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Implementing IT Knowledge to a PostGraduate Health Care and Nurse Studying Program

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Abstract

Nowadays every visit to the doctor requests the cooperation between the nurse and IT technology. But are nurses really sufficiently equipped with knowledge about their working environment, as far as IT technology is concerned? Without doubt, more knowledge about the possibilities, benefits, possible mistakes and their consequences related to IT technology is needed for being used adequately in the health services. In the paper we will present the postgraduate program which aims at moving those possible obstacles and targets also at decreasing the lack of knowledge in this field of knowledge. We will present the study program in general and, additionally, will focus on specific IT areas like databases. The paper will also discuss the experiences and assessments which are acquired during the last years by the students in the database lecture. The mentioned lecture constitutes a part of the IT modules in the postgraduate health care and nursing program.

Keywords:

IT, postgraduate program, databases, information systems, education models, health informatics, nurse informatics, assessment

Introduction

Providing better health care for all is closely related to fast and secure information processing including data gathering, decision making, data mining and information generation, either in the health care centers, pharmacies, hospitals or any other health care institution. To meet all this requirements, it is demanded that appropriately trained staff is involved in activities where IT is a part of everyday work and life. To cope with this situation, nurses have to be trained in a proper way [7], [14].

Taking into consideration the needed knowledge from IT, we believed that the proper way to equip the responsible persons with sufficient knowledge is a regular undergraduate or post graduate education, which enables nurses to play an active role in the lecture phase as well as later in daily work with and for IT. To reach these goals, we developed a postgraduate nursing curriculum in the frame of the EU Phare Tempus project called NICE - Nursing Informatics and Computer Aided Education [1], [7] in which, as already the name itself reveals, informatics and IT are pointed out.

In the paper we will give a brief overview on the NICE curriculum. Furthermore, we will concentrate on some details in the Database lecture which is part of one of the modules of the study program. Additionally, we will present our experiences which we acquired during the last years since teaching the mentioned lecture. Experiences are very important for a further upgrading of the lecture and for up-to-date lectures materials available on webpages. Since the numbers of regularly enrolled students is approximately 15 per year, we are not able to work on summative assessment [12], but we need to find a less formal but, nevertheless, correct form for dealing with formative assessment or evaluation. The paper will be concluded by teaching results and final remarks, given in the Conclusion.

NICE curriculum

What is the concept behind “nursing informatics”? Simply speaking, we can define “nursing informatics” as the usage of information technology (IT) to support and make easier activities carried out by nurses. Some other definitions [2], [3] view nursing informatics as a discipline applying computer science to nursing processes or a combination of nursing science, informatics (information science) and computer science to manage and process nursing data, information and knowledge to support the delivery of health care.

Taking into account these definitions, we have decided that the nursing informatics curriculum needs to provide the students of the program with the following knowledge: basics of computer technology, medical informatics, nursing informatics, computer-aided patient care, computer networks and information retrieval as well as computer-assisted learning tools.

At the end of the nineties of the last decade, the NICE project was established with the aim to develop and introduce new short cycle degree courses from nursing

informatics at the university colleges. The project partners came from Austria, France, Greece, Italy and Slovenia [1]. The team who developed the curriculum consisted of members of various professions like nurses, engineers, computer scientists, medical doctors and administrators, who have very different views, opinions and beliefs on nursing informatics in general and in particular on the content of the nursing informatics curriculum [4]. The postgraduate program in Slovenia was the first one of his kind which integrated IT lectures to the curriculum for educating people of the health care and nursing domain. One of the top priority goals by establishing the program was, besides integrating informatics and computer science knowledge to the program, the integration of experts from the mentioned fields for giving lectures for nurses and health care domain staff.

After discussing various approaches that had been used in education [5], [6] as well as talking about other system approaches [6], we agreed on the common definition about teaching nursing informatics and IT as follows[1]: Teaching nursing informatics is a process in which students obtain knowledge from basics of informatics and computer science, informatics in health care (medical informatics), informatics in care and nursery (nursing informatics) computer communications and security (internet), medical instrumentation and simulation supported by computers with the aim to support nursing care processes as well as making nursing work more visible and enjoyable and, last but not least, to provide and enable better health care for all. On this foundation, taking into account also the before mentioned knowledge, the postgraduate nursing and health care informatics curriculum was developed and approved to by Slovenian authorities. Until our satisfaction with the curriculum was met, hard work was necessary and common decisions were done for each module and each single lecture.

