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STORY-BASED ONLINE SIMULATIONS IN THE CONTEXT OF ACUTE CARE NURSING

Development, Feasibility and Nursing Students' Learning Experiences

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ABSTRACT

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Registered nurse's education in Finnish Universities of Applied Sciences is planned to offer competencies that are required in the profession. Teaching methods combine traditional lectures with simulations, but more and more teachers need skills for online teaching. Distance learning is increasing in nursing education, and it challenges teachers to renew their teaching methods.

This thesis presents the development process of Story-Based Online Simulations (S-BOS). The context of the S-BOS is in acute care nursing. Service design methods were used and the data for this research was collected from 166 (n=166) nursing students who participated at SeAMK's Campus Online course *Nursing in acute and critical situations* in summer 2021. The data collection method was a questionnaire that contained quantitative and qualitative questions. The data was used to study the feasibility of the S-BOS and nursing students' learning experiences of the S-BOS.

The aim of the research part of this thesis is to provide knowledge that can be used when developing online teaching methods and simulations as part of the nursing studies. The research objectives are to describe the nursing students' perspectives of the feasibility and their learning experiences of the S-BOS.

According to the results, the feasibility of the S-BOS was on a good level and nursing students enjoyed it as a learning method. Only minor changes needed to be done, based on the results of the feasibility study. Nursing students' learning experiences were analyzed with inductive content analysis. S-BOS supports nursing students' *learning the content of the acute care nursing* and *learning about myself as a learner.*

The conclusions indicate that service design is a suitable method when developing new teaching methods and it should be used more often to develop higher education. Story-based online simulations can be an effective teaching method for nursing students, but more research is needed. Research on teachers' competencies of using service design methods as well as their competencies of online teaching and using story-based teaching methos is needed.

CONTENT

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1 INTRODUCTION

Registered nurse's education builds the professional competencies that the graduating registered nurse must have. As all other professional instructions, also nursing education is changing more and more into blended learning mode mixing online teaching methods with classroom teaching methods. Learning experiences and outcomes are rather good, thus teachers need more education to be competent in using online teaching methods in nursing education. (Ferri et al. 2020.)

Simulation pedagogy is widely used in nursing education. Mainly, simulations happen in classrooms combining teacher led and student-centered teaching and learning methods. Simulations are aiming for full learning experience. It is deemed important that nursing students learn how to take care of a patient holistically. Simulations have good learning results among nursing students and many teachers use them as an assessment method. (Berndt et al. 2015.) In the future, simulations may become more web-based and use virtual and augmented reality to support nursing students' learning (Weeks et al. 2019; Harris et al. 2020).

Story-based teaching methods use narratives to make the learning situation more realistic to nursing students (Gazarian et al. 2016). The most used story-based method is that the teachers share patient cases with the students. By using stories, it is possible to get a more realistic image of the patient's situation. Stories can be shared in classrooms or online, and students can work alone or in small groups. (Attenborough & Abbot 2020.)

This thesis presents the development process of Story-Based Online Simulations (later S-BOS). Service design methods were used when developing the S-BOS. Service design helps to understand the needs of the end users, to create new innovations or improve those that are already existing (Stickdorn et al. 2018). In this case, the author with her colleague Tiina Koskela, wanted to create a new online teaching method as part of the 3ECTS course *Nursing in acute and critical situations.* The course can be found in the curriculum of Seinäjoki University of Applied Sciences, Degree Programme in Nursing. The context of the course is *acute care nursing*. Service design helped create S-BOS that combines online teaching methods with simulations and story-based narratives.

The research part of this thesis represents nursing students' perspectives of the feasibility and their learning experiences of the S-BOS. This mixed-method research combines quantitative and qualitative methods. Quantitative methods were used to study the feasibility of the S-BOS. Qualitative methods were used to describe nursing students' learning experiences of the S-BOS. The research objectives are to describe the nursing students' perspectives of the feasibility and their learning experiences of the S-BOS. In this research, feasibility was divided into two themes: 1. Nursing students' user experience of the S-BOS and 2. S-BOS as a pedagogical approach in the context of the acute care nursing. The research aims to produce evidence-based knowledge that can be used when developing online teaching methods and simulations as part of the nursing studies.

