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DESIGNING A NURSING CARE PLAN APPLICATION FOR
NURSING EDUCATION IN FINLAND

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Documentation with electronic applications requires nursing competences and therefore nursing students need to learn the skill during their studies. There are several electronic medical records (EMR) in use in health care, which allow nurses to make nursing care plan according to the nursing process and care classifications. Nursing students may train documentation skills with those during their clinical practice periods but there is not a unique educational application, which could be used in theoretical nursing courses and especially in nursing simulation laboratories.

The aim of this study was to draw up a requirement analysis for an educational nursing care plan application for medical and surgical nursing courses in Finland. The developing process of the nursing care plan application comprised of literature review, software and paper prototype designing, validation of the prototype and the designing of the final prototype version. The functional and non-functional requirements for the application were produced by content analysis. After the application prototype was designed in verbal and illustrated presentation, it was evaluated in four validation-meeting groups. Nursing students (n=3), teachers (n=5), technology personnel (n=2) and a nurse (n=1) were testing the prototype with talk aloud method. As a result, from these meetings final version of the prototype was designed. The paper prototype enables encoding, testing the prototype and further technological development. Afterwards, it is ready for national and international assessment and possible dissemination.

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CONTENTS

LIST OF APPENDICES

LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

Technology in nursing comprises monitoring and graphical interface, telemedicine and telenursing, and medical devices (Korhonen, Nordman & Eriksson, 2015). Nurses´ skills to master technological equipment and information and communication technology (ICT) is necessary. eHealth, nursing information systems and carrying out nursing care plans are examples of contents that are included in the professional competencies in nursing (EFN, 2015; Eriksson, Korhonen, Merasto & Moisio, 2015). Therefore, is required to find and produce innovations, which support students´ learning in order to achieve technological competence before graduating as a registered nurse.

During last decades, electronic documentation is being developed all around the world and several types of electronic documentation have been designed. At the same time, conceptual diversity is spread. Concepts as electronic medical record (EMR), electronic health record (EHR), electronic patient record, educational electronic health record (EEHR) and academic electronic medical record are all used describing the electronic documentation and some of those even from the same point of view. In this research, all of these different concepts are thought as an electronic documentation system, which can be used in nursing education as a way of documenting nursing care plan with electronic devices.

For nursing students, it is significant to understand not only the usage of electronic documentation system, but also the importance of appropriate documentation principals and the structure of the nursing care plan included in electronic record systems. Learning can realize with theoretical studies and in clinical practice periods. Due to missing clinical practice places, the simulation laboratories can be used in addition of clinical skills lab as an alternative place for clinical training. The problem is the lack of training possibilities with electronic documentation in nursing simulation labs (Curry, 2011; Kowitlawakul, Wang & Wai-Chi Cahn, 2013; Mannino & Cornell, 2014).

The need for improvements in nursing students´ documentation skills became realized to the author in simulation laboratory in medical and surgical nursing course in 2015. Medical and surgical nursing simulations are about adult patients´ care in inpatient wards and is a part of professional studies where documentation is a very important component. Documentation in those simulations includes that nursing students find out patient information and assess the condition of a patient, decide the problem statement and nursing diagnosis, plan and implement the care, and finally evaluate of the goals status. In the simulation laboratory, students were documenting patient information or their findings to the paper forms occasionally, but usually they did not document at all. In addition, mentoring nurses from hospitals were complaining students´ skills to use electronic documentation.

Documenting nursing care plan is a common procedure all over the world, which has similar contents. This research is focusing on documentation only in Finland because there is no general, structured electronic documentation tool used in nursing education even the need is obvious, and because of differences in applications which have produced. Depending on where the documentation is done, there may be additional forms or included limitations but the structure in the nursing process is the same (diagnosing, planning, implementing and assessing). The differences between the care plans are the care classifications, which varies with countries. In Finland, in addition to the nursing process, the Finnish Care Classification (FinCC) is the main structure in a nursing care plan. For example, in Spain the electronic record system is based on the International Classification of Diseases (González-Chorda et.al, 2014), which is more medical classification than FinCC. Whereas the American Clinical Care Classification (CCC) system resembles more the Finnish classification system (Saba, 2017).

The FinCC consists of three national classification systems, which are The Finnish Classification of Nursing Diagnoses (FiCND), interventions (FiCNI) and outcomes (FiCNO). In Finland, in repeated survey of physician's experiences of electronic patient record (EPR) systems the most popular and common ones were studied. Even the FinCC was as a basic structure to document the nursing care plan, all systems were experienced unstable, slowly responding, unclear and illogically organized. (Vainiomäki et.al, 2014) Because of functional challenges and the amount of costs, the intended use of these EPR systems was intentionally excluded in this research as a base

for developing a nursing care plan application and the interest was to develop a unique educational application.

2 PURPOSE OF THE STUDY AND RESEARCH QUESTIONS

The purpose of this study was to draw a requirement analysis for an electronic nursing care plan application aimed to assist nursing students in documentation in nursing simulation labs. With the assistance of the application nursing students´ skills to use electronic documenting, plan patients´ care and furthermore their clinical decision-making skills can be improved which are consequently adding the patient safety and the quality of care offered by graduating nursing students.

The aim of this study was to draw up a requirement analysis for an educational nursing care plan application for medical and surgical nursing courses in Finland. The functional features were aimed to be charted and described as accurately and fairly, as possible. Based on the requirement analysis, a generation of a prototype of that application was designed. The prototype enables encoding, testing the prototype and further technological development.

The main research question was:
What kind of educational nursing care plan application assists nursing students to learn electronic documentation in medical and surgical nursing in Finland?

Sub questions were:
• What are the relevant contents in a nursing care plan application in medical and surgical nursing in Finland?
• What are the functional requirements for the application´s use?
• What is the usable appearance for the application?

3 DOCUMENTATION AS NURSING COMPETENCE

3.1 Nursing education and prospected competences

Nursing education has experienced several changes since Florence Nightingale´s first nurse training school at St Thomas´ Hospital in London 1860, which was more like apprenticeship education. Little by little, nursing education transferred closer to higher education. In 1923 the first university school of nursing became in the United States, in 1956 the first department of nursing studies was established in UK, and in Australia the first nursing course was commenced in 1974. (Wikipedia, 2017) In Finland nurses´ education moved slowly from schools to institutes, and finally to universities of applied sciences as an experiment in 1991 (Korte, 2013, 7).

According to the Merriam-Webster Dictionary (2017) a registered nurse (RN) has graduated from a nursing program and qualified for registration in order to obtain nursing license by a state authority. First registered nurses were graduated in New Zealand in 1901 (Kirkman, 2017). There are still worldwide differences with educational level. According to Nursing and Midwifery Board of Australia (2017), nurses' registration has been at a national level since 2010, where the educational requirements are at the level of Bachelor´s degree. The Bachelor of Science in Nursing (BSN) or Bachelor of Nursing (BN) is an academic degree in the science of nursing. The Bachelor level is required in Canada, except for Quebec (Canadian Nurses Association, 2017). In the UK, all nurse-training programs must be at degree level since 2013 (Nursing & Midwifery Council, 2017). In the US, a registered nurse has completed diploma program and the examination for initial licensure but the Bachelor degree is not required in all states. There are other requirements also, which vary by state. (National Council of State Boards of Nursing, 2017)

In Finland, the Degree Program in Nursing leads to a Bachelor of Health Care degree. The education consists of 210 ECTS credits and lasts 3.5 years. The curriculum consists of basic (27 cr), professional (83 cr), and elective studies (10 cr), and supervised clinical practice (75 cr). Thesis (15 cr) is included to clinical practice studies. (SAMK, 2017) In addition to the national laws and orders, nursing education is based on the

directive 2005/36/EU of European Parliament and Council, which was modernized in directive 2013/55/EU. (Finnish Nurses Association, 2017; Eriksson et al, 2015, p. 12-13) The professional competence of a nurse responsible for general care (180 credits) was defined in Finland in 2015. According to the directive 2013/55/EU, the education needs to last at least three years and include 4 600 hours of education. Therefore, the Finnish education is 30 ECTS credits broader than the directive requires. The additional 30 ECTS credits are meant to deepen the nursing knowledge and competence. (Eriksson et al., 2015, p. 12-13)

The European Federation of Nurses Association (EFN) gave guidelines for implementation of Article 31 of Directive 2013/55/EU into national nurse education programs. Competency area 4 is about communication and teamwork, where the contents are for example: e-Health and ICT, and health and nursing information systems. Potential learning outcomes are comprising skills to use IT systems in healthcare systems and apply healthcare technologies, and information systems. Competency area 6 is about nursing care, which is divided into theoretical education and training, and practical-clinical education and training. The content "Nursing process and documentation" includes potential learning outcomes concerned in identifying the conceptual framework for nursing care and carrying out care plans. From practical-clinical point of view, this means establishment of a nursing care plan and its implementation to different patient cases. (EFN, 2015) Based on these EFN guidelines the professional competence of a general nurse in Finland consists of nine competencies. Social and health care environment-competence includes the use of technology in patient care. Contents of this are the use of care and monitoring equipment, and the use of patient record systems. Clinical nursing-competence includes care classification systems and national standardized electronic nursing documentation as a base of nursing documentation. (Eriksson et al., 2015) These contents reflect the idea of three-dimensional definition of technology in nursing where technology in nursing comprises monitoring and graphical interface, telemedicine and telenursing, and medical devices (Korhonen et al, 2015)

The Finnish Nurses Association (FNA) published eHealth Strategy 2015-2020 in 2015. The purpose of it was to describe the nature of the digitalization in nursing both in national and international level and to strengthen the role of nurses in developing and implementing eHealth services. Strategy listed ten main aims, which include e.g.

educational point of view, and six elements, which include e.g. digital services as natural part of a nurse´s job. Objectives that have set there comprises the reform of education, previous practices, internal processes and e-services. (Ahonen et al, 2015)

Technological skills that nurses need when taking care of patients can be taught in different ways. Nurse faculties in universities of applied sciences are expected to provide learning experiences for nursing students that incorporate student-centered and patient-focused learning activities into their teaching. According to Risling (2017) there are healthcare technology trends of the next decade, that nursing educators could utilize in teaching. These trends are: 1) expanded electronic health record use and interoperability, 2) increased influence of technology wearables, 3) Big data and data analytics, and 4) patient engagement. The need to improve nursing education and find more real-time solutions to learning environments, which produce students´ skills to use different technological equipment and devices, is therefore coming more and more important.

3.2 Nursing care plan

A written nursing care plan is a plan for patients/clients/family to have standardized, evidence-based, holistic care that they need or may need. It provides care with ethical principles such as continuity, safety and quality of care. It promotes a documentation process where the needs or problems of the patient are identified, solutions discovered and needs or problems resolved or prevented and assessed by the nurse. A nursing care plan includes the nursing process components: 1) assessing and diagnosing, 2) planning, 3) implementing, and 4) evaluating phase. (Liljamo, Kinnunen & Ensio, 2012, p. 14-18) These steps may have presented also in five steps, in which case the first phase is divided into two; 1) assessing and 2) diagnosing. The other steps are kept the same. (American Nurses Association, 2017) These nursing process phases are the same than the nursing decision making phases (Liljamo et al, 2012, 10)

In assessment and diagnosing phase nurse collects and analyzes data about a patient/client/family from holistic view. Planning phase includes decision making of the needs or problems for the care with the patient/client/family together, prioritizing the

needs, setting measurable and achievable short- and long-range goals for the care, and choosing the possible interventions. Implementation phase is the phase where the previously planned interventions are implemented. The need for care, set down goals and effectiveness of the implemented care are assessed in the evaluation phase continuously and when the care period is finished. After evaluation, the plan is modified as needed. (Liljamo et al, 2012, p. 13; American Nurses Association, 2017)

Developed electronic health record (EHR) systems have influenced nurses to document data in electronic records instead of paper-based nursing care plans. Nursing faculties need to prepare nursing students to incorporate the nursing process into caring for patients, teach to understand the importance of identifying patient data and document it to patient records (Pobocik, 2014).

