller (1990) and there exists a specialized program for preparing nurses for the role of NIS specialist.

Recommendations have been published over the past 10 years for teaching nursing informatics (Hannah 1988, Saba 1988, Tallberg 1988, Romano *et al.* 1989, McGonigle & Eggers 1991, Strength & Keen-Payne 1991, Gonce-Winder *et al.* 1993). These recommendations agree that nursing informatics should be integrated into the nursing curriculum. Recent research has also described the possible range of computer literacy objectives for nursing degree programmes (Bryson 1991) and identified the computer-learning needs of practising nurses (Carter & Axford 1993).

One concern in the literature is to describe courses designed to cover major areas of computer use in nursing. Nursing informatics courses must prepare student nurses to manage information and to research and communicate via computers (McGonigle & Eggers 1991). Information on the duration of these courses is only rarely provided.

The evaluation of nurses' attitudes towards computer use is another area that has received attention in the literature (Thomas 1990, Burkes 1991, Scarpa *et al.* 1992). Burkes (1991) in her investigation involving 133 nurses tested several hypotheses: for instance, the greater the nurse's computer knowledge (and experience), the greater the computer-use satisfaction, beliefs and motivation. Computer knowledge showed a significant positive correlation with beliefs. Computer experience, on the other hand, produced significant correlations with satisfaction, but the correlations were negative.

Ngin *et al.* (1993) studied 268 nurses and their practice patterns, comparing the nurses' individual and organizational characteristics, their computer skills, and levels of work excitement. Computer users turned out to be significantly less negative about their work. The vast majority of the nurses regarded the computer as a nursing technology that could help make their work easier. In fact, 'the introduction of computers could not only improve unit morale but also stimulate learning of new skills related to the delivery of effective care'.

Several studies predict that the quality of nursing care will improve with the increasing use of computers and of information technology (Leino-Kilpi 1990, Burkes 1991, Grassy 1991, McGonigle & Eggers 1991, Carter & Axford 1993).

The Delphi technique is a type of survey method aimed at soliciting and obtaining group consensus on an important issue or question (Reid 1988). The method has been used in previous studies, although it has been criticised (Grant *et al.* 1990, Lee 1990, Crotty 1993, McKenna 1994, Williams & Webb 1994). Selection and size of the group of experts and criteria for defining consensus have been identified as potentially problematic in previous studies (Williams & Webb 1994).

Amstrong (1986) used a two-round Delphi survey to collect and organize judgements of present and future needs for computer competence for nurse educators ($n = 56$). The most pressing needs for nurse educators were found to be knowledge of computer technology, information on how to use the computer as an instructional tool, recognition of the nurse's role and issues of computer use in health care and use of the nursing process in the development of computerized care plans.

Rizzolo (1990) used a three-round Delphi survey to identify factors impeding the development and use of interactive video in nursing education. Some of the nurse educators ($n = 31$), from academic backgrounds, continuing education and the business sector, did not believe that interactive video could bring any real changes to nursing education.

Carty (1993) used a two-round Delphi survey in a study among nursing information specialists ($n = 97$), aiming to identify the scope of information features for clinical nursing information systems (CNIS). The data from this study indicate that more graduate courses and programs need to be developed and made available to prepare qualified practitioners in nursing informatics.

THE STUDY

The purpose of this study was to address the following questions.

1 What are the basic information technology skills that nurses need in practice?
2 What should be included in the information technology syllabus in nursing education?

METHOD

This study was based on the Delphi technique, which can be used for gathering information and achieving a consensus (Lee 1990). The method is based on the use of a panel of experts who are asked questions relating to specific issues. The Delphi technique consists of a series of rounds during which the experts respond to the questions and supply their comments. The procedures are anonymous and confidential (Linstone & Turoff 1975, Lee 1990, Polit

& Hungler 1991). Recently the technique has been discussed and applied in a number of studies (Crotty 1993, Duffield 1993, Williams & Webb 1994, Procter & Hunt 1994, McKenna 1994), including works concerned with nursing informatics (Rizzolo 1990, Carty 1993).