This thesis includes the theoretical background of the development project that resulted in S-BOS, description of service design as a development method, results that describe nursing students' perspectives of the feasibility and their learning experiences of the S-BOS. The final chapter describes the implementation of the S-BOS and how it has been modified based on these research results. In addition, ethicality, reliability, and future research topics are discussed in the last chapter of this thesis.

2   THEORETICAL BACKGROUND

This chapter includes the theoretical foundation of this thesis. Competencies that are needed for registered nurses are described and pedagogical methods such as online teaching, simulations and storytelling are discussed in this chapter. In addition, service design as a development method is described here as well.

2.1   Registered nurses' professional competencies and their education

Registered Nurse as a profession is highly respected, and globally, they are needed now more than ever (World Health Organization 2018). Registered nurses work in various fields of nursing. They respect patients' dignity, provide support, maintain health, and take care of patients in times of sickness and crises. Registered nurses have high standards and follow the ethical principles of their profession. (Fukada 2018.)

In order to secure registered nurses' qualifications, there are core competencies that the nursing students must achieve during their studies. Competencies are defined as knowledge, skills, attitude, and behavior that registered nurses must have. (World Health Organization 2018.) Kajander-Unkuri et al. (2020a) have studied nursing students' competencies. Competency areas that the registered nurse should have are: *helping role, teaching-coaching, diagnostic functions, managing situations, therapeutic interventions, ensuring quality,* and *work role.* According to Kajander-Unkuri et al. (2020a), nursing students feel that they have the best competencies in helping role. This includes taking care of people. Apart from that, registered nurses must have all the other competencies as well. Registered nurse's education is planned to fulfill all these competency areas (Pradeep et al. 2014). These competencies are evaluated and updated by Kajander-Unkuri et al. (2020b) in a national project in Finnish Universities of Applied Sciences. The project revealed 13 competency areas for registered nurses:

1. Ethicality and professionality in nursing
2. Customer orientation
3. Communication and multi-professional skills

4. Health promotion

5. Management

6. Guidance, teaching and supporting patients' self-care

7. Clinical nursing

8. Evidence-based nursing

9. Entrepreneurship

10. Quality management

11. Social and health care service system

12. Patient and customer safety

13. Knowledge management

To meet the professional competencies, nursing students follow the curriculum that defines the studies in their education. In Finland, registered nurse's education consists of 210 ECTS. Education is provided in universities of applied sciences, and it follows EU directives 2005/36/EY and 2013/55/EC. Universities of applied sciences have the autonomy to set the curriculum of the nursing education, but it must meet the qualification criteria that are set in EU directives. (Ministry of Education and Culture 2022.) After the student has completed the studies, the National Supervisory Authority for Welfare and Health (Valvira) grants the right to practice registered nurse's profession (Valvira 2023).

During clinical trainings and theory studies, nursing students are evaluated through different evaluation methods, such as self- and peer-evaluation. In addition, teachers and clinical training instructors participate in this evaluation process. Registered nurse's education includes many clinical training periods that take place in basic care, primary health care, and specialized health care. (Rudberg et al. 2022.) Clinical trainings take approximately 75-90 ECTS that are divided among the years of study (Ministry of Education and Culture 2022). Apart from clinical trainings, nursing education includes general theory studies of health promotion and nursing of all aged people with different sicknesses in different life situations (Rudberg et al. 2022). To be professionally qualified as a registered nurse, the student must be able to provide holistic nursing care to patients and their next-of-kin (Wu et al. 2015).

Due to lack of nursing professionals, universities of applied sciences have increased the intake of nursing students. Group sizes are growing, and universities of applied sciences must find new ways to provide education for nursing students. At the same time, health care workplaces need nursing

students to work during their studies. Many universities of applied sciences have multimodal studies, and some parts of the studies are offered online. This challenges the nursing education and requires teachers to have competencies in online teaching. Besides teachers, nursing students need skills with online studies as well. (Gronlien et al. 2021.)

2.2   Online teaching in nursing education

Online teaching is becoming more common in nursing education as well as in any other education field. In the future, distance learning and the use of digital tools are part of every curriculum, especially in higher education. (Ferri et al. 2020.) The past few years have made it possible for teachers to expand their knowledge and skills in online teaching. The development has been fast after the Covid-19, which made it mandatory for teachers to explore online teaching methods. (Molato & Sehularo 2022.)