The program is, like all other study programs for postgraduate students at our university, offered as a part time study. Most of the students are part time students (regular matriculation is also possible, but only exceptional required from students), mostly working as nurses or keeping other similar positions, having already a background knowledge from the nursing area duties or closely related to it. Some of the students have a technical background in computer science and informatics and are working in health care institutions, pharmacies, hospitals and similar institutions. Having started the program in 2001 which was attended then by one student, the number of students in the meantime has reached 10-12 students starting every year. The postgraduate program can be finished within 1,5 year (3 semesters). While two of the semesters are dedicated to attending classes and lectures, the students will spent the last semester on preparing their thesis and research. Within two semesters, the students have to pass 18 exams. Additionally to the lectures and to the gathering of practical experience, the students individually need to organize themselves when it comes to arranging time which is required for exercises, seminar work and the preparation for exams.

The offered lectures of the program are divided into three modules: Nursing informatics, informatics in health care and search for information in computer networks. In the following we will focus on the first module and give insight to the single lectures: “Information systems”, “Telematics in health care”, “Databases”, “Intelligent Systems”, “Ethics” and “Security of computerized data.” Already the titles of the lectures reveal the multidisciplinary content of the curriculum. Knowledge from the nursing program is combined with knowledge from the informatics and computer science program and is added by electrical engineering cognition. The teachers of the individual lectures have high competence in their subject as they have achieved their expertise in this specific field of knowledge. Lectures like “Information Systems”, “Databases”, “Intelligent systems” and “Ethics and security for computerized data” are given either only by a lecturer from informatics and computer science or by lecturers from two or three areas who will then cooperate in the same lecture.

For each single lecture also teaching materials were produced, concretely books were written [9] and PowerPoint presentations were prepared. Books were published in the NICE series, covering all lectures and providing basic knowledge which is required to finish the obligations of the program. Books have been a part of the NICE project as well. Additionally, PowerPoint presentations and other electronic materials and tools [13] are as response to the achieved feedback from lectures of the last years available for students via webpages [7], [14] and [15].

Database lecture: the content

This lecture covers five sections that include methodologies and techniques for database development. The lecture details are as follows:

- *Introduction:* This part briefly introduces the importance of the database and gives basic definitions and information on the architecture
- *Database design:* Database design is the most important part when developing a database. The work is divided into three parts: conceptual, logical and physical database design. The focus is on the conceptual model as a basic work for further design and development. The Entity-Relationship model is presented as a basic technique for conceptual database design.
- *Relational database:* This part discusses the logical level of the database design with properties and trans-

formation rules from the E-R model to the relational database.

- *Databases in the future:* Special areas such as medicine, health, pharmacies and some others develop special models for special needs, quite often upgraded also with the knowledge and knowledge based systems. Students will get the encyclopedical knowledge from the knowledge based systems as well as enterprise and domain models.
- *Summary:* Instructors guide students to have a look at database from their own field of profession. The enterprise is defined by each student for his/her seminar work and database design is done on a conceptual level. Results are presented and discussed with other students, the instructors and the lecturer. Final conclusions are done after having gained practical experience.

Experiences

After getting a brief overview on the nursing and health care postgraduate program and after having presented the "Database lecture", we would like to present some experiences acquired during the last years. Most of the experience we share is gathered in the informal discussion with the students after the exam of the "Database lecture" (formative assessment/evaluation). More formal assessment (summative assessment/evaluation) is not possible because the group of the participating students tend to be very small (between 5 and 12 students). Furthermore, as assessment is much more difficult when new teaching methods and experiments are just being introduced.

In general, the process of educational assessment can be approached as being the process of gathering, describing or quantifying information about learning performance. The person or lecture being evaluated can range from the performance of students and instructors to that of lectures materials, courses and or the whole study program. Educational assessment/evaluation can be done either during or after lectures and with different purposes. Generally speaking, assessment can be defined as the systematic process used to obtain information about student achievements [12] in order that that information can be used to:

- Give feedback to students.
- Make educational decisions about students.
- Make decisions about the lecture or the program and the effectiveness of the lecturer.