Selecting the panel of experts

A total of 20 experts were recruited to the panel, with five from each of the following four groups: clinical nurse managers, patients, nurse educators, and student nurses. All clinical nurse managers and nurse educators on the panel had an information technology training and were experienced computer users. The clinical nurse managers were actively engaged in the field of nursing informatics. The nurse educators and student nurses represented the same nursing college, and representatives of all groups were selected from five different towns. The patients on the panel, representing health care consumers, were selected from the ranks of a voluntary organization. In geographical terms all districts from around the country were represented on the panel of experts.

Informed consent was received from all experts taking part. The student nurses were contacted via their teacher and the patients via the chair of their association. The researcher contacted the candidates by telephone and mail; all those contacted volunteered to take part. However, two patients and two student nurses refused to continue when round one was started.

During the first round of the study the experts were asked to provide basic demographic background data and to describe how they used computers on the job. All said they used the computer for word-processing and/or emailing purposes.

Data collection

The three-round Delphi postal survey was carried out between October 1993 and February 1994. In the first round, the aim was to identify the content areas relevant to the problems of the study. It started with two open-ended questions: 'What do you think a nurse should know about information technology'; and 'What do you think should be taught about information technology in nurse education'. The data were analysed for content (Polit & Hungler 1991) and, on the basis of the responses obtained from the first round, a questionnaire was drawn up.

This questionnaire was administered in the second round in an attempt to withdraw, alter or add to the responses obtained in the first round. The respondents were asked to consider the importance of 58 items divided into 18 content areas on a five-point Likert-type scale (5 = very important; 4 = important; 3 = neither important nor unimportant; 2 = not important; 1 = not at all important). The questionnaire was tested on two clinical nurse

specialists, and some minor additions were made on the basis of this test.

A total 16 questionnaires were returned within 2 weeks and one panel member returned a blank questionnaire and refused to continue. A total of 15 experts were then participating in the study: five clinical nurse managers, five nurse educators, three student nurses and two patients. To describe the importance of the items and the degree of consensus among the experts, the mean and standard deviation were calculated from the responses of the second round.

In the third round, the experts were asked to reconsider the statements presented in the questionnaire, which now included 69 items in 17 content areas. The mean and the standard deviation were again calculated from the responses.

Consensus was defined either as perfect (100%) or as a majority view (>67%) (c.f. Carty 1993, McKenna 1994, Williams & Webb 1994). Earlier studies using the Delphi technique have failed to pay sufficient attention to defining consensus (see Williams & Webb 1994). In the present study an acceptable level of agreement was defined as consensus when the standard deviation (SD) was <0·75, i.e. there was a strong consensus.

The data were also categorized according to the importance of the items as defined by the experts.

RESULTS

Round one

The following content areas were obtained from the first-round responses to the questions concerning competencies in computer use:

1 basic components of the computer system;
2 skills in computer use;
3 ability to resolve error situations;
4 ability to use hospital information system;
5 skills in computerized patient monitoring;
6 system security;
7 significance of automated data processing (ADP), and
8 obstacles to and prerequisites for ADP.

The following content areas were obtained from the responses to questions concerning the teaching of information technology:

1 introduction to computers;
2 skills in software application;
3 system security;
4 data transfer;
5 skills in computerized patient monitoring;
6 how to teach about hospital information systems;
7 how to teach nursing informatics;
8 teacher's role;

9 length of training courses, and

10 the responsibilities of continuing education.

Round two

Nurses' competencies in nursing informatics

In the second round of the survey, the panel of experts was asked to weight the importance of the different computer skills defined on the basis of the first round. The results are summarized in Table 1. The most important item (mean 4·93) with the lowest SD (0·25) was 'the importance of confidentiality'; the item regarded as least important (mean 1·87) was 'know the most common programming languages'.

