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New Trends in Nursing Informatics (NI) Education: Revision of the NI Curriculum for Three Nursing Programmes

University of Applied Sciences Osnabrück, Germany

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ORGANIZATION

With the advent of gradually moving nursing education into universities in Germany, the University of Applied Sciences Osnabrück (Osnabrück) was among the first to offer academic programmes in Nursing since the early 1980's. In the wake of these developments, nursing researchers at the Osnabrück founded the German Network of Quality Developments in Nursing (in German DNQP), which fosters and supports the development of scientifically based nursing guidelines. Since their foundation in 2002, a multitude of expert standards were published and promoted [https://www.dnqp.de/de/information-in-english/]. Osnabrück was the first German university to appoint a full professor in health informatics to teach Nursing Informatics (NI). Likewise, it was the first university to establish a research group in 1997 that has integrated Nursing Informatics into its spectrum of research topics since its foundation.

Today, the nursing study programmes at the University of Applied Sciences Osnabrück embrace two part-time Bachelor Programmes; one in Nursing Science, the other in Nursing Management, and a full-time Bachelor Programme in Clinical Nursing, designed as a dual study in cooperation with hospitals. This set of Bachelor Programmes is supplemented by an inter-professional Masters Programme for healthcare professionals. There are a total of 455 students in these Nursing Programmes, who primarily come from Germany, but among them, there are also students from Austria and Switzerland. All programmes embrace a mandatory course in Nursing Informatics. Due to the regular re-accreditation of these programmes, all curricula, including the one for Nursing Informatics, had to be updated in summer 2016. Furthermore, there was a request from the faculty to synchronise the Nursing Informatics curricula across all Nursing programmes.

BACKGROUND

In Germany, nursing process documentation received new momentum in 2012, when legal regulations concerning the representation of nursing in the German DRG system via nursing complex intervention scores (in German: PKMS) were adopted [1]. PKMS documentation allows German hospitals to claim reimbursements of interventions for highly acute patients. Outside hospitals, nursing documentation in nursing homes yielded new stimulation through legal measures in the context of reducing bureaucracy for nurses [2]. These measures gave care planning a higher importance as only deviations from the care plan now have to be documented. These regulations made many nursing homes implement electronic documentation systems to meet quality requirements and to comply with the new regulations. In hospitals, the number of nursing documentation system has increased slowly but steadily over the last 15 years. Currently, about 27-36 % of the German hospitals have implemented Information Technology (IT) systems for nursing documentation [3]. However, nurses take over documentation duties beyond primarily nursing issues as they are highly involved in patient process and information management. It can therefore be concluded that there is a great demand for competencies in managing patient data and processes electronically, operating the technical systems, knowing about their context in terms of data quality and

availability, confidentiality and integrity. Furthermore, it can also be concluded, that there is a need to design, select and implement the best systems for their purpose, which calls for user participation in software engineering and the life cycle management of health IT applications.

STATUS/CURRENT DEVELOPMENTS

To this end, all persons who are lecturing NI came together to identify the core competency areas, which should be addressed by the courses. Although the content of the courses had evolved over the past 20 years, it was decided to abandon the previous approaches and to use the D-A-CH recommendations for NI core competencies and the TIGER (*Technology Informatics Guiding Education Reform*) recommendation framework when designing the new direction of the NI curriculum. The D-A-CH recommendations were developed in a joint effort of the NI Working Group of the German Association for Medical Informatics, Biometry and Epidemiology (GMDS), the Austrian Society for Nursing Informatics (ÖGPI) and the Swiss Interest Group for Nursing Informatics (IGPI) [4]. The TIGER recommendation framework is an evolving concept of integrating priority ratings of experts and case studies and was first published at the Medical Informatics Europe (HEC) 2016 multi-conference in Munich 2016 [5]. Both sets of recommendations use the same terminology, share the same foundation of references and are therefore compatible. As all three different study programmes should have had a uniform NI curriculum, the overall relevance ratings of NI core competencies from the D-A-CH recommendations guided the developments. This approach should warrant a broad type of education for students, who often could not tell what kind of job they were going to take after graduation. Furthermore, it should be possible for students to be qualified for jobs in Austria and Switzerland as well, thus the D-A-CH recommendations matched these requirements very well. In addition to this specific input that reflects the perspective from Austria, Germany and Switzerland, the international view had to be integrated to ensure a view out of the box. The TIGER recommendation framework [5] was found to be very suitable for this purpose, as it covers a very broad spectrum of views from many countries around the world.

ACTIVITIES/MEASURES

Against this background, it was decided to identify primary competency areas, associated competency areas and emerging topics according to the rule that a primary competency area had to be represented among the top five most relevant areas in at least two of the five roles (see Tab. 1). These deliberations led to the following areas as primary competencies:

1. *Nursing Documentation (including terminologies)*
2. *Data Protection and Security*
3. *Process Management*
4. *Information and Knowledge Management in Patient Care*
5. *Quality Assurance and Quality Management*
6. *Project Management*

In addition, two more primary competency areas should be selected from the international findings that were represented among the top five in at least two roles.

This resulted in the inclusion of the following areas:

7. *Principles of Nursing Informatics*

8. *Information and Communications Systems for Nursing (including Interoperability).*

The two associated competency areas were also selected based on the international findings with very high relevance ratings [5]. These were

6a. *Change und Stakeholder Management*, which was assigned to the primary competency area Project Management, which was then renamed as *IT Project Management and Change Management*, and

2a. *Ethics and IT*, which was assigned to Data Protection and Security.