3.3 The Finnish model of Standardized Documentation

The nursing process is used as a framework for nursing documentation. In order to standardize electronic nursing documentation and its terminology, care classifications are needed. Several different classifications such as the International Classification of Nursing Diagnoses (NANDA-I) or the International Classification for Nursing Practice (ICNP) have been used for the nursing documentation purposes. (Häyrinen, Lammintakanen & Saranto, 2010). In the Spanish research of González-Chorda et.al. (2014) the electronic record system was based on the International Classification of Diseases, which is more medical classification than ICNP. Whereas the American Clinical Care Classification (CCC) system provide the nursing care components as a framework for classifying (Saba, 2017). Challenges to develop classification for multiprofessional use are recognized. Healthcare leaders may overlook the value of terminology and classification, nursing and non-nursing terminology and classification systems may differ, and the EHR system may not be adapted with other healthcare professionals. (Strudwick & Hardiker, 2016)

The Finnish model of Standardized Documentation is based on the World Health Organization´s (WHO) nursing documentation model. It encompasses the nursing process and the Finnish Care Classification (FinCC). It was developed as a part of national

electronic health record project. The Finnish model consists of four phases of nursing process: 1) data collection and needs/problems assessment 2) nursing diagnoses and goals for the care, 3) planning and implementing nursing interventions, and 4) evaluation of the outcomes. It also consists of the nursing summary and the intensity of the nursing care. Nursing diagnoses and goals for the care are documented using the Finnish Classification of Nursing Diagnosis (FiCND). Nursing interventions are documented using the Finnish Classification of Nursing Interventions (FiCNI). The evaluation of the outcomes is documented using the Finnish Care Classification of Nursing Outcomes (FiCNO). Nursing summary comprises all the important information concerned the care period. The intensity of the nursing care is documented using the Finnish Oulu Patient Classification. (Häyrinen et al, 2010; Liljamo et al, 2012, p. 10-19; Nykänen, Kaipio & Kuusisto, 2012)

FiCND and FiCNI have similar hierarchical structures consisting of 17 Care Components, which present patient´s holistic needs or problems. Under components, FiNCD includes 88 main categories and 150 sub-categories and FiCNI includes 127 main categories and 180 sub-categories. FiCNO is for evaluating the outcome of the care process in relation to the need of the care. Therefore, the scale is simple: improved, stabilized and deteriorated. Nurses document patient care plan using components, categories and sub-categories by selecting options from a list, and writing additional narrative text to give descriptive data. The intensity is describing patient´s dependence of nurse´s work contribution and is therefore describing, how demanding the care is. (Häyrinen et al, 2010; Liljamo et al, 2012, p. 10-19; Nykänen et al, 2012)

3.4 Teaching documentation in nursing education

Learning of nursing is a slow process of internalization where theoretical knowledge is a base to build own competence in nursing. When nursing student master theoretical knowledge, it enables student to use it in different nursing situations, where practical and theoretical knowledge are in intense interplay with each other. (Havukainen, 2003) Nurses need increasingly skills to use information and communication technology (ICT) and different technological equipment. Using electronic patient record systems and documenting nursing care plans are included in the professional competencies of

nursing (Brooks & Lynn, 2012; Eriksson et al, 2015) and are therefore crucial issues for nursing students to train during their nursing studies. At the same time hours that can be spend for teaching these technical skills are been decreased. Therefore, is required to find new ways to teach technologic skills and produce innovations, which support students´ learning so that they can achieve technological competence before graduating as a registered nurse.

Nursing students learn to make a nursing care plan theoretically when implementing the nursing process and the care classification to fictitious, written patient cases. When they are training their nursing care plan skills in a simulation laboratory, they usually use the paper-based system. The idea of using simulation lab as an authentic nursing ward environment with as real situations as possible, is not been fulfilled then. Building the simulation environment as same as possible comprises the use of an electronic documentation application as well (Najjar, Lyman & Miehl, 2015). When nursing students are documenting with paper and pen, they do not adopt the use of electronic patient record system during their studies at the university, but during their practical placement periods or not until they have graduated. Students´ lack of documentation competence causes extra work to nurses who are mentoring students during their training periods or familiarizing graduated nurses to their tasks (Miller et al, 2014). Nursing education in this case has not developed synchronously with nursing reality.

An academic electronic medical record (EMR) is a computerized system, which is usable in nursing education. It contains features of EMR such as patient assessment and decision making which are required in clinical practice. According Gardner and Jones (2012) there are issues to take account when planning the implementation of an academic EMR to nursing education. The simulated documentation is effective to implement throughout the nursing curriculum. In addition, the identification of the expected outcomes as well as possible pros and cons and budgeting are important to consider ahead. There are already fully functional academic EMR systems, which are quite similar to those used in hospitals but those are more expensive than simulated charting programs developed by educational publishing houses. When deciding the system, it is efficient to choose the one that can be integrated into variety of classroom settings, including simulation.

There are several types of electronic medical records (EMR) in use in the health care sector and it is impossible to prepare students for each of them (Gardner & Jones, 2012). Significant for students is to understand the importance of appropriate documentation principals and the structure of the nursing care plan included in electronic record systems, and learn to find information from it and to write new data to it. Part of learning can realize with theoretical studies such as familiarizing to the contents of a nursing care plan, but as important part as that is to learn employing it, and in nursing education that can occur in clinical practice periods and in simulation laboratories. The problem is that there is a lack of training electronic documentation in nursing simulation labs (Curry, 2011; Kowitlawakul et al, 2013; Mannino & Cornell, 2014) due to a missing nursing care plan application with proper functions for educational needs. Educational EMRs are used only in few nursing faculties because of the costs of the installation and maintenance, the lack of adequate training and continued support from the academic faculty (Brooks & Lynn, 2012).

According to Spencer and Lunsford (2010), nursing students learn documentation when caring the patients. This in educational environment may stand for practicing in clinical periods with an application at bedside (Choi, Lee & Park, 2015) or in simulation laboratory also. There are some nursing faculties, which have incorporated electronic documentation into simulation, and due to documentation´s, skills of nursing students´ are been enhanced. Simulated E-health Delivery System (SEED) helped majority of participants in University of Kansas School of Nursing to understand nursing process and clinical documentation. Realism of the training with EMR in simulation labs improved students´ learning and helped them to concentrate more to patients instead of computers (Lucas, 2010). An educational electronic documentation system (EEDS) includes the basic care classification features and allows nursing students to create nursing care plans and document the care in it. The use of EEDS improved students´ skills to identify nursing diagnosis, and furthermore developed their clinical reasoning and their higher-level thinking skills. (Pobocik, 2015) The Electronic Health Record for Nursing Education (EHRNE) successed to promote students´ attention of electronic documentation (Kowitlawakul et al, 2013) and students´ documenting skills improved by electronic application´s use in simulation (Kowitlawakul et al, 2013; Jansen 2014; Mannino & Cornell, 2014; Bowling, 2016). Using at least some type of

electronic health record system in simulation is important for students to train documentation (Jansen, 2014; Mannino & Cornell, 2014; Bowling, 2016).

Because EMR and clinical practices are constantly changing, both nursing students and the nursing faculty are needed to be informed of the modifications. Due to an academic medical centre with nursing faculty developed an online education program. It was placed outside the centre´s firewall, which gave an opportunity to use it from the nursing faculty´s computers. Only the faculty members could access, not the students. Both privacy and confidentiality were taken into consideration when each member needed to have their own account and a password. With the program, the faculty´s members could access new information in practice and EMR and thus keep their students up-to-date. (Schumacher & Twedell, 2010) The program was a good example of co-operation, which benefits the clinical practice as well. Another good example of collaboration was development of an EHRS teaching tool for a module of home care documentation in nursing education. It was based on the Outcome and Assessment Information Set (OASIS), which is a complex system of a group of data elements and therefore difficult to teach, but is free of charge, which is important aspect for the faculty. The simulated scenario was designed in written and audio format, which helped students in their clinical reasoning and due to documenting. Because of using EHRS, students reported that they understood home care documentation better than before and improved their documentation skills. (Nokes et al, 2012)

The framework, which is used in electronic documentation, influences the quality of nursing information (von Krogh, Nåden & Aasland, 2012). In Finland, Vainiomäki et al. (2014) repeated a survey of physician's experiences of EPR systems by brand in 2014. Even the survey was addressed to physicians, the results are consistent with Häyrinen et al. (2010) and Nykänen et al. (2012). The brands that were examined were the most popular and common ones: Effica, Pegasos, Grafical Finstar (GFS), Mediatri, Uranus and Esko. The users found the systems unstable and slowly responding. Even the FinCC was the framework to document the nursing care plan in every EPR system, it was experienced too detailed, multi-layered and difficult to use, unclear and illogically organized in all of those systems. (Nykänen et al, 2012). The lack of remarks in nursing care plans may be due these challenges or the need for further training (Häyrinen et al, 2010).

4 REQUIREMENT ANALYSIS

A requirement for an application is a technical and functional need that a design or product must be able to perform. The requirements describe characteristics, capabilities, and quality of the design for it to have a meaning to the user. A systematic requirement analysis also known as requirements engineering, is the process where the expectations are determined for a design.

Requirements are divided into several groups or classes based on the context where it is applied. Requirements for the software engineering process are usually divided into functional and non-functional requirements. Functional requirements specify something, which the system is expected to or should do, or specifies a behavior or a function of the system. Non-functional requirements describe how the system should work or behave, or as quality attributes for the system, and hence specify criteria that judge the operation of a system. (Friman, 2014, p. 13-15; Eriksson, 2012) Non-functional requirements set conditions and boundaries to the system, and due to their importance, these non-functional requirements may require overruling some functional requirements. Limitation is more like a special requirement. It can be part of a requirement or it can be presented as a unique requirement, or linked to some other requirements. Typically, limitations are finally and therefore any negotiation with their importance is not possible. (Friman, 2014, p. 14-15)

4.1 Methods

A software process is a process where different, required activities are set for a structure to attain new or modified software system. According to Sommerville (2015), all software processes involve following phases:

1. Specification, where the needs and expectations are gathered, discussed and defined
2. Design and implementation, where the organization of the system is defined and the system is implemented
3. Validation, where the system is checked that it does, what the users expected
4. Evolution, where the system is changed due to users changed needs

In this research the specification was done with the literature review, where an overview of what was currently published in empirical studies about electronic documentation and nursing care plan applications used in nursing education, what were the functional requirements for their usability especially in nursing simulation labs, and what were their appearances was obtained. The articles, which were chosen in the literature review, were analyzed with the content analysis. It is a heterogeneous set of techniques for interpretations of documents. It was applied to analyse and understand the contents, and reform categories. These categories were the building blocks for the application.

Software prototyping is a way of simulating the product and in addition allowing users and developers to evaluate the products usability. Based on the requirements, the paper prototype was developed. The paper prototype is a technique that consists of creating drawings, which can be made by hand or computer. These drawings of user interfaces enable them to be rapidly designed. (AAL, 2015; Mifsud, 2012) In validation meetings with participants from different user and professional point of views, the results of produced requirements were reviewed, evaluated and specified, and prototype´s usability was assessed. Based on the feedback, the final prototype was designed.

4.1.1 Literature review

The literature search focused on library databases, which were found in a subject area of nursing and wellbeing. The articles were selected based on the title or the text from the abstract or summary. The Finnish scientific databases, Finna and Medic includes references from Finnish medicine and nursing literature. The search terms "potilas" + "tieto" + "järjestelmä" (patient + data + system) with no time range or other limitations to narrow the search gave 253 hits. Any of those hits were useful because those were not discussing about educational electronic systems, only electronic documentation systems used in hospitals.