There was a high level of agreement among the experts on the importance of the items included in the first content area, i.e. 'basic components of the computer system'. To this content area the experts wanted to add an item: 'know how to use peripheral devices'. There was much disagreement on the importance of the items in the second content area of 'skills in computer use', although almost all experts agreed that it is important for nurses to know how to use email. The experts wanted to add one item to the content area 'ability to use the hospital information system', i.e. 'know how to use the nursing information system'.

An open-ended question was presented to the experts on the general role and importance of automated data processing (ADP) in nursing. The emphasis in their responses was on the beneficial impacts computers have in terms of speed, efficiency and flexibility. It was also pointed out that computers can help to reduce costs in nursing.

Teaching information technology in nurse education

In the second round of the survey, the panel of experts was also asked how they thought information technology should be taught in basic nursing education (Table 2). Most importance (mean 4·80) was attached to items concerning teaching about hospital information systems and nursing informatics. It was also agreed that teaching should be integrated into hospital training.

There were some new items that the experts wanted to add to the content areas; these stressed the importance of security and of a broad perspective in teaching. It was considered very important (mean 4·47) that information technology is taught by a nurse educator who specializes in nursing informatics. Opinions on the suitable length of information technology courses ranged from 10 to 160 hours. One expert suggested that nursing colleges should offer information technology courses at different levels: basic, applied, and advanced. It was also suggested that training could be arranged in the form of extension training courses by nursing colleges, employers (i.e. hospitals) or software dealers, or jointly by nursing colleges and hospitals.

Round three

Nurses' competencies in nursing informatics

The third-round questionnaire included seven content areas, with a total of 33 items (Table 1). Delphi consensus, as defined in this study, was recorded in 28 items (85%). The items rated as important or very important and with a SD <0·75 are shown in Table 3.

The highest level of consensus was recorded for the content area of 'system security', where three items out of four scored a 100% consensus and one a 93% consensus. The experts were also agreed on every item in the content areas of 'ability to resolve error situations' and 'obstacles and prerequisites of automated data processing'. It was also agreed that nurses must be able to use the hospital information system to retrieve patient information and the nursing information system to generate a nursing care plan.

The experts did not consider it important that nurses are familiar with the most common programming languages (mean 2·27), although opinions varied (SD 1·12).

Teaching information technology in nurse education

The questionnaire concerning the teaching of information technology in nurse education had 36 items divided into 10 content areas (Table 2). Delphi consensus was recorded in 22 items (61%). The items that were considered very important or important are shown in Table 4.

The highest level of consensus was recorded in the content area of 'how to teach hospital information systems', where a 100% consensus was recorded for two items out of three. The items in the content area of 'skills in software' were also considered important.

The experts agreed that skills in computerized patient monitoring are important. Nurses should also be familiar with legislation concerning data security and patients' rights, as well as appreciating the confidentiality of computerized medical information and records. Hospital information systems and nursing information systems should both be integrated into hospital and laboratory training. The experts concluded that educators who teach information technology should specialize in nursing informatics. On the wards, student nurses can also be taught by clinical specialists.

The experts suggested that the course in information technology should last two study weeks (80 hours). Nursing colleges and employers should work together to provide continuing education.

DISCUSSION

This study had two purposes: first, to identify and describe the computer skills required in nursing; and second, to find out what should be taught about information technology in nursing education.