Students usually attend the Database lecture after having finished the Information system lecture, where they are equipped with basic knowledge about what is an information system, what are its processes and activities as well as being told the basic importance about data and database for each information system and/or application.

Among the books in the NICE-series a book for the Databases lecture is available and we, additionally, have a PowerPoint presentation about the most important parts as well. The main goal is that students understand what is a database, its importance, as well as how to develop it. They are also informed how to implement it and access data, but we do not provide any special training on this part because mostly the students will be not actively involved in the implementation or writing SQL queries, for example. But in cases where they will in the future come across developing and using a database, **we expect that queries will be very basic one.** For those involved exceptionally more practically to data access, another chapter in one of the NICE series book is available [10].

One of the goals of the lecture is to prepare students to be actively involved to the development of the database, while they will have probably the role of a domain (nursing, health care) expert consultant. Therefore they have to acquire knowledge and exercise how to do this. Thus every student has to select his or her own domain to develop a database conceptual model (abstract presentation of the database).

How do the students normally react when being asked to develop such a model? Up to then, they are mostly not familiar with the topic (except most of students with non nursing background or undergraduate study) and they are motivated to "reject" the lecture and/or to pass it as fast as possible, neglecting the importance of the topic.

After the first "shock" ("we are not able to do this"), the students slowly start making themselves familiar with the importance of collecting data and developing databases for nursing or health care processes. Usually, after having developed the conceptual model, they make themselves familiar with the importance of the whole system that they have selected or with at least a part of it. This incident is maybe surprising because they have already been close to the selected domain or working there partially already for a long time. Questions about its importance tend to arise, they ask themselves what is important, which data is need or if something is maybe missing. From the quality point of view (quality of the conceptual model), they have been in the past time very successful in their profession. One goal to be reached during the teaching process is raising awareness for the fact that the students own a very important knowledge which contributes to the success of a database. Our students also become aware that they can be an important member of the team working on developing databases on their own domains (nursing, health care). Students with a background from informatics and computer science acquire for their future work very important domain knowledge.

In the formative assessment the students tells us their own stories, quite close to that just described above. For our

students it is an unusual situation to be asked to be active in selecting and deciding on the content of their seminar paper (they select the domain as well as the possible application for which the database should developed). Transferring the gathered knowledge of the study program then later to their workplace in reality, they find out to be happy to play an active role.

In the summative evaluation, a secondary emphasis was put to assess students' achievement at the end of the lecture. The assessment data which has been collected can also be used to provide feedback about lecture materials, approach, **exacting of the whole lecture** and, last but not least, gives information on the adequacy of the lecture in the presented program.

Conclusion

The main idea of this paper was to clarify the importance of IT in the nursing and health care educational programs. Actually, IT is nowadays a part of every day life, when it comes to activities ranging from shopping up to working place surroundings and when consulting a doctor. Whenever things take an unpleasant, unintended direction, we are unsatisfied and complain either to the shop assistant or vendor or both or to our webmaster, IT engineer and, last but not least, put forward our complaints to the nurse or even to the doctor. Quite often we blame persons who are not responsible for the failure because actually the fault is related to the system which is either not good or not working correctly. But, without doubt, there is sometimes also a lack of knowledge by people using these IT systems and this deficit we would like to avoid and thus we have developed and implemented the just mentioned post graduate program.

We have decided to introduce the knowledge of IT to the educational program, independent from the fact that for our students this so far has been a new, mostly unknown domain. The NICE curriculum provides the postgraduate students with the opportunity to compensate the before mentioned lack of knowledge. By using lectures from the field of computer science and informatics we motivate our students to take over an active role in real projects in their daily work environment including developing new IT products for the mentioned domains. Depending on the environment, those products are still rare, and, after all, nurses hardly ever have an active role or do have a lot of influence in IT domains, but we are optimistic that this could chance. In the future, nurses with the required IT knowledge will not only be experts when in comes to acting as an consultant, but they will also be able to make their own proposals, suggestions and solutions concerning the conceptual level, while the implementation of it will remain the domain of IT and computer science experts and engineers.

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