In Finland, all universities and universities of applied sciences are heading towards online teaching and already there can be found degrees that can be completed fully online (Study portals 2023). Digivisio 2030 is a project that includes all Finnish universities and universities of applied sciences to seek possibilities to offer online courses, online education, and teach by using digital tools. The aim is that by the year 2030, students can choose courses that interest the most and support the competency development that students feel important in their future profession. Digivisio challenges teachers' competencies in online teaching, hence many students are seeking courses that can be studied fully independently without time or place limitations. (Digivisio 2022.)

One of the benefits of online teaching and digital tools is that they offer possibilities to enhance learning after graduation, especially considering life-long learning (Rouleau et. al. 2019). Another one is that usually group sizes can be bigger than in classrooms (Attmiller & Pepe 2022). Growing group sizes need much methodology planning from the teacher. Teacher's workload can be enormous if online teaching methods are chosen incorrectly. Furthermore, evaluation methods and interaction with the students by using online teaching are important factors that must be considered when planning online teaching. (Misri 2021.)

In nursing education, all courses cannot be taught fully online. The nature of the nursing education requires competencies that must be practiced at school. Still, it is possible to combine classroom teaching with online studying. From students' perspective, it seems that this kind of blended teaching has the best learning results. (Langegård et al. 2021.) Nursing students' learning experiences can increase, if teachers can choose right online teaching methods, create engaging online assignments that can be repeated, and combine online teaching with classroom teaching. Learning results could be so good that it can be seen in better patient care and improved patient safety. (Rezayi 2022.)

Interaction with the teacher and with other students is an important part of nursing studies (Goodwin et al. 2022). There are digital tools that can be used when learning important interaction skills online (Moreillon 2015). Today's nursing includes much health technologies and the use of digital communication tools, so it is important that nursing students learn these skills, as well as taking care of a patient in clinical settings (Anderberg et al. 2019).

Successful online teaching needs a teacher who has skills to use online learning methods. The use of digital tools is time consuming, and the teacher must select the right ones to make learning situations interesting, motivating, engaging, and possible to achieve the learning goals. (Authement & Dormire 2020; Goodwin et al. 2022.) The teacher must secure that online learning is student-centered (Goodwin et al. 2022) and that the students get feedback of their learning and their tasks (Mousavizadeh 2022). Just as for the teacher, online teaching and learning is time consuming for the student as well. It needs many resources and skills, such as online learning equipment, internet connection, time, and self-management skills. (Mousavizadeh 2022.) For those students who have these skills, online learning is a suitable method to study. They feel that they want to study online, and they are learning, some even better than in classroom. (Langegård et al. 2021.) When online teaching is well planned, it gives the flexibility that especially students with families and work need (Bramer 2020).

Online teaching is a growing trend in education. Nursing education is a field with good possibilities to utilize different online teaching methods. This needs resourses and teachers who are interested in developing new online teaching methods. (Authement & Dormire 2020; Goodwin et al. 2022.) Nowadays online teaching is changing fast, and new products and virtual technology possibilities are coming all the time (Das 2023). Therefore, teachers must be careful when choosing online teaching methods, and choose those methods based on learning goals, not based on the product.

All teachers should have at least basic knowledge of online teaching methods, since this is the trend, and education is heading more and more to online or at least to blended learning mode. (Cutri & Mena 2020.) Online teaching in nursing is quite a new area, and therefore more research is needed to assess the effect of online teaching methods as well as teachers' competencies in using online teaching methods in nursing education (McCutcheon et al. 2015).

2.3   Simulations in nursing education

Simulation is defined as a teaching method that combines theory with practice (Berndt et al. 2015). Learning theory behind simulations is social constructivism, it is student centered and experimental learning method (Ross 2021). Simulations are well known in aviation education, and recently simulations were transferred into nursing education (Al-Elq 2010). In simulations, nursing students can practice situations that they face in real nursing settings in clinical trainings and later in working life (Park et al. 2013). The strong statement is that simulations could replace even half of the clinical trainings (Waxman et al. 2019), so there is evidence of its efficacy in nursing education (Berndt et al. 2015).