Afterwards, the search was limited to studies that met the following criteria: a) written in English, b) published over last ten years, c) included only nursing empirical studies,

d) published with full text, e) peer reviewed, and f) available in electronic version or via library. These criteria were the same at the end of the search process.

The search process with international electronic databases included PubMed, MEDLINE, EBSCO (Academic Search Elite) and ScienceDirect. PubMed is a comprehensive database, which includes references from medicine and nursing literature. MEDLINE is a bibliographic database of life sciences and biomedical information covering nursing and health care as well. Both PubMed and MEDLINE are known as reliable databases. Used combinations of search terms were "electronic documenting" AND "nursing", "nursing" AND "education" AND "document*" AND "electronic", and "electronic health record" AND "nursing" AND "education". Article was excluded if it was not linked to nursing education or it was not discussing issues concerned in this study. Therefore, only two articles were selected.

EBSCO has multi-disciplinary references and full text databases including Cinahl. Cinahl is a database, which includes references from health care and nursing literature. The search terms were "electronic documentation" and following combinations: "patient care plan" AND "electronic" AND "education", "electronic medical record" AND "nursing education", "documentation" AND "nursing education", "electronic health records" AND "nursing education" AND "simulation", "electronic documentation" AND "simulation". As a result, 11 articles that were selected discussed about electronic documentation systems and their usability whether among nursing students or nurses.

ScienceDirect is a database, which has scientific and medical research journals and e-books, which are grouped into four sections. The Health Sciences is one of those sections. The search was limited to previous criteria and with one added criteria, which was that the articles concern only nursing and health professionals. The search term combinations were "electronic documentation" AND "nursing education", "electronic medical record" AND "nursing education", "electronic medical record" AND "simulation", "electronic health record" AND "education", "care classification" AND "documentation". Only 10 articles were included based on their descriptions in the title,

summary or abstract. These articles were discussing documentation in nursing educa-
tion from different point of views, and were not duplicates for previous selected arti-
cles.

The search results, including the search terms and their combinations, databases, the
number of hits and, selected articles, are described in the Table 1. Articles, which were
screened, were 1570 in all.

Table 1. The table of the search results. It includes the search terms and their combinations, hits and selected articles.

Search terms	Database	Hits (number)	Considered (number)	Selected articles (author, year)
electronic documentation	SAMK's international databases	121	2	Student perceptions of electronic health record use in simulation (Jansen, D.A. 2014). Requirements for Prototyping and Educational Electronic Health Record: Experiences and Future Directions (Kushniruk, A., Borycki, E., Kuo, M-H., Parapini, E. Wang, S.L. & Ho, K. 2014)
patient care plan AND electronic AND education	EBSCO	76	3	Using an Educational Electronic Documentation System to Help Nursing Students Accurately Identify Patient Data (Pobocik, T., 2014) Teaching Electronic Charting with Simulation and Debriefing in Early Fundamentals (Manning, J.E. & Cornell, G. 2014) Testing a Nursing-Specific Model of Electronic Patient Record documentation with regard to information completeness, comprehensiveness and consistency (von Krogh, G., Nåden, D. & Aasland, O.G. 2012)
electronic medical record AND nursing education	EBSCO	129	1	Utilization of Academic Electronic Medical Records in Undergraduate Nursing Education (Gardner, C. & Jones, S. 2012)
documentation AND nursing education	EBSCO	40	5	Usability of Academic Electronic Medical Record Application for Nursing Students' Clinical Practicum (Choi, M., Lee, H.S. & Park, J.H. 2015) Development of the electronic health records for nursing education (EHRNE) software program (Kowitlawakul, Y., Wang, L. & Chan, S.W. (2013) Teaching Home Care Electronic Documentation Skills to Undergraduate Nursing Students (Nokes, K.M., Aponte, J., Nickitas, D.M., Mahon, P.Y., Rodgers, B.. Reyes, N., Chaya, J. & Dornbaum, M. 2012) Selection and implementation of a simulated electronic medical record (EMR) in a nursing skills lab (Curry, D.G. 2011) The electronic medical record and clinical nursing student instruction: tips and tricks for success (Schumacher, D. & Twardell, D 2010)
electronic health records AND nursing education AND simulation	EBSCO	291	1	Electronic documentation and the caring nurse-patient relationship (Spencer, J.A. & Lunsford, V. 2010)
electronic documentation AND simulation	EBSCO	41	1	Health Information Technology, Patient Safety, and Professional Nursing Care documentation in Acute Care Settings (Lavin, M.A., Harper, E. & Barr, N. 2015)
electronic medical record AND nursing education	ScienceDirect	28	3	Incorporating Electronic Documentation into Beginning Nursing Courses Facilitates Safe Nursing Practice (Bowling, A.M. 2016) What is the solution for clinical nurse educators and the electronic medical record? (Brooks, C.L. & Erickson, L.K. 2012) Partnering to Enhance the Nursing Curriculum: Electronic Medical Record accessibility (Lucas, L. 2010)
electronic medical record AND simulation	ScienceDirect	222	1	Evaluation of electronic nursing documentation – Nursing process model and standardized terminologies as keys to visible and transparent nursing (Häyrinen, K., Lammintakanen, J. & Saranto, K. 2010)
electronic health record AND education	ScienceDirect	14	2	Impact of simulation training on self-efficacy of outpatient health care providers to use electronic health records (Vuk, J., anders, M.E., Mercado, C.C., Kennedy, R.L., Casella J. & Steelman, S.C. 2015) The Role of Simulation and the Electronic Medical Record in Preparing the Next Generation of Nurses (Brown, S. & Waite, J. 2009)
care classification AND documentation	ScienceDirect	88	2	Congruency between educators' teaching beliefs and an electronic health record teaching strategy (Baníssa, W. & Rembusheski, V.F. 2014) Educating the nurses 2025; Technology trends of the next decade (Risling, T. 2017)
electronic documentation AND nursing education	ScienceDirect	25	2	Understanding the use of standardized nursing terminology and classification systems in published research: A case study using the International Classification for Nursing Practice (Strudwick, G. & Hardiker, N.R. 2016) Evaluation of the national nursing model and four nursing documentation systems in Finland – Lessons learned and directions for the future (Nykänen, P., Kaipio, J. & Kuusisto, A. 2012)

Twenty-three articles were read more carefully through. The articles´ contents were analyzed and evaluated from the viewpoint of the research questions. If those were not answering to any of these questions or were not adding new perspectives or confirming previous outcomes, article was excluded. As a result, the quality of 15 articles were assessed (n=15). The articles were categorised by the description of the methods into reviews, qualitative and quasi-experimental studies, and text and opinion papers. These categorised articles were evaluated with the Critical Appraisal tools (Joanna Briggs Institute, 2014). Descriptions of those articles´, including authors´ names, publication countries and years, the purposes and aims of the studies, data collection and analysis methods, and main findings, are introduced in the Appendix 1.

The evaluation of the articles deduced disapprovement of 2 articles and hence 13 articles (N=13) were analysed for the requirements. A summary of the evaluation of the articles, which were assessed with the Critical Appraisal Checklists, is presented in the Appendix 2. The summary includes authors´ names, the publication year of the article, the research method, the scale of the assessment process, and the result of the evaluation. The assessment scale was: an answer "yes" got 2 points, an answer "no" did not get any points and if the answer was unclear, it got one point. An example of the scale is 14/22, where the max points are 22 including 11 questions. The number of questions were depending on the research design. The whole process of the literature data selection is presented in the Figure 1.
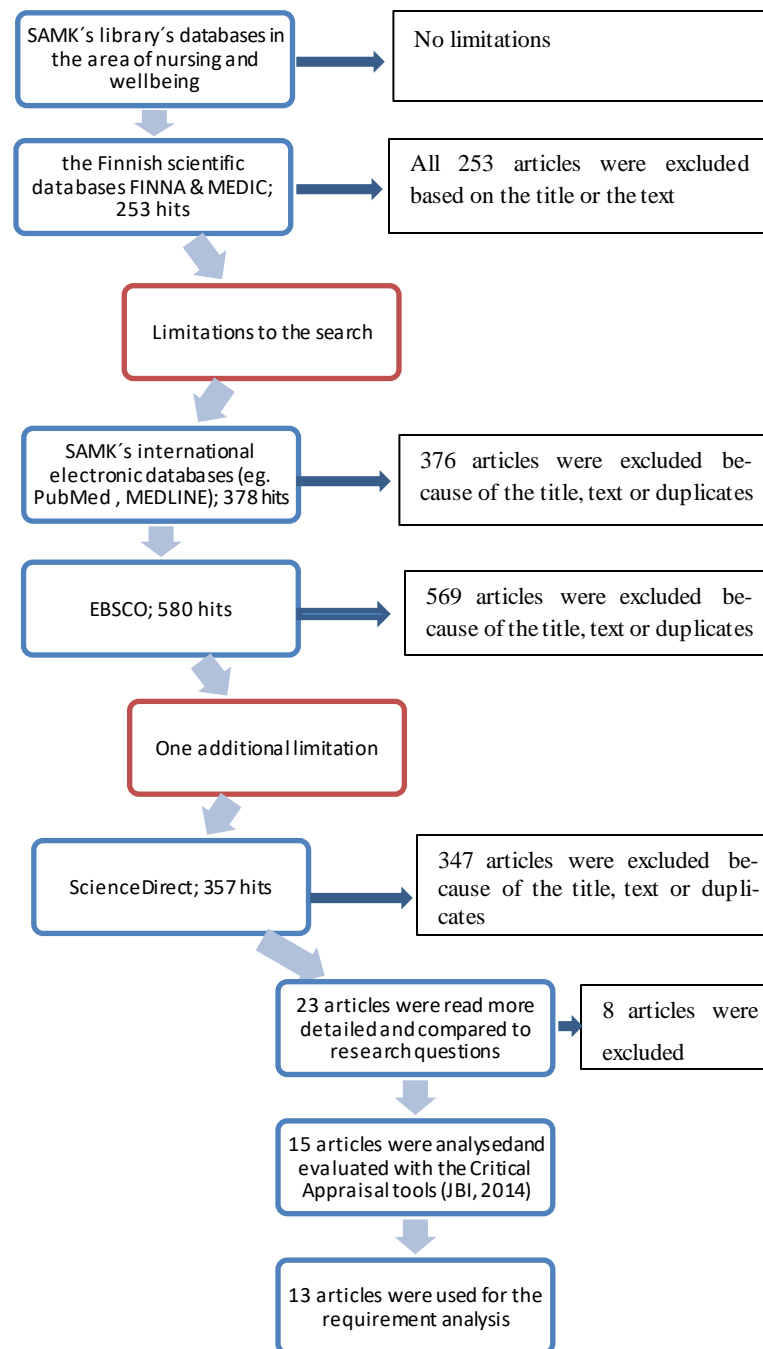
```
┌──────────────────────┐        ┌──────────────────────────┐
│ SAMK´s library´s     │───────▶│  No limitations          │
│ databases in the     │        │                          │
│ area of nursing and  │        └──────────────────────────┘
│ wellbeing            │
└──────────────────────┘
          │
          ▼
┌──────────────────────┐        ┌──────────────────────────┐
│ the Finnish scientific│──────▶│ All 253 articles were     │
│ databases FINNA &    │        │ excluded based on the     │
│ MEDIC; 253 hits      │        │ title or the text         │
└──────────────────────┘        └──────────────────────────┘
          │
          ▼
┌──────────────────────┐
│ Limitations to the   │
│ search               │
└──────────────────────┘
          │
          ▼
┌──────────────────────┐        ┌──────────────────────────┐
│ SAMK´s international │───────▶│ 376 articles were excluded│
│ electronic databases │        │ because of the title, text│
│ (eg. PubMed, MEDLINE);│       │ or duplicates             │
│ 378 hits             │        └──────────────────────────┘
└──────────────────────┘
          │
          ▼
┌──────────────────────┐        ┌──────────────────────────┐
│ EBSCO; 580 hits      │───────▶│ 569 articles were excluded│
│                      │        │ because of the title, text│
└──────────────────────┘        │ or duplicates             │
          │                     └──────────────────────────┘
          ▼
┌──────────────────────┐
│ One additional       │
│ limitation           │
└──────────────────────┘
          │
          ▼
┌──────────────────────┐        ┌──────────────────────────┐
│ ScienceDirect;       │───────▶│ 347 articles were excluded│
│ 357 hits             │        │ because of the title, text│
└──────────────────────┘        │ or duplicates             │
          │                     └──────────────────────────┘
          ▼
┌──────────────────────┐        ┌──────────────────────────┐
│ 23 articles were read│───────▶│ 8 articles were excluded  │
│ more detailed and    │        │                          │
│ compared to research │        └──────────────────────────┘
│ questions            │
└──────────────────────┘
          │
          ▼
┌──────────────────────┐
│ 15 articles were      │
│ analysed and evaluated│
│ with the Critical     │
│ Appraisal tools       │
│ (JBI, 2014)           │
└──────────────────────┘
          │
          ▼
┌──────────────────────┐
│ 13 articles were used │
│ for the requirement   │
│ analysis              │
└──────────────────────┘
```

Figure 1. The process of the literature data selection.