Table 1 The importance of nurses' competencies in nursing informatics

Content areas and items	Round 2		Round 3		
	Mean	SD	Mean	SD	Rank
Basic components of the computer system					
Know the basic components of the computer system	3·53	1·20	4·67	0·47	1
Know the features of a PC (personal computer)	3·73	0·85	4·27	0·57	2
Know the features of the terminal	3·87	1·02	4·27	0·77	3
Know the features of the computer network	2·87	1·31	3·20	0·65	6
Know the purpose of software	3·73	1·06	4·07	0·88	4
Know the most common programming languages	1·87	0·88	2·27	1·12	7
Know how to use peripheral devices			3·86	0·83	5
Skills in computer use					
Know how to use a word processor	4·47	0·72	5·00	0	1
Know how to use a spreadsheet program	2·73	1·06	2·73	0·85	7
Know how to use a database program	3·60	1·25	3·60	0·71	6
Know how to use an application for generating a schedule	3·87	1·02	4·67	0·70	4
Know how to integrate different programs	3·40	1·50	4·21	0·67	5
Know how to email	4·80	0·54	5·00	0	2
Know how to use a fax machine	4·07	1·48	4·80	0·54	3
Ability to resolve error situations					
Know what different error messages mean	3·93	0·85	4·07	0·25	4
Know what support is available	4·53	0·81	4·93	0·25	2
Be aware of viruses	4·20	1·11	4·87	0·34	3
Appreciate continuing education			5·00	0	1
Ability to use hospital information systems					
Know how to use hospital information system for retrieval of patient information	4·60	0·61	5·00	0	1
Know how to use part of system	3·13	1·09	2·87	0·34	4
Know how to use different information systems used in health care settings	3·60	0·95	3·57	0·73	3
Know how to use nursing information system to generate a nursing care plan			4·87	0·34	2
Skills in computerized patient monitoring					
Know how to use computerized patient equipment	4·53	0·50	5·00	0	1
Know about auxiliary devices for the elderly and disabled			4·60	0·61	2
System security					
Know the laws concerning data security and patients' rights	4·53	0·62	4·93	0·25	4
Know the importance of confidentiality	4·93	0·25	5·00	0	1
Ensure access to information collected	4·80	0·54	5·00	0	2
Know the importance of passwords	4·67	0·70	5·00	0	3
Obstacles and prerequisites of automated data processing					
Be aware of the fears related to computers	3·87	1·31	4·80	0·54	3
Realize that computer technology can only benefit nursing if we know enough about our needs	4·07	1·29	4·87	0·34	2
Develop positive attitude towards computers	4·67	0·70	5·00	0	1
Know that computers are not intelligent in themselves but must be programmed for application desired	3·40	1·50	4·80	0·75	5
Be familiar with ergonomic recommendations	3·93	1·29	4·80	0·54	4

5 = very important; 4 = important; 3 = neither important nor unimportant; 2 = not important; 1 = not at all important.

Table 2 The importance of teaching information technology in nurse education

Content areas and items	Round 2 Mean	SD	Round 3 Mean	SD	Rank
Introduction to computers					
Know about					
disk operating systems (DOS)	3·07	1·29	2·73	1·18	4
Windows	3·67	1·01	4·27	0·85	2
Know about PCs and peripherals	3·73	0·93	4·53	0·88	1
Know the features of the workstation	3·40	0·95	3·73	0·68	3
Skills in software					
Know how to use a word processor	4·40	0·80	4·93	0·25	1
Know how to use a spreadsheet program	3·27	0·77	4·07	0·68	2
Know how to use a database program	3·47	1·15	3·93	0·57	3
Know how to use a statistical program	3·13	0·96	3·40	0·71	4
System security					
Know the laws cocnerning data security and patients' rights	4·73	0·57	4·87	0·34	1
Know about viruses	4·00	1·15	4·80	0·40	3
Know about what data are collected and how the data are used	3·20	0·98	3·40	0·80	4
Know the importance of the confidentiality of computerized medical information and records			4·87	0·50	2
Data transfer					
Know how to use a data communications program	3·47	1·09	3·93	1·03	3
Know how to use a library information retrieval system to search for documents	3·53	1·15	3·80	0·91	4
Know how to use email	4·40	0·80	4·73	0·57	1
Know how to use a fax machine			4·20	1·11	2
Skills in computerized patient monitoring					
Know the components of a computerized patient monitoring system and its function (e.g. i.v. pumps)	4·33	0·79	5·00	0	1
Know how to use a computerized patient monitoring system	4·47	0·72	4·87	0·50	2
Know how to service a computerized patient monitoring system	3·07	0·93	4·13	0·50	3
How to teach hospital information systems					
Integrated into laboratory training in college	4·47	0·72	5·00	0	1
Integrated into hospital training	4·80	0·40	5·00	0	2
Integrated into foundation course in information technology	3·07	1·06	3·43	0·82	3
How to teach nursing informatics					
In basic-level studies as an independent course	2·87	1·45	3·36	1·17	6
Integrated into laboratory training in college	4·33	1·07	4·93	0·25	1
Integrated into hospital training	4·80	0·40	4·93	0·25	2
Integrated into specific courses (e.g. clinical nursing, administration)	4·53	0·72	4·93	0·25	3
Differentiated according to individual skills	3·53	1·02	3·53	0·88	6
Self-directed learning			4·57	0·62	4
Simulations of different patient situations			4·40	0·71	5
Teacher's role					
Nursing educator specialized in nursing informatics	4·47	1·09	4·93	0·25	1
Lecturer in mathematics	2·20	1·33	1·47	1·09	6
Computer educator	3·40	1·14	3·27	0·77	5
Clinical nurse			4·47	0·72	2
Every educator should integrate nursing informatics into syllabus			4·40	0·71	3
Student nurses as tutors			3·80	0·83	4