The teacher must have pedagogical skills to use simulations (Forbrig et al. 2023). Learning goals set the aim for simulations and they should be clear for the students. Furthermore, the students who are observing the simulation need guidance from the teacher. The teacher must explain what is about to happen, what is the situation, and what nursing interventions are expected to learn. (Haddeland et al. 2021.) Simulation is an experimental (Keskitalo 2015) and collaborative teaching method, where the students have high impact on their own learning (Berndt et al. 2015; Keskitalo 2015). Students are actively participating in learning. They can learn even though they are not directly participating in the simulation situation. This is possible because observation of the simulation situation and reflective discussions with other students and with the teacher are educative as well. (Brady 2011; Haddeland et al. 2021.) In simulations, the students can learn teamwork and how to provide feedback with collegial manners (Brady 2011).

Nursing students enjoy simulations, and their learning experiences are high. Still, it is known that simulations can cause stress and anxiety to students who feel that their theoretical knowledge has

gaps. This can bring pressure from other students who are more competent, and they can take the lead in simulations. Less competent students can feel that they really did not have a role in simulations, and they did not succeed as well as others. (Akselbo et al. 2020.) Therefore, it is important that simulations can be repeated, and the situation can be re-practiced to improve students' learning experiences (Abelsson et al. 2016).

There are many kinds of simulations that the nursing teachers can use. It depends on the learning goals what methods are chosen. (Dale & Barret 2017.) The teacher can create a scenario with patient actors who are used especially if the learning goal aims for learning interaction with the patient (Robles et al. 2017). If the learning goal is more skills based, the teacher can choose to use high fidelity simulation with a mannequin. High fidelity simulations use high technology mannequins in a patient's role. (Alshehri et al. 2022.) One example of this is a situation where patient assessment is practiced (Carrero-Plannels 2021). Best learning results are achieved when the teacher combines classroom teaching with high-fidelity simulation. This combination of classroom teaching and high-fidelity simulation can take place as a "bedside simulation", where the teacher teaches while the students are simulating the scenario. (Alshehri et al. 2022.)

Simulations can be transferred into a real environment (Tun et al. 2015). For example, paramedic students and professionals practice on scene "in-situ" and get real image of how it is to take care of a patient (Abelsson et al. 2016). These simulations that take place in real environment can train nursing and paramedic students before clinical practices. Simulations on scene show how well nurses need to be prepared with equipment, how long it takes to take the patient into the hospital, and how effective communication must be between the team members. Simulation practices can help to maintain patient safety in clinical action. (Al-Elq 2010.)

Nowadays simulations can be offered online. Teachers can transfer simulations via videos, or via telepresence communicators. Computer programmed simulations and video simulations are repeatable, and the student can take it many times to secure the learning process and to achieve the learning goals. (Huun 2018.) In the future, simulation takes even more realistic view with virtual reality that gives possibilities to add real feeling into simulations. It is possible that in the future we no longer need to have expensive classrooms with cameras if the students can have simulations in virtual reality. (Weeks et al. 2019; Harris et al. 2020.) Changing simulation pedagogy requires teachers to be educated in using new pedagogical methods, approaches, and equipment (Forbrig et al. 2023).

2.4 Story-based teaching methods in nursing education

Stories have been a part of teaching methods in nursing for a long time (Attenborough & Abbott 2020). Storytelling, also known as narrative pedagogy, is a teaching method that evolves from teachers', nurses', and students' lived life (Ironside 2006). Storytelling can include texts, poetry, videos, pictures, arts, sounds and music. Skilled pedagogy can combine different elements and create a story that enables students' learning process. Stories can foster nursing students' problem-solving skills, critical thinking, emotional communication, and empathy. (Gazarian et al. 2016.) From the nursing student's perspective, stories can also help to memorize things. Memorizing is easier if the storytelling has been lively. In nursing education, one way to enliven the story is to use someone who has experienced the situation as a patient. This is often seen in mental health nursing when the service users come to meet the students and tell them about their experiences. (Pringle & Smith 2022.) Using stories can help nursing students to reflect on their own experiences. This can support them to understand their learning process, especially after the clinical trainings. (Ironside 2015.)

There are three types of stories that nursing teachers have used in nursing education:
- Stories from the nurse's perspective (Attenborough & Abbot 2020)
- Stories from the patients' perspective (Tevendale & Armstrong 2015)
- Stories from the nursing students' perspective (Attenborough & Abbot 2020)

The aim of storytelling in nursing education is that nursing students can adapt the feeling of a real situation and to grow into the nursing profession (Attenborough & Abbott 2020). In a way, stories are a link that combines theory into practice (Attenborough & Abbott 2020), and they can help student nurses to see themselves in a registered nurse's profession (Hunter 2008).