4.1.2 Software design requirements based on content analysis

There are several different software process models to adapt for software development, such as the Waterfall, Agile, and SCRUM. The models are presenting the process as an abstract way and all from particular perspective. (Garcia, 2016; Sommerville, 2015) Because in this study, the objective was to develop a requirement analysis for a nursing

care plan application for educational use and there was not any previous app to redesign, the general model of the design process was chosen as a starting point.

A general model of a software design process is structured from three parts: design inputs, design activities and design outputs. Design inputs are descriptions of requirements and information that are needed before further designing. It includes following information: data of the platform, specified requirements and data description. Design activities include information from architectural, interface and component design, which formulate the data for the database design. Architectural design explains the overall structure of the system, the main components, their relationships and distribution. Interface design defines the interfaces between the components of the software. Component design includes the design of every component and their ways of operating. Therefore, these three designs form the database design, which includes designing the structure of the system and how it is presented. Design outputs incorporates the architecture of the system, database, interface and components specifications. (Sommerville, 2015)

The literature review produced 13 articles answering to the research questions. The qualitative content analysis, which is presented here, consisted of systematic text analysis with inductive approach. The step model of this inductive category development is presented in the Figure 2. The process, not a theoretical base, guided the research questions. (Mayring, 2000)

Research question, Objekt

Determination of category definition (criterion of selection) and levens of abstraction for inductive categories

Step by step formulation of inductive categories out of the material, regarding category definition and level of abstraction
Subsumtion old categories or formulating new categories

Revision of categories after 10 – 50% of the material → **formative check of reliability**

Final working through the texts → **summative check of reliability**

Interpretation of results, ev. quantitative steps of analysis (e.g. frequencies)

Figure 2: Step model of inductive category development (Mayring, 2000)

The content analysis included that the articles were read several times and notes were made based on the research questions. These notes were collected and written down to post it -stickers. These stickers (121 stickers in all) were organized to three categories based by sub-questions of the research. The stickers were arranged by their meanings and interpretations to sub-classes, and these sub-classes were organised again to bigger headings, categories. An example how the content analysis proceeded, is presented in the Table 2.

Table 2. An example of the formulation process of the content analysis.

Original expression	Reduced expression	Sub-class	Main category	Connective factor
"a national agreed way of documenting nursing"	a national way of documenting in nursing	Finish Care Classification	Classification system	1. sub-question: What are the contents of a nursing care plan application in medical and surgical nursing in Finland?

Answers to the first sub-question produced four main categories: nursing process, classification system, patient information and nursing components. These categories were all functional requirements for the application design.

As an architectural design, the first sub-question´s categories and their components formed the overall structure of the system. Those were part of functional requirements for the software design. The structure of the software was based on the Finnish Model of Standardized Documentation, which included both nursing process and care classification, which in this case was the Finnish Care Classification (FinCC). Patient information included patient identification and history. Nursing process started from assessing the need for care, defining the need and setting goals for the care and in this phase, the Finnish Classification for Nursing Diagnosis (FiCND) was used. Process continued with planning and implementing the care and during these phases, the Finnish Classification of Nursing Interventions (FiCNI) was used. The evaluation of the care finalised the process and the Finnish Classification of Nursing Outcomes (FiCNO) was used. After the care is finalized, nursing summary can be written. The structure and terminology presented was compatible with the patient data system in the current nursing environments.

In the screen, the formulated parts had pull-down menu except the patient information and nursing summary. Patient information was a box where was possible to write down free text such as patient history. Only the identification and risk factors such as allergies were always in sight. Nursing summary was a page with free text. The pull-down menus contained components, categories and sub-categories derived from FinCC. Choosing certain component effected to the choice of category and those effects further to the choice of sub-category. Near these pull-down menus were empty boxes where to type freely additional text from patient´s problems/needs, interventions and assessment. Documenting the patient care plan requires continuing process, which means that usually interventions require diagnosing done before and evaluation requires that interventions have written before. According to Häyrinen et al. (2010) there could be possible to record the performed interventions before nursing diagnosis. Especially in an acute care setting, this is usually the order that happens in clinical situations. In the application, the order was not forced to proceed in a structural manner.

Answers to the second sub-question produced two main categories: documenting as a process (functional requirements) and technical issues (non-functional requirements). Documenting as a process was formulated from following contents: documenting environment, usability from faculty´s, instructors´ or users´ point of view, and additional documents. The application was designed for documentation in simulation laboratory but it was possible to use in other premises also. Documentation can happen in real-time during simulation scenarios. From faculty´s point of view the price was important, and due the application was developed in co-operation with the faculties of the same University of Applied Sciences, the costs could be reasonable both in the development, implementation and maintain phase. The application was easily modified and customized when it was ruled by the developed university. From instructors´ point of view, it was important that the features could be turned off until needed. Students in the first nursing skill course do not need features, which are performed in the professional courses later in the curriculum.

From users´ point of view, there were several important usability requirements. The application needed to be simple to use without unnecessary clicks, hence the structure needed to be clear, logic, organized and present essential aspects. It also needed to be easy to understand and navigate through. Remarks were expected to write quickly and both in Finnish and English because of international nursing curriculums. Documented nursing care plans and added forms are allowed to save a file under a different file name, because then those can be re-opened, and sent to students´ email accounts for further use. Documents can be recorded and printed. There can be added additional forms, scales or tables for documenting extra information of patient´s physical, mental or social needs and condition, or assessing provided care. These additional contents could be customized to fit the nursing course modules.

Non-functional requirements were including requirements that included information of devices, connections and their usability. The application should fit in within the technical environment of SAMK and stand on SAMKs server. The program needed to be web-based and wirelessly loaded from SAMK´s app store without any costs to students. The program was usable with computers, laptops and mobiles at the bedside in the simulation room or in other classes. Students and faculty could log in with the same campus logon that they use in other occasions, because any real-time information with

actual patients´ data is not used, and therefore legislations and rules of patients´ privacy and confidentiality are not threaten. Information from the sensors of human-patient simulator (RFID-tags in patient bracelet) and monitors could be transferred automatically (no browser) in the future. The staff from technology faculty will update the application.

Descriptions to the third sub-question were examples of the overall structure of the system, the components and their relationship. These are presented with pictures. Nykänen et al. (2012) introduced an example interface for a nursing documentation system, which had a place for patient´s identification, additional information from the patient and notes. There was also place for date and nurse´s identification. Patient´s history and nursing summary were missing from this version. The structure was based on nursing process and FinCC. Planning, interventions, and evaluations were both planned to include drop-down menus and place for free-text. An example scenario from this version is presented in the Figure 3.

Figure 3. An example scenario from a nursing documentation system by Nykänen, Kaipio & Kuusisto (2012).

Nokes et al. (2012) presented a screen shot (Figure 4) from their developed tool to teach home care electronic documentation skills to undergraduate nursing students in USA. The structure was based on the OASIS, which includes the core items of an

assessment for a home care patient. It can be used for clinical assessment and care planning but the actual nursing process with the four phases is not clearly notified. The scene from the visit was formulated from patient´s identification and history data (diagnosis, medications, prognosis, activities, allergies, functional limitations, mental status, nutritional requirements, safety measures, supplies, discharge plan), which was more from medicine viewpoint than nursing, and data from the visit´s frequency and duration. Goals for the care and documentation of the visit was presented in other screen, as well as conclusions. Documentation was done to word-version and there was not used any drop-down menus.
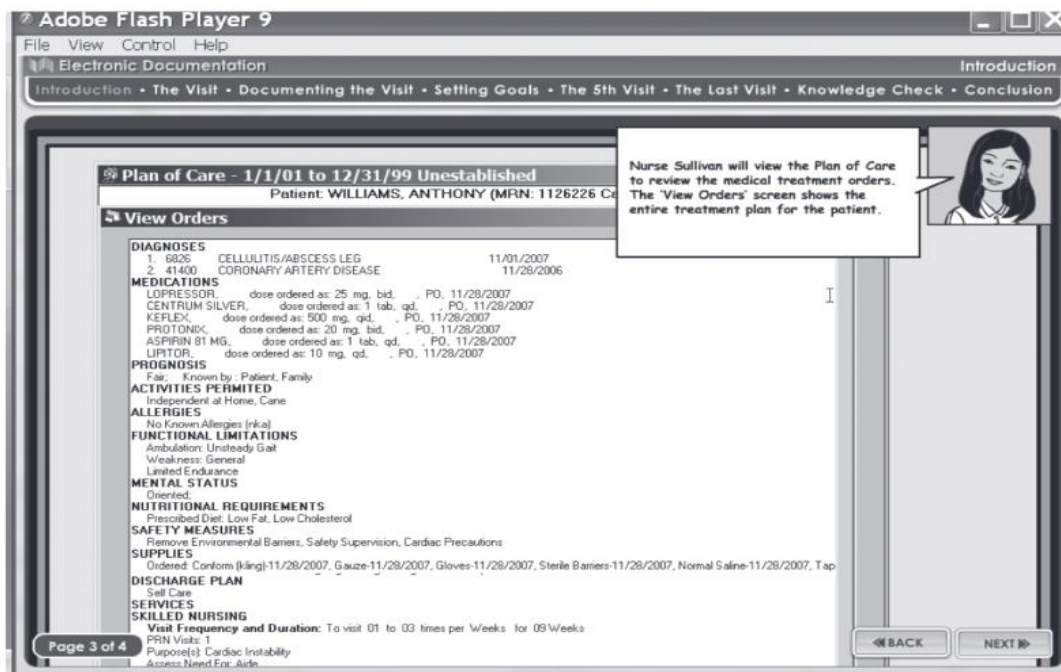
Figure 4. A screen shot from a home care electronic documentation application for undergraduate nursing students by Nokes et al. (2012).

Electronic Health Record for Nursing Education (EHRNE) was the first software program, which was developed for use in nursing education in Singapore (Kowitlawakul et al, 2013). The program was built in seven main tabs: admission, nursing assessment, measurements, downloadable forms, vascular access, nursing notes and case studies (Figure 5).

Figure 5. The screen in EHRNE were the seven main tabs are presented in the upper part of the page (Kowitlawakul, Wang & Chan, 2013).