5 = very important; 4 = important; 3 = neither important nor unimportant; 2 = not important; 1 = not at all important.

Table 3 Nurses' qualifications in nursing informatics

Items (considered very important or important)	Consensus, %
Basic components of a computer system	
Know the basic components of the computer system	93*
Knowt the features of a personal computer	93*
Know the features of the workstation	80*
Skills in computer use	
Know how to use a word processor	100
Know how to email	100
Know how to use a fax machine	93
Know how to use an application to generate a schedule	87
Know how to integrate different programs	80
Resolving error situations	
Appreciate continuing education	100
Know what support is available	93
Know what error messages mean	93
Know about viruses	87
Ability to use hospital information systems	
Know how to use hospital information system to retrieve patient information	100
Know how to use nursing information system to generate a nursing care plan	87
Skills in computerized patient monitoring	
Know how to use computerized patient equipment	100
Know about auxiliary devices for the elderly and disabled	93
System security	
Know the importance of confidentiality	100
Ensure access to information collected	100
Know the importance of passwords	100
Know the laws concerning data security and patients' rights	93
Obstacles and prerequisites of automated data processing	
Develop positive attitude towards computers	100
Know that computer technology can only benefit nursing if we know enough about our needs	93
Be aware of the fears computers cause	87
Know that computers are not intelligent in themselves but must be programmed for application desired	87
Be familiar with ergonomic recommendations	87

$n = 15$.
SD < 0.75 (strong consensus).
*SD > 0.75 (weak consensus).

Table 4 Recommendations for teaching information technology in nurse education

Items (considered very important or important)	Consensus, %
Introduction to computers	
Know about PCs and peripherals	87*
Know about Windows	87*
Know the features of the workstation	73
Skills in software	
Know how to use a word processor	93
Know how to use a database program	87
Know how to use a spreadsheet program	80
System security	
Know the importance of confidentiality of computerized medical information and records	93
Know the laws concerning data security and patients' rights	87
Know about viruses	80
Data transfer	
Know how to use email	80
Know how to use a fax machine	73*
Skills in computerized patient monitoring	
Know the components of a computerized patient monitoring system and its function (e.g. i.v. pumps)	100
Know how to use a computerized patient monitoring system	93
Know how to service a computerized patient monitoring system	73
How to teach hospital information systems	
Integrated into laboratory training in college	100
Integrated into hospital training	100
How to teach nursing informatics	
Integrated into laboratory training in college	93
Integrated into hospital training	93
Integrated into specific courses (e.g. clinical nursing, administration)	93
Self-directed learning	87
Simulations of different patient situations	87
Teacher's role	
Nurse educator specialized in nursing informatics	93
Clinical specialist	87
Every educator should integrate nursing informatics	87

$n = 15$.
SD < 0.75 (strong consensus).
*SD > 0.75 (weak consensus).