Decision Support, eHealth, Telematics and Telehealth, as well as Assistive Systems, were chosen as emerging topics. This decision was based on a mixture of the international relevance findings and current research topics. eHealth, Telematics, Telehealth and Assistive Systems were combined to one unit and Decision Support was included into Quality Assurance and Quality Management, which was renamed to Quality Management and Decision Support.

These primary competency areas were arranged in a logical sequence and allocated to teaching and learning units in the syllabus. Each primary competency area was enriched with competencies from the literature [6-12] and derived from previous experience of the lecturers. Considering the total amount of time for the NI course and the expected time needed for each competency area, the list of areas was assigned to the following schedule with teaching units of 1.5 hours.

Table 1: NI curriculum for nursing study programmes University of Applied Sciences Osnabrück

Teaching and Learning Unit: Primary Competency Areas	1.5 h unit	Competencies
Principles of Nursing Informatics	1	• Understand the concepts of data, information and knowledge, and • Understand the types and roles of health IT systems
Nursing Documentation (including terminologies)	3	• Understand the difference between structured and unstructured data and their implications, • Understand, apply and evaluate nursing terminologies, • Understand the pros and cons of electronic nursing documentation and electronic health records, • Understand and apply data analysis methods based on structured data, • Apply existing nursing documentations systems, and • Evaluate a nursing documentation system based on a semi-structured questionnaire.
Process Management	2	• Understand the difference between process oriented and function oriented organisations, • Understand the concept of business process analysis in patient care, • Understand and apply clinical guidelines and clinical pathways for process analysis, and

		• Understand and apply the notation of process modelling, i.e. read complex models, create simple models
Information and Communication Systems for Nursing (including Interoperability)	3	• Understand the concepts of health IT system to support clinical processes, • Understand health information systems: composition of subsystems in particular electronic patient record systems, • Understand the basics of health IT architectures, integration and interoperability and become aware of the needs of standards, • Understand the basics of communication servers and HL7 messages, • Understand and apply the relation between HL7 messages and terminologies, and • Understand and apply the IT application in ClinLab
eHealth, Telematics, Telehealth and Assistive Systems (including Interoperability)	1	• Understand the German acts and laws with regard to eHealth, e.g. "eHealth Gesetz" and electronic health card, understand other acts, such as in Austria and Switzerland, • Understand the principles of systems in a network, in particular electronic health record systems to bridge institutions, • Understand and apply tele-monitoring, e.g. blood pressure and pulse rate, • Understand, apply and evaluate mHealth applications, e.g. wearables.
Data Protection and Security and Ethics and IT	1	• Understand the right of informational self-determination and the goals of data protection, in particular confidentiality, integrity, availability, non-repudiation and others in the light of data protection and security, • Understand the European and German regulations and laws for data protection, • Understand different types of attacks and attackers, • Understand technical and organisational measures, • Understand and evaluate different scenarios: remote service, BYOD (bring your own device), password policies, qualified digital signatures • Understand and evaluate ethical standards with regard to information

Information and Knowledge Management in Patient Care	1	• Understand the relationship between reading literature and guidelines and performing statistical analyses and research, and • Apply related tools, e.g. pubmed, citavi or endnote, SPSS
Quality Management and Decision Support	1	• Understand the definitions of quality, • Understand the contribution of clinical guidelines to quality management, • Understand the relationship between patient safety and quality, in particular with regard to information continuity and information logistics, and • Apply IT systems for information continuity in patient handover scenarios, • Understand and apply decision support, e.g. for wound care
Project Management and Change Management	2	• Understand the definition of a project, • Understand the concepts of project goals, work breakdown structure, work packages, time plan and milestones, • Apply and create a project plan for the introduction of a nursing IT system and hereby consider issues of change management, such as user participation, change agents, champions, key users and communication with sceptics.

CHANGES

The newly developed curriculum differs in part significantly from the previous one. Information and knowledge management in patient care, quality management and decision support are new competency areas. Likewise, the combination of project management with change management, of eHealth, telematics with assistive technology and of data protection and security with ethics in IT are new. This new approach should intertwine competency areas of Nursing Informatics with competency areas in Nursing Research, Quality Assurance and Healthcare Management in a stronger fashion. The approach goes back to students' comments of previous courses, which included the wish to better weave NI into other major topics in nursing and into their daily work as nurses. This also entails consequences for the NI lecturers to make themselves more acquainted with nursing and lecture NI from an application perspective not from a technology point of view.

RESULTS

The new NI course design takes effect during the winter semester of 2017/2018. It gives a wide overview of the field and interlinks with other subjects from direct patient care and management. It therefore should demonstrate that NI goes far beyond mere technological topics and serves to establish innovative approaches in healthcare. In particular, it focuses on building and entertaining safe care networks and on

instruments for ensuring high quality of care through information and knowledge management and clinical decision support systems.
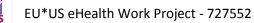
OUTLOOK/LESSONS LEARNT

The ultimate goal of this new approach is to weave NI into other topics and transform it from an external add on to an integral organic part of nursing. The intention is to motivate nurses to regard health IT/eHealth as part of their job and be capable of using it in a meaningful way. Whether this can be achieved will have to be seen in the next semesters and years. The regular evaluations will take these aspects into account.

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