Admission history included the data from the patient (Figure 6). There were documented demographical data, the reason for the patient to seek care, patient´s care and family history, and psychosocial condition. In EHRNE the patient is seen as a person with physical, mental and social aspects. Nursing assessment was based on a head-to-toe assessment (neurological, respiratory, cardiovascular, gastrointestinal, urinary, reproductive, musculoskeletal, skin and incision, head and neck, eyes and ears), and psychosocial assessment. All these different parts of assessment had their own screen. Measurements included vital signs, pain assessment, body measurements, intakes and outputs, and glucose monitoring. These several parts were documented in additional forms, as were the other downloadable forms such as medication list also. EHRNE had different patient cases. Patient´s background data had an identification data and a description of the patient and his/hers condition with measurement results (Figure 7). Nursing process was quite unclear and care classification was lacking. However, the structure was logic, clear and easily used because of separated forms and blocks.

Figure 6. An example of admission history part of the EHRNE (Kowitlawakul, Wang & Chan, 2013).

Figure 7. An example of a case study screen in the EHRNE, where is described the patient´s X-ray results (Kowitlawakul, Wang & Chan, 2013).

Mannino and Cornell (2014) introduced a documentation software developed by Feeg, Saba and Feeg (2008), which Mannino and Cornell incorporated into nursing simulation lab in nursing fundamentals course. The software called PC-CCC was designed according to nursing process and a Clinical Care Classification (CCC). It was an evidenced based documentation system available via free download from the internet, and it had an automated, drop-down menu approach to documenting nursing care plan.

An example of the main user interface from the PC-CCC (Figure 8) demonstrates the structure of the application and its use. It had blocks for patient´s identification, additional information from the patient, and visit date. Additional data from patient´s history and nursing summary were missing. Care category and component, diagnosis, sub-diagnosis, intervention and sub-intervention were all made with drop-down menus. There were also place for free-text. Types of nursing action were divided into four alternatives: assess (A), care (C), teach (T) and manage (M).

Figure 8. An example of the main user interface screen from the patient care classification system (PC-CCC) by Mannino and Cornell (2014).

Pelander (2013) introduced Nurseus, a software system for documentation nursing care in nursing education in Tampere University of Applied Sciences (TAMK) in Finland. The structure was based on nursing process and FinCC. There was a block for nurse´s identification and date. Second block included patient´s identification, the reason for patient to come to care, health habits and behaviour, physical measurements, previous illnesses, medication, and risk factors concerning patient´s health. Nursing summary was missing from this version. Planning, interventions, and evaluations were written to drop-down menus and free-text blocks, which were able to read from the same print screen without a need to print. Multiple problems could have documented

to the same page. The problems of the patient and the goals for the care needed to document before interventions could be added. An example screen from this version is presented in the Figure 9.

Figure 9. An example from the screen shot in Nurseus by Pelander (2013).

Additional remarks for the appearance of the application were that it should be uniform in the way it looks with the current electronic health records (Nykänen et al, 2012; Kushniruk, et al., 2014) and it should be supported with free-text data (Mannino & Cornell, 2014). Additionally, the computer screen should be easily read without any interpretation possibility or intuition (Jansen, 2014), and the screen should be broken down into different blocks or menus (Kowitlawakul et al, 2013).

4.1.3 Paper prototyping

A throwaway prototyping is one of the variants of a software prototyping. It is a useful model when the requirements for the prototype are not clear, the technology is unfamiliar, the development of a prototype is needed to finalize quite quickly, and the product can be visible at early face. (Garcia, 2016; Sommerville, 2015) The throwaway

prototyping model by Sommerville (2000) is illustrated in the Figure 10 with the Sommerville´s (2000) software process phases (specification, design and implementation, validation and evolution) applied with the used study methods.
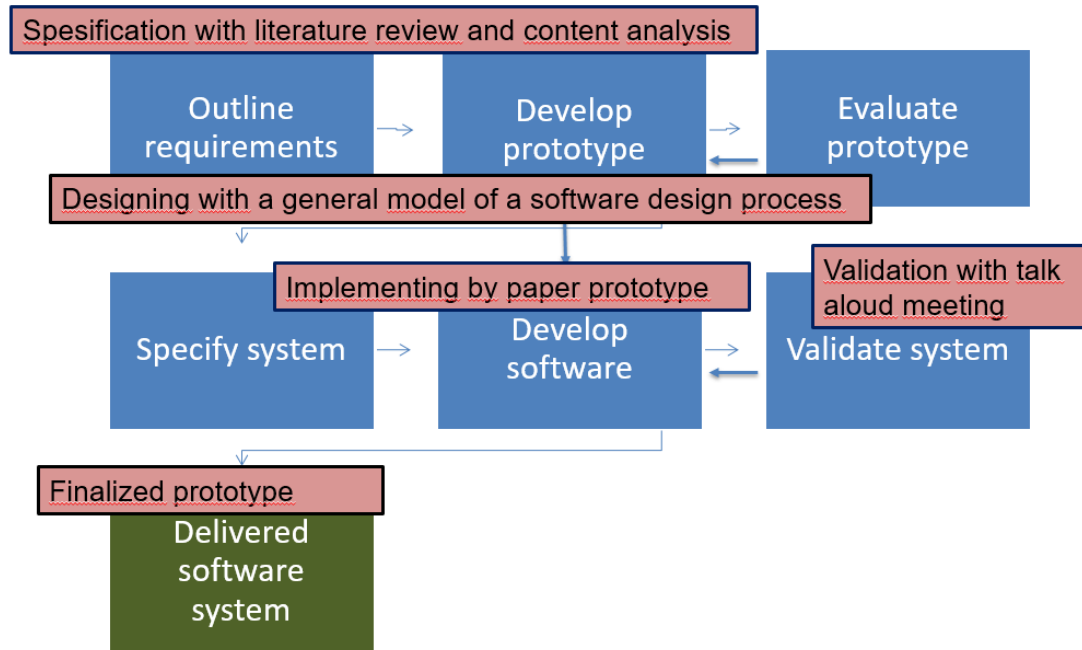

Figure 10. A throwaway prototyping model and software process phases by Sommerville (2000) applied with the used study methods.

The developed paper prototype was based on the Finnish Model of Standardized Documentation. Nursing process was an overall structure, which was conceived from the block left side of the screen (Table 3). In the upper part of the screen were patient identification data, the date and time, and the risk factors, which were in sight in every phase of the process. Patient history was including physical, mental and social information from the patient and were formulated from 18 separated blocks. These features came into sight when scrolling the screen.

Table 3. The patient information screen from the paper prototype of the nursing care plan application.

The Finnish Care Classification (FinCC) came into sight in the next screen, Planning (Table 4). Patient ID, name, date and risk factors were in the upper part of the screen. In the planning phase, the Finnish Classification for Nursing Diagnosis (FiCND) was used as a guide for writing a patient care plan. The Component, Main category and Sub-category were all pull-down menus. When the component was chosen, main categories of that component came into sight, and after the main category was chosen, sub-categories came into sight. Below those blocks were two places for free-text. The other was meant for assessing the patient´s condition and defining the need for care. The other was meant for defining goals for nursing care and planning for interventions. Free-text could be written before any component was chosen. Below the place for assessment was a pull-down menu for additional measurement forms, scales and tables. These attachments were customized to nursing modules and were released by the course instructors. In medical and surgical nursing course, the contents were formulated from following documents: table for vital signs assessment, pain assessment, medication administration, intravenous insertion and nutritional assessment, elimination assessment, wound care, and patient counselling.

Table 4. The Planning -screen from the paper prototype of the nursing care plan application.

The next screen (Table 5), Nursing interventions was based on the Finnish Classification of Nursing Intervention (FiCNI). Therefore, component, main categories and sub-categories were different. In addition, the headings above the free-text places were different, but otherwise the structure in this screen was the same than before.

Table 5. The Nursing interventions -screen from the paper prototype of the nursing care plan application.

The Evaluation-screen was based on the Finnish Classification of Nursing Outcomes (FiCNO) (Table 6). There were not any component or category blocks, on the other hand there was a pull-down menu of the outcome of the care. Below the menu was a

place for free-text, where the patient´s condition, the implemented care and the goals for the care could be assessed.

Table 6. The Evaluation -screen from the paper prototype of the nursing care plan application.

The last screen in this nursing care plan application was the Nursing summary (Table 7). Like in previous screens, patient´s identification, date and risk factors are in the upper part of this screen. Due to missing classification, there was only a place for free-text, where the summary of the nursing care could be written.

Table 7. The Nursing summary -screen from the paper prototype of the nursing care plan application.

4.1.4 Validation

Validation is the phase in a software process where the system produced is checked how the expectations are answered. There are several ways of validation, and one way is to organize meetings or events, where participants who have produced the requirements, could discuss and test the developed prototype. (Friman, 2014, p. 24-27)

In this study, the validation was done with the paper prototype of the nursing care plan application, in four separate validation meetings. The four validation groups were: 1) nursing students, 2) nursing teachers, who teach in the simulation lab, 3) technology personnel, and 4) nurse, who applies electronic nursing documentation application in her work. Nursing students have all started their nursing studies in autumn 2015. One of them was previously a practical nurse and has several years of working experience in different nursing fields. Two of them have graduated from high school. The other one spent three months in Switzerland as an exchange student in spring semester 2017. He worked there in two placements in different hospitals. All of them have studied almost all clinical studies already and had several different ways of documenting experiences both in their theoretical and practical studies.

Five nursing teachers, who participated the validation, teach in the simulation lab and develops simulation teaching in SAMK. They are responsible for different courses: mental health and substance abuse nursing; medical and surgical nursing; child and adolescent nursing and family nursing; and gerontological and district nursing. They all have worked several years in different hospitals and health care sectors in Finland. They also guide nursing students during their clinical practices and therefore know the current documentation system.

Technology personnel in this research were persons who are working in a field of ICT in SAMK whether their position is not in the ICT-faculty. The group was formulated from a researcher from SAMK´s faculty of Energy and Construction, who have participated actively to development process and produced suggestions to prototype earlier. The other person is a lecture from the faculty of Health and Welfare, where he is responsible from teaching basic IT skills to students and guiding digital services to teachers.

Nurse, who participated the validation, is a medical-surgical nurse and have the Master of Nursing Science degree. She works as a service designer in a municipality´s basic service. Her job description includes among other thing that she is the municipality´s main user of the electronic patient record system, the project manager of an electronic shift planning system, and in charge of patient care documenting.

Paper prototype with talk aloud method was employed in these meetings. Test persons navigated through the simulated papers to detect usability problems and challenges. They were guided to take account following criteria from Systems and software engineering (ISO/IEC 25010, 2011): functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability and portability. The author had a framework for talk aloud discussions (Appendix 3). It was based on the requirements and categories produced earlier. Participants described their actions, and gave suggestions and ideas for the prototype improvements. (AAL, 2015) The author observed participants, asked questions based on the framework, and wrote down notes from their questions, answers, comments and ideas. Based on these improvements the prototype was finalized.

4.2 Results

The final version of the nursing care plan application prototype and the appearance of it and explanations of the changes are explained in this chapter. The screens of the paper prototype are presented as pictures in the Appendix 4.

The nursing care plan application was planned to fit in within the technical environment of SAMK and stand on SAMK´s server. It was designed as a web browser version, which could be wirelessly loaded from SAMK´s pages. The application was designed to be usable with computers and mobiles at the bedside in the simulation room, or in other classes as well. The identification occurs when the user log in with the SAMK´s username and password. When student graduates, the username expires automatically. The application was planned to have several layers: a) the simplest for the students, who could only read and write to the pages, which the instructors allowed, b) the second layer, where the instructors could read, write, plan, and adapt the contents

of the pages, and c) the layer for updating the system. The staff from technology faculty (probably a trainee) take care of updating the application when needed, and run down the data once a year, at the end of the academic year.