The Delphi technique provided a flexible method of data collection for the present study; to collect informed judgements from a large number of experts in any other way would be far too time-consuming and expensive (Lee 1990). The validity of the technique is based on the research design, the selection of the panel of experts, an

acceptable level of agreement among the experts and the ability of the researcher to use the technique (Linstone & Turoff 1975, Lee 1990, Williams & Webb 1994).

Panel selection is crucially important. The experts recruited may represent either the same or different professions, but in this case heterogeneity was thought to support validity in selecting experts with different kind of experience in health care. A total of 20 experts were invited to sit on the panel, five each from the following four fields: nursing practice, nursing education, nurse students and patients, i.e. consumers. However, there were feelings among both students and patients that they were not sufficiently competent to sit on the panel and therefore both these groups remained under-represented. Although the final size of the expert panel in this study was small ($n=15$), there were no further dropouts after the first round. McKenna (1994) has observed that the response rate is often poor in the final round of a Delphi survey.

Consensus was defined in terms of majority view ($>67\%$) and 100% agreement (Williams & Webb 1994). In the third round of the study, at which point the questionnaire included 69 items in 17 content areas, 65% of those items were rated as important or very important. Only two items were rated as unimportant or wholly unimportant. A majority view was recorded for 38 of the final items and a 100% consensus for 11 items, giving a 71% consensus on the items. Carty's (1993) study of the 70 information features of clinical nursing information systems reported a consensus of 80%. In the present study the highest level of consensus among the experts occurred in the content area of system security. The experts disagreed on many of the items in the content area of 'basic components of the computer system'. These items were similar to the knowledge/skill items that were considered non-essential in Carter's & Axford's (1993) study.

The experts agreed that the ability to use information systems was important in nursing practice, and accordingly it was an important subject for nursing education. Likewise it was agreed that nurses must be able to use hospital information systems. Nursing information systems are not in common use in Finnish hospitals, which possibly made it easier for the experts to reach a majority view on this aspect. According to Strength & Keen-Payne (1991), computer literacy may be enhanced by integration of content and increased exposure to different information systems.

Computers were thought to have a beneficial impact in nursing by improving speed, efficiency and flexibility. In earlier studies on computerized patient care documentation, nurses have been reported as saying that computers help to make their job easier (e.g. Ngin *et al.* 1993).

Many studies have discussed the obstacles to the wider use of information systems that were also evident in this study, i.e. fear and attitudes towards computers (see e.g. Scarpa *et al.* 1992, Gonce-Winder 1993). Scarpa *et al.*

suggest that positive attitudes towards computer use can be enhanced by using as tutors nurses with previous computer experience. Information technology can benefit nursing only if nurses know enough about the possibilities offered. Nurses may also be sceptical about the adequacy of information systems. Ngin *et al.* (1993) concluded that nurses recognize and value the use of computers in nursing, but only insofar as they are capable of meeting the nurses' clinical needs.

The findings of this study clearly support the conclusion that the teaching of information technology should be integrated with laboratory and hospital training. The experts suggested that the information technology course taught to student nurses should last 80 hours, which is twice as long as the current course in Finland. The students should be taught by a nurse educator who specializes in nursing informatics. This implies that continuing education and postgraduate programmes must be made available for nurse educators.

The panel of experts questioned in this study said they did not consider familiarity with programming languages a significant factor. Bryson's (1991) findings, on the other hand, point to the importance of knowledge of computer programming, although not of programming skills *per se*. Programming is not covered by the current information technology course in nurse education in Finland. However, it was surprising to see that programming was mentioned in a content area concerning competencies in information technology rather than in a content area concerning the teaching of information technology.

Clearly the main areas that warrant further research in this area are the current methods employed in the teaching of information technology and its outcomes. Also, given the heavy emphasis in Finland on security and confidentiality, it is important to establish whether student nurses are aware of existing legislation concerning data security and patients' rights.

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