The first screen of the application was changed as a title page, because the title was missing from the previous version and without it, the user does not know what the application is. In this page, the user is able to choose the language (Finnish or English) and log in as a SAMK user. The username influences the layer of the user.

After the user is logged in, the next page opens, where the user is able to choose the subject of the simulation. There are seven alternatives of the simulations, which are the professional studies from the current nursing curriculum in SAMK, and presented in the order of their appearance in the curriculum´s road map. Clicking the name of the simulation decides the contents of following pages, and leads automatically to the next screen. In the following pages, the choice is Medical Nursing Simulation, and the contents are the same in Surgical Nursing Simulation. In the right corner of the screen is a button, Log out, where the user is able to log out, if necessary and this button is fount from the same place in every screen after this.

In the third screen, the nursing process as a structure of this application comes up in the left side of the screen. This structure is seen in all screens after this. It stayed the same from the previous version. In this third screen, the user is able to choose the patient of the case. There are two options: new and search. If the user wants to write down data from a new patient, she clicks the button, New, and the Patient Information -screen opens. If the user clicks the Search -button, next page, Search for the Patient opens.

With the Search for the Patient -screen the user discover a patient, which has been taken care previously and the care is documented with the application. The search can be done by the patient ID or name, or by the date. These three alternatives are written under each other, and the choice is made by clicking the spot in front of the phrase. The search term is then written to the empty box and the Search -button is clicked. If

the choice is wanted to change, the button Clear deletes the box. Patient´s search directs straight to the next page, Patient Information -screen and the identification data is written automatically to it.

Because the page, Patient Information is open, the heading is written in read. This same procedure is working with the other pages here after. In the upper part of the Patient information -screen are patient´s identification data. No changes were done to previous version. If the patient involved is a new patient, the user is able to write down the identification data by clicking the box with the tabulator. These information texts from the upper part of the screen are in sight in every screen here after.

In the middle of the screen, is an interview form, which parts are depended on the subject of the simulation. Some changes were made to these parts because of the current documentation advices and suggestions presented by validation participants. The reason for treatment was a question in the form and was moved to the Planning screen because it belongs to a planning phase of the care plan. Gender, language, height and weight, religion and others were added to the list. Functional ability and assistive devices were unified as one. Housing was removed because it was understood as one part of the social services, and therefore not needed. After every question, the user is able to write down free-text to the block. The number of the blocks are informed. The question marks after every question are information sources. By clicking the mark, the user can find additional information from the subject in question.

In the left side of the bottom of the screen is seen the name of the user, who has logged in, and the time. These are in sight in every screen here after. At the bottom of the screen are also five buttons. The Clear and Log out buttons were explained earlier. Adapt-button makes it possible to re-open the form, Save-button records the text to be re-opened later, and with the Print-button, the written text is possible to print out.

After the patient information is written and saved, the user opens the next screen, Planning. The other structure of this application, FinCC, comes up in this page. Any changes of the contents were not made. The appearance of this screen was changed after the feedback. Below the data from the patient is a block, where the user is able to write freely the reason for nursing care (previously this was named as the reason for

treatment and located in the interview form) and assessment of the patient. Below this is a new block, Doctor´s orders. During simulations, nursing students sometimes need to call to the doctor (presented by the teacher or the person controlling the simulation mannequin) and ask orders for further care, such as laboratory or X-ray tests, or medication orders. These orders can be written here.

Below doctor´s orders are the component, main category and sub-category blocks based on the FiCND structure, which were the same as in the previous version. When the user has chosen a component and categories, and saved those, these come into sight in the block below, called Goals for nursing care and planned interventions. Clicking the Adapt-button enables the user to write additional text, such as a goal for the care or planned interventions below the component and categories. If the user wants to add another component and categories, clicking the Add-button makes it possible. In case, there is written something that is wanted to be removed, an X-mark after the sentence enables it.

A block called Additional measurements for assessment is removed from the final version. It was meant to include additional forms, which could be used when assessed the patient. There are immeasurable number of forms, which were thought to add to this application. These forms need to be fount and assessed first, which is a large workload. Therefore, those were decided to exclude for now.

After planning the care, the user continues to the next screen, Nursing Interventions, where the plan is implemented. Now the structure of the components and categories are based on FiCNI, which was the same in the previous version. When the user has clicked component and categories, and saved those choices, these come into sight in Implementation of the planned interventions -block below and in the next screen: Evaluation of the care -block as well. Adapt-button enables the user write additional text to the same block and Add-button to add a new component.

Two blocks were removed from Nursing Interventions-screen: Evaluation of the planned interventions and Additional measurements for assessment. Evaluation of the planned interventions was taken off because the feedback of it was, that having two different places for evaluation will make it disordered and confusing. Therefore, the

evaluation of the care is now only in the next screen, Evaluation. This Evaluation-screen stayed exactly as in previous version. The structure of the outcomes assessment is based on FiCNO, which was familiar already from the previous version.

The last screen in the application is Nursing Summary. When the user has saved the reason for care, patient´s assessment, goals for the care, implemented interventions, the outcomes and evaluations of the care with all chosen components and categories, these will come into sight in this screen. Students may add here information of the care, and suggestions or instructions for the future. Finally, the user saves the documentation and log out.

5 DISCUSSION

5.1 Educational discussion

Nursing students learn nursing in theoretical and clinical studies where practical and theoretical knowledge interact with each other (Havukainen, 2003). Learning documentation is included in both. Students began their documentation learning process already in the first semester with documentation principles, ethical guidelines and basic structures. In the following semesters, they learn more documentation applying it in professional studies. Applying is realized in clinical periods and in simulation labs. The produced application may assist students learning in every professional course during their studies because its contents are changing over courses. At the first nursing skills and interventions courses, the content is very basic including only nursing process, care classification and patient information. When students are progressing in their studies, nursing content is expanding also.

As Spencer and Lunsford (2010) and Choi et al. (2015) stated, students learn to document when they are caring real patients. Whether students documented in real nursing environments or in simulation, documentation with EMR system improved their documentation skills (Lucas, 2010; Kowitlawakul et al, 2013; Jansen, 2014; Mannino &

Cornell, 2014; Bowling, 2016). Therefore, developed prototype of a nursing care plan application was presumed to assist their documentation learning.

Because there is a lack of educational nursing care plan application in simulations (Curry, 2011; Kowitlawakul, et al, 2013; Mannino and Cornell, 2014), the prototype of a nursing care plan application was produced as an answer for it. The prototype was implemented throughout SAMK´s nursing curriculum and designed as using in both simulation and other classrooms as well, which was recommend by Gardner and Jones (2012). It was based on functional and non-functional requirements, which were because of the content analysis. The content analysis was based on 13 assessed articles. The number of articles was sufficient and the quality of these articles was good (Appendix 2).

As in SEED (Lucas, 2010) or EEDS (Pobocik, 2015), in the designed prototype the use of nursing process and care classification were meant to give realistic understanding of documenting in nursing and creating a nursing care plan. Despite of the recommendation of Nykänen et al. (2012), FinCC as the only classification system used in Finland was included as a framework to this nursing care plan application.

5.2 Ethical aspects

The Finnish Advisory Board has drawn up ethical guidelines for good scientific practice and procedures in science and these Guidelines for Responsible Conduct of Research in Finland were updated 2012 (Academy of Finland 2016). These guidelines are not to harm participants, apply informed consent, and respect everyone's privacy and not to deceive. Because any empirical research was not done, there were not any participants and therefore an informed consent did not need to apply. The only guideline to commit from these was not to deceive.

SAMK is one of four universities in Satakunta region, which have formulated common ethical committee for human research purpose together in 2010. This committee gives ethical research statements for applicants and publishes these if the researcher allows

that. Each individual researcher is responsible of good scientific practice but this responsible is shared by the management of the organisation. Because the research was concerning SAMK, there needed to be the research permission before any planned period of research implementation was made. SAMK´s Quality Manager gave the permission to this research. The signed research permission is presented in Appendix 5.

5.3 Validity and reliability of the study

When the process, methods and data are appropriate for the research, then the qualitative research is valid. This includes that the research question is adequate, methods are appropriate, design is valid, the analysis processes are adequate, and the results and conclusions are appropriate. Reliability in quantitative research is about exact replicability of the research processes and its results. In qualitative research, this is not acceptable because of its nature. Therefore, the essence of reliability lies with consistency (Shuttleworth, 2008; Leung, 2015) According to Noble and Smith (2015) in qualitative research there are no universally accepted criteria used to evaluate the research. However, for the research´s credibility and importance, it is significant that the researcher applies methodological strategies during research design and implementation. With these strategies, the researcher answers for the trustworthiness of the study. Utilizing the strategies presented by Noble and Smith (2015), the research process is evaluated.

Bias is a tendency to favor something or someone, when the facts are presented in a way that supports only one way. A researcher must take account the possibility of biases and their influence to the findings. In the literature review, the author was the person, who decided the search terms, made the retrievals, assessed the hits and decided the exclusions of the articles and researches. Chosen databases and search terms may have resulted in missing some relevant literature, but carefully considered criteria for the search, large number of articles, saturation of contents, and the use of JBI´s Critical Appraisal Checklist when assessing the articles confirm the results of review. In addition, the fact, that all the chosen articles were answering to the research questions was an indication of good quality.

The software design process was based on content analysis, which was done by the author. Any other person did not evaluate the categories produced, but the meanings and contents were assessed in validation meetings with students, teachers, technology personnel and a nurse. These participants were professionals from their own point of view with diverse experiences, and gave a wider viewpoint for development process. The expressed improvements were made after. Validation with four meeting groups was based on voluntariness, not in any kind of bonus even though refreshments were offered during the meetings. Invitations to participate the meetings were send by email and spoken aloud.

Meticulous records of analyzed articles, their printed checklists and summary tables, content analysis with post-it stickers and photographs of the categories, pictures of paper prototypes and notes from validation meetings were kept for quality assurance and potential control of readers. The meaning of these records was to ensure the quality of the protocol and author´s interpretations.

6 CONCLUSIONS

Documentation in nursing education is discussed quite extent and the number of electronic documentation researches is increased, whereas few studies on educational nursing care plan applications and especially their use in simulation labs exist. It is indicated that the use of electronic documentation is rapidly increasing in nursing and nurses are obligated to master the programs and systems. Therefore, nursing students´ education should include learning in electronic documentation and guarantee their competence in employing nursing care plan applications. The need for this study was therefore unquestionable.

The aim of this study was achieved with the requirement analysis for a nursing care plan application and with a prototype of that application, which was designed based on produced requirements. The prototype of the application was not directed only to medical and surgical nursing courses, whereas to all professional nursing courses. Both the main research question and three sub questions were answered.

The literature review was not necessarily comprehensive, but adequate and high quality enough for the content analysis, which was verified using the Critical Appraisal Checklist of Joanna Briggs Institute (2014). Requirements, which were drawn up from the literature, were confirmed and defined in the validation process. The prototype of the nursing care plan application and its functions was described both in verbal and illustrated presentation. Its functional suitability is justified but not tested. However, the prototype enables encoding and further technological development.

The validation as a software process measured up the author´s expectations. Four meeting groups were comprised of all-round, enthusiastic developers, who voluntarily participated and gave their knowledge and skills from different perspective to the author's usage. Even participants were observing the prototype from different point of views, their questions and suggestions were quite alike. This reflects that the used data is saturated. Therefore, the requirements and the prototype could be assessed appropriate and functional.

The prototype reflects nursing curriculum and education in Finland and after encoding and testing, it is therefore usable in all Universities of Applied Sciences in Finland. The FinCC as another structure of this application outlines its use in Finland. Nevertheless, the nursing process is an international concept in nursing, and the change of the care classification is rather undemanding.

7 SUGGESTIONS FOR FURTHER DEVELOPMENT

The discussions in validation process and author´s observations indicate that several additions will be made after the prototype is encoded, tested and evaluated of the software product functional suitability. The need for the usage of this application is urgent and therefore the encoding process should begin immediately.

The prototype is now only in English, but after it is encoded, the Finnish version needs to be designed according Finish terminology and added to the application. The additional measurement forms for patient´s assessment, which were omitted from the final prototype version, will be added as long as the current prototype is first been tested. The amount of forms was so substantial hence, augmentation is reasonable to do not until to final version.

Login could be done with student or identity card or with bar code. Bar codes could also be used when loading patient´s information data from patient´s bracelet. This was planned to include to this prototype version already, but with recommendation of the technology personnel, it was excluded for now. The same decision was made with transferring the data from mannequin´s monitors in simulation. These additions will be taken into consideration later as well as other possible improvements that will be come up.

After the nursing care plan application is tested and necessary improvements have been made, it is ready for national assessment and possible dissemination. Because there is not a universal, educational electronic documentation application in use in Finland, experiences of implementing it to other Universities of Applied Sciences are important and valuable. Critical empirical experiences and research help to develop it further. Moreover, the national usage gives evidence of its usefulness and necessity for nursing education, which are high-quality foundations for international co-operation in nursing education field.

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Appendices

Appendix 1. The description of the literature material.

Descriptions of these 15 articles include authors´names, publication countries and years, the purposes and aims of the studies, data collection and analysis methods, and main findings.

Author(s), country and year	The purpose and the aim of the research	Data collection and analysing method	Main findings
Spencer & Lunsford, The United States, 2010.	The purpose of this literature review is to describe technology and simulation used in nursing education, and explains simulation as a means to incorporate electronic documentation into educational care relationship.	How the literature review is done is not explained in the article.	Students learn documentation skills when they are taking care of patients. Electronic documentation effects the time spent with patients. Simulation lab is the best place to train documentation. The use of electronic documentation in the simulation is studied rearly. Only few nursing faculties have incorporated electronic documentation into simulation scenarios (SEEDS and COMPASS).
Häyrinen, Lammintakanen & Saranto, Finland, 2010.	The purpose was to describe and evaluate whether nurses have documented the nursing care plan according national nursing documentation model and nursing process in electronic health records in neurologic and surgical wards.	The data consist of the electronic nursing care plans of neurological patients (n=67) and surgical patients (n=422) from a central hospital in 2003-2006. The data were anaysed using statistical methods and content analysis.	The national standardized electronic documentation model is based on nursing process and suitable for the documentation of patient care, although the use varies across patients. The lack of needs assessment, nursing diagnosis, care aims and nursing interventions planned indicates the need for further training. Also the use of standardized terminology needs further training.
Lucas, The United States, 2010.	The aim was to integrate EMR system into undergraduate nursing curriculum, thus providing hands-on practice with an EMR system and the use of bar code scanning device on the clinical unit.	One clinical group of senior nursing students who practiced with simulation labs. After several experiences students answered in open-ended questionnaire. The analysis method was not mentioned in the article.	Students responsed that the realism of the training with EMR and simulation lab improved their learning and helped them to concentrate more to patients. Also the staff noticed the students improved skills with documentation and their decreased need of time and support to document.
Curry, The United States, 2010-2011.	The purpose of the project was to bring electronic documentation into nursing skills lab including both software for documentation and wireless internet access as well as 11 bedside computers for documentation practice. Another purpose was to use real-time documentation during simulation scenarios, and which were alike more to EMRs used in hospitals. The aim was that the product(s) will be functional, flexible and cheap.	Software developing project Senior and junior nursing students have used the implemented software in simulation scenarios. Research of students experiences is started.	The software fit well into simulation scenarios but some resistance have been occured. Actual patient documentation is done too little whether on paper or computer.

von Krogh, Nåden & Aasland, Norway, 2012.	The purpose was to present the testing of the quality assurance, problem solving and caring (KPO) documentation model in electronic patient record with regard to completeness, consistency and comprehensiveness of nursing information.	Data was gathered with nursing documentations from five psychiatric wards which were selected by the management. The pre-test was before implementing the model, the first post-test was just after the implemention period and the second post-test was one year afterwards. Nursing documentations included all inpatients material during four-week period (n=177 redords). Data was analysed with content analysis and the data from pre- and post-test 2 were subjected with statistical analysis.	A documentation framework can influence the quality of nursing information. Terminology in nursing documentation is used but less than expected. The information in test 2 was more complete, comprehensive and consistent than in pre-test.
Nokes, Aponte, Nickitas, Mahon, Rodgers, Reyes, Chaya & Dornbaum, The United States, 2012.	The article is describing the collaborative developing project of a home care EHRS teaching tool for undergraduate nursing students integrated into community health nursing content. The aim was that nursing students would comprehend the importance of the documentation system (OASIS), apply interaction skills and demonstrate their beginning skills in home care documentation with electronic health record system.	A simulated EHRS home care documentation module which was based on OASIS components and lasted 50-minutes was developed. After every screen students completed it before answering 12-item post-test. The test was repeatable. During the first semester, 200 nursing students completed the module.	Nursing students understood the importance of a home care documen-tation and their documentation skills were improved.
Nykänen, Kaipio & Kuusisto, Finland, 2012.	The aims were to evaluate the feasibi-lity of the national nursing model in nursing practice in Finland, to evaluate the usability of the national documen-tation systems in four electronic health record systems in Finland, and to evaluate the usefulness of the nursing model and the national documentation system in multiprofessional co-opera-tion.	The evaluation study was made with seven health care organizations. Data was gathered with qualitative usabili-ty study methods (scenario walk-throug, contextual inquiries, thematic inter-views, expert reviews) from 20 (n=20) nurses.	The nursing process model is usable in nursing practice but the national model FinCC is too detailed, multi-layered and difficult to use. Therefore both need improvements.
Kowitlawakul, Wang & Wai-Chi Chan, Singapore, 2013.	The purpose of the development process is to enhance nursing students´ electronic documentation skills with EHRNE in a simulation lab. (EHRNE = electronic health records for nursing education, a softwear program)	A qualitative research of students´ experiences using EHRNE was done with two focus group interviews. Nine (n=9) students were separated into two groups. In the first part of the study students used EHRNE, and in the second part participants had group discussion. Data was analysed with Colaizzi guide-line.	EHRNE has advantages and limitations. Four categories were identified: functionality, data management, timing and complexity, and accessibility. Focus group interview is a good way to improve the program from the students´point of view.
Jansen, The United States, 2014.	The purpose was to ascertain under-graduate nursing students´ perceptions of the importance of an EHR system and simulation, and their evaluations of an certain simulation/EHR system.	A survey included 10 closed-ended items, which were Likert-scale rated, and 10 open-ended questions. 16 nursing students participated the survey. Closed-ended questions were analyse statistically, and open-ended questions with content analysis.	The majority of the students fount the S/EHR realistic, easy to work with, and increased their documentation skills. The majority also felt that using some type of EHR system is important for students to train with.

Mannino & Cornell, The Unites States, 2014.	The purpose is to teach electronic documentation with PC-CCC (certain softwear program) in simulation lab to nursing students.	In this development project 77 nursing students document patient care to PC-CCC during simulation scenario. In the debriefing process these records offered a framework to discussion. Evaluations of the PC-CCC were carried out using a survey with 13-items. All participants answered to the survey. Analysing methods are not described.	Students were satisfied with the PC-CCC. Also the faculty admits that the program enhances students´ experiences in documenting and expecially in simulation, and improves their learning.
Pobocik, The United States, 2014.	The aim of the study is to review how an educational electronic documenta-tion system (EEDS) helps nursing students to become familiar with the EDS used in health care.	A quasi-experimental pre-test/post-test design was used. Both in the intervention and control group had both tests, using two different cases, which were analysed statistically. The intervention was a case study in an EEDS. The sample group included 37 senior nursing students (the intervention group included 19 participants and control group 18 participants) and they were enrolled in the medical surgical course.	This study supports the use of an EEDS in nursing education and it helps the students to use and refine electro-nic documentation skills, identify patient data and develop their higher level of thinking.
Kushniruk, Borycki, Kuo, Parapini, Wang & Ho, Canada and Taiwan, 2014.	The purpose of the article is to describe a development of requirements for an educational EHR system and creation of a prototype based on the requirement analysis.	A development project, not a research	Requirements for the funtional and technical point of view are introduced (15 requirements) as well as the prototype.
Choi, Lee & Park, Korea, 2015.	The purpose of the study was to assess the pilot test results of the Academic EMR (AEMR) before adapting it for the clinical practicum of nursing students.	Five (n=5) nursing students who were using PC-based EMR in their clinical practicum participated the study. They completed 15 tasks using think-aloud method with tablet device. The comments were recorded and trans-cribed and extracted the strenghts and weaknesses of the AEMR. The duration of each task was measured.	Students thought that the application is beneficial for them. It was convenient and quick for students to use at bedside.
Bowling, The United States, 2016.	The aim of the project was to develop an educational electronic documenta-tion system for the nursing assessment and nursing skills courses.	The development project was incorpo-rated into two first courses where the electronic documentation assign-ments were mimicing the real-life documentation system. Participants were 93 nursing students from beginning nursing course and the comparison group was 85 students who were enrolled into pediatric nursing course. Assignments were assessed but the the instrument is not described. A survey with 8-items was used to assess students´ experiences. Analysis was statistical.	Students notice the importance of the electronic documentation learning. Documentation experiences in the simulation lab were valuable to students. The level of simulation and technological capabilities should match
Strudwick & Hardiker, Canada and United Kingdom, 2016.	The purpose of the literature review is to understand the use of nursing terminology and classification systems through a case study of International Classification for Nursing Practice (ICNP)	A systematic literature review since 2006, 38 empirical studies were found. Data was utilized to generate themes.	A number of challanges was found: healthcare leaders overlook the value of terminology and classification; nursing and non-nursing terminology and classification systems have a challange because they may have decided to use different systems; EHRs implemented may not be adapted with other healthcare professionals. ICNP features, standardized nursing terminology and classification systems seems to be well developed for various settings.

Appendix 2. Evaluation of the articles with JBI Critical Appraisal Checklists for the literature review.

The summary table include description of the author(s), year, method, scale and the result of the evaluation.

The scale: Yes (2), No (0) and Unclear (1).

Author(s) and year	Method	Scale	The result
Spencer & Lunsford, 2010.	Systematic review	14/22	Excluded
Häyrinen, Lammintakanen & Saranto, 2010.	Qualitative research	19/20	Included
Lucas, 2010.	Qualitative research	14/20	Excluded
Curry, 2010-2011.	Text and opinion paper	9/12	Included
von Krogh, Nåden & Aasland, 2012	Quasi-experimental study	14/18	Included
Nokes, Aponte, Nickitas, Mahon,	Quasi-experimental study	10/18	Included
Nykänen, Kaipio & Kuusisto, 2012.	Qualitative research	18/20	Included
Kowitlawakul, Wang & Wai-Chi Chan, 2013.	Qualitative research	16/20	Included
Jansen, 2014.	Qualitative research	16/20	Included
Mannino & Cornell, 2014.	Qualitative research	14/20	Included
Pobocik, 2014.	Quasi-experimental study	14/18	Included
Kushniruk, Borycki, Kuo, Parapini, Wang & Ho, 2014.	Text and opinion paper	10/12	Included
Choi, Lee & Park, 2015.	Qualitative research	15/20	Included
Bowling, 2016.	Quasi-experimental study	18/18	Included
Strudwick & Hardiker, 2016.	Systematic review	22/22	Included

Appendix 3. The framework for theme interview in talk aloud meetings.

Functional requirements

- nursing process (structure)
- classification system (FinCC)
- patient information (identification, history, risk factors)
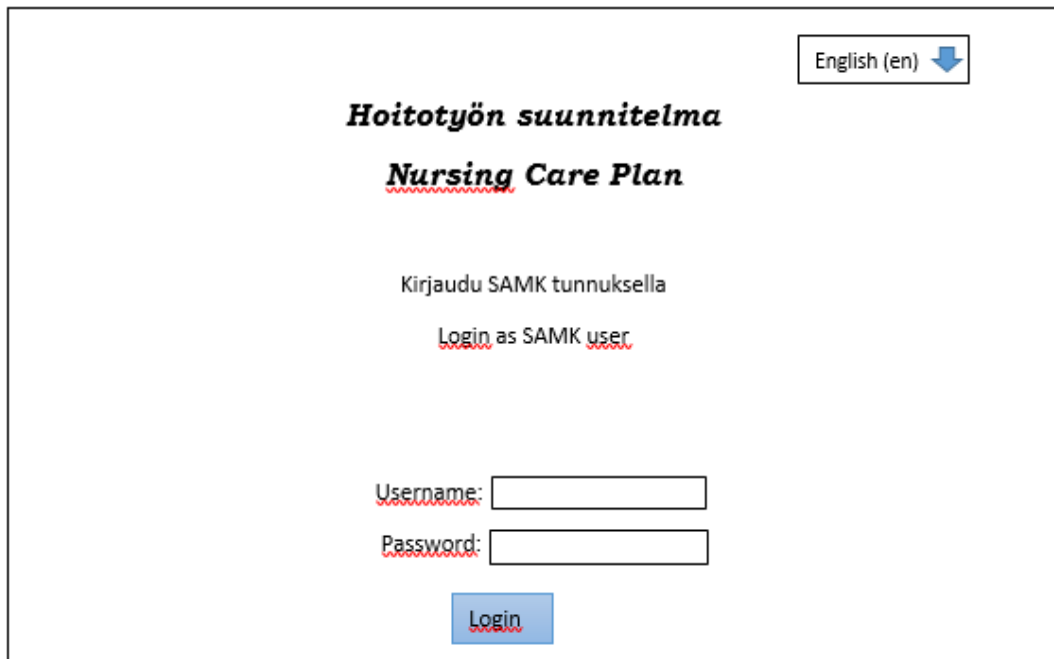- nursing components (terminology, contents, in Finnish and English)

- faculty´s point of view (implementation, customizable, prize)
- instructors´ point of view (features turned off, additional contents customized)
- users´ (students´) point of view (easy to understand and navigate through, simple to use, clear, logic, organized and present essential aspects, pull-down menus, order how to proceed, recorded and printed, re-opened and sent to students´ email accounts for further use, saving a file)
- documentation in real-time (other premises)
- usability and additional documents (written down freely, additional forms, scales or tables, uniform in the way it looks with the current electronic health records, any interpretation or intuition possibility, the screen broken down into different blocks or menus)

Non-functional requirements

- application in Internet, loaded to computers etc. (fit within the technical environment of SAMK, stand on SAMKs server, web-based, wirelessly loaded from SAMK´s app store, the staff from technology faculty will update the application)
- logging (log in with the campus logon, automated logging)
- device (program is usable with computers, laptops and mobiles, working at the bedside in the simulation room or in other classes)
- further possibilities: Information from the sensors of human-patient simulator (RFID-tags in patient bracelet) and monitors can be transferred automatically
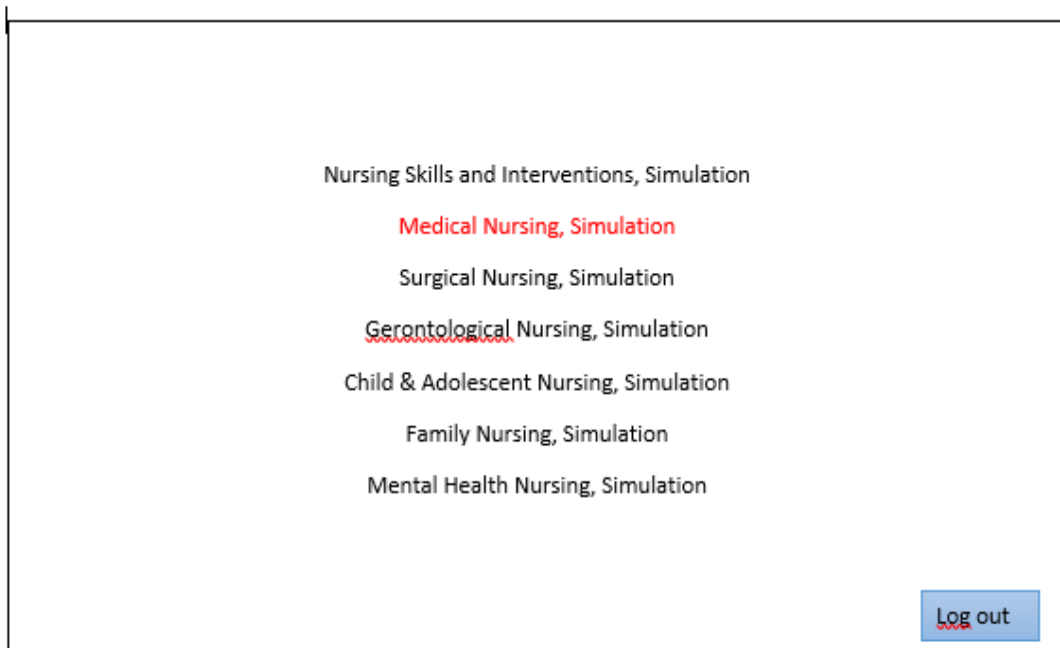
Appendix 4. The screens of the nursing care plan application prototype.

The screens of the nursing care plan application are presented here as pictures and explained in the chapter 6.

Hoitotyön suunnitelma

Nursing Care Plan

Kirjaudu SAMK tunnuksella

Login as SAMK user

Username: [   ]
Password: [   ]

Login

The title page, were to choose the language and log in. Login decides the layer of the user.

Nursing Skills and Interventions, Simulation

Medical Nursing, Simulation

Surgical Nursing, Simulation

Gerontological Nursing, Simulation

Child & Adolescent Nursing, Simulation

Family Nursing, Simulation

Mental Health Nursing, Simulation

Log out

Second screen, where to choose the subject of the simulation. The subject is based on the nursing curriculum. The choice decides the contents of following pages.

Patient

Information   Choose the patient: New   Search

Planning

Nursing

Interventions

Evaluation

Nursing

Summary   Log out

Third screen, where to choose the patient. There are two options: New and Search. If the user clicks New, next screen is the Patient Information -screen. If the choice is Search, next page is the Search the Patient-screen.

Patient

Information   Search the Patient by:

                   ● Patient ID

Planning   ● Patient name

                   ● Date

Nursing

Interventions   ┌─────────────┐
                   │   │
                   └─────────────┘

                   [Search]   [Clear]

Evaluation

Nursing

Summary   Log out

Search for the patient is possible with the patient´s ID, name or the date. After the patient is found, next screen is the Patient Information-screen.

Patient	Patient ID	Patient name		Date		Risk Factors
Information						

Planning

- address and phone number (2 blocks)   ?
- gender   ?
- language   ?
- height and weight (2 blocks)   ?
- next of kin and contact information (2 blocks)   ?
- religion   ?
- occupation   ?
- activities   ?
- diagnoses   ?
- medication   ?
- nutritional requirements   ?
- substance use   ?
- sight and hearing and assistive devices (3 blocks)   ?
- functional ability and assistive devices   ?
- mental status   ?
- social services   ?
- others   ?

Nursing

Interventions

Evaluation

Nursing

Summary

The name of the user is shown here with the time. | Clear | Adapt | Save | Print | Log out |

The Patient Information screen. The contents of it depends on what simulation subject is chosen. Question marks give additional information for the choice, if needed.

Patient	Patient ID	Patient name		Date		Risk factors
Information						

The reason for nursing care and assessment of the patient: ?

Planning

(free-text)

Nursing

Interventions   Doctor´s orders:

Component: ?	Main category: ?	Sub-category: ?
⬇	⬇	⬇

Evaluation

Goals for nursing care and planned interventions: ?

Nursing

(free-text)

Summary

If a sentence needs removed, it happens from a mark X behind the sentence.   X

User and time | Add | Clear | Adapt | Save | Print | Log out |

The Planning -screen includes nursing assessment, goals and planned interventions and doctor´s orders.

Patient Information
Patient ID | Patient name | Date | Risk factors

Planning
Component: ? | Main category: ? | Sub-category: ?

Implementation of the planned interventions: ?

Nursing Interventions

(free-text)

Evaluation

Nursing Summary

User and time

Add | Clear | Adaot | Save | Print | Log out

The Nursing Interventions -screen without the block of the evaluation of the planned interventions.

Patient Information
Patient ID | Patient name | Date | Risk factors

Planning
The outcome of the care: ?

The evaluation of the care: ?

Nursing Interventions

(free-text)

Evaluation

Nursing Summary

User and time

Clear | Adapt | Save | Print | Log out

The chosen components and categories in the Nursing Interventions -screen come into sight to this Evaluation -screen. The evaluation is easier to write under the headings then.

Patient	Patient ID	Patient name	Date	Risk factors

Information

Planning

Nursing

Interventions

Evaluation

Nursing

Summary

(free-text)

| Clear | Adapt | Save | Print | Log out |

User and time

The reason for care, patient´s assessment, goals for the care, implemented interventions, the outcomes and evaluations of the care with all chosen components and categories come into sight to the Nursing Summary -screen. Here nursing students may write additional information to the summary of the care and suggestions for the future and possible care instructions.

Appendix 5. The signed permission for the research.

samk   SATAKUNNAN AMMATTIKORKEAKOULU   OP21B
        SATAKUNTA UNIVERSITY OF APPLIED SCIENCES

SAMK / Application for a research permission

For theses and other studies which concern Satakunta University of Applied Sciences.

Please enclose the research plan approved by your thesis supervisor. Send the application to SAMK's Quality Manager well before the planned period of implementation (procedural instructions ME71110). Do not start the empirical part of the research before you have obtained the permission.

Researcher(s)/Student(s):

Elo Anu

Address:

Sinkkitie 4, 26910 Unaja

E-mail: anu.elo@samk.fi

The working title of the thesis/study:

Designing a nursing care plan application for nursing education in Finland

Planned timetable of implementation: March 27 – July 9th, 2017

Degree programme in which the applicant is studying: Welfare Technology (Master Care & Technology)

Educational institution if other than SAMK: SAMK, TAMK, Zuyd, Saxion, Fontys and Universidade da Beira Interior

Shall personal data** be collected and registered during research? ☐ yes ☑ no

** Collecting and registering personal data refers to the collecting of individualised data (such as name, personal identity code, date of birth) and research data into a register. (Further information www.tietosuoja.fi). Upon completion of the research work, the register shall be either deleted or filed without identification data.

Supervisor(s):

Andrew Sirkka, SAMK and Charles Willems, Zuyd

Supervisor's approval: Approved 24.03.2017

Supervisor's opinion:

The purpose of the studyt is closely related to development in nursing education at SAMK emphasis set on simulation education in nursing skill labs in terms of utilising mobile technologies in nursing documentation training. The master's thesis study is conducted as a part of Master Care & Technology consortium studies supervised by Dr Charles Willems at Zuyd UAS and Dr Andrew Sirkka at SAMK.

Supervisor's signature

Andrew Sirkka

Date and place 30.03.2017 Pori

Applicant's signature

Quality Manager's decision

☒ permission is granted

☐ permission is granted conditionally

☐ permission is not granted

Grounds; if permission is not granted or is granted conditionally:

30.3.2017   Pori

Date and place

Erja Kuurila

Quality Manager

Note: The decision shall be notified to the student(s), the supervisor(s) and the contact person at SAMK.