The most used story telling method in nursing education is *case studies*. The nursing teacher creates a case and nursing students try to solve it. Usually this happens in the classroom, where the solution is told to students after they have solved the case independently or in small groups. Another way to use cases is to give them as a homework. Then the solution is given in the next lesson or online. Cases are usually built based on the teacher's experiences, thus some teachers who have not been working as a nurse for a while can feel that they cannot use cases anymore, since they can be out of date. Cases can include one or many problems that the nursing students

must solve. Ethical issues or problems with a patient description are one common case type that nursing teachers use. Nursing teachers feel that cases of this kind are not so critical with up-to-date information since ethical reasoning and discussions take time. The more nursing skills are needed with cases, the more up-to-date knowledge is needed from the nursing teacher. Stories enable students to be in a patient's or colleague's position and to endorse emotional aspects of a patient care. (Wood 2014.)

The teachers feel that, with stories, they can engage students into the learning process, link theory with practice, be a role-model of a good practice, and help students to adapt to the nurse's profession. Teachers who use storytelling as a pedagogical method, feel that the registered nurse students respect them, and believe they have nursing skills that are needed. Especially good real-life case stories are the kind that increase teachers' credibility. (Attenborough & Abbot 2020.)

Even though research results indicate that stories are a good way of teaching in nursing education, Wisker (2008) states that the nursing teacher should not use stories without planning them carefully. Storytelling itself should not be the aim, there must be some learning goal that the teacher is aiming at by using the stories. Attenborough & Abbot (2018) remind that all teachers who use stories as a teaching method, should use critical thinking while choosing the story they want to tell. There is a risk that the teacher chooses the kind of a story that gives unwanted picture of a nursing profession. The aim should not be to shock the students with hero stories or with unethical behavior of nursing professionals.

Stories are a way to share experiences, to widen pedagogical methods and enable nursing students to adapt their role as health care professionals (Attenborough & Abbott 2020). The future pedagogical approaches may increase the use of stories in nursing education when online pedagogy with virtual and augmented reality enables the use of more complex stories. Still, nursing teachers must remember that the learning goals set the use of the pedagogical methods. Nothing should be used just for fun, there must be learning goals that guide the teachers' choices of the pedagogical methods. (Ququandi et al. 2023.)

2.5   Service design as part of education development

Service design is an innovative method that helps to understand the needs of the end users, to create new innovations or to improve those that are already existing (Stickdorn et al. 2018). Service design methods are usually effective, low-cost, visual, and fast to use. Service design offers a chance for a teamwork and to create an innovation together. It is also an evidence-based method since it uses research methods when collecting user experiences and piloting new products or services. (Stickdorn et al. 2018; Wan 2019.)

Service design is more often used in the fields of business than in education. However, the education field needs new innovations and the users, in this case the students, have expectations towards teaching and learning methods. (Stickdorn et al. 2018.) Service design is a suitable method to develop higher education (Fazekas et al. 2021). According to Joshi & Alavaikko (2020), service design in higher education can be applied on several development projects, such as:

- Courses and assignments
- Pedagogical methods or models
- Pedagogical applications for specific groups
- Pedagogies outside formal education

Online teaching and online learning are good examples where service design methods can be used to produce new innovative teaching methods for the end-users, who usually are students. Nowadays, the end-users can be post-graduated workers who want to develop their skills because continuous learning is a skill that is expected from workers and experts. (Sanchez-Polo et al. 2019.) Therefore, using service design methods to create innovations that help to attract students and post-graduates who are already working, are needed (Baranova et al. 2011).

An important aspect when using the service design methods are the stakeholders. Service design is used to create an innovation for them or to improve something that already exists. Usually stakeholders are the end-users, in this case the students, but stakeholders can be seen as anyone who is directly or indirectly affected by the innovation that is created. (Stickdorn et al. 2018.)

Service design is an iterative process with different phases. These phases do not run linearly. Different actions and customer feedback can have an impact on the service design process.

Therefore, it is important that the end users are involved in the development process in all phases. These four phases of service design are named differently, depending on a source. In the double diamond model, these phases are named as *Discover, Define, Develop,* and *Deliver* (figure 1). (Whicher & Walters 2017.) Cramer (2021) has named these phases as *Exploration, Creation, Reflection, and Implementation* (figure 2).

Figure 1 Double diamond model of the service design process Whicher & Walters (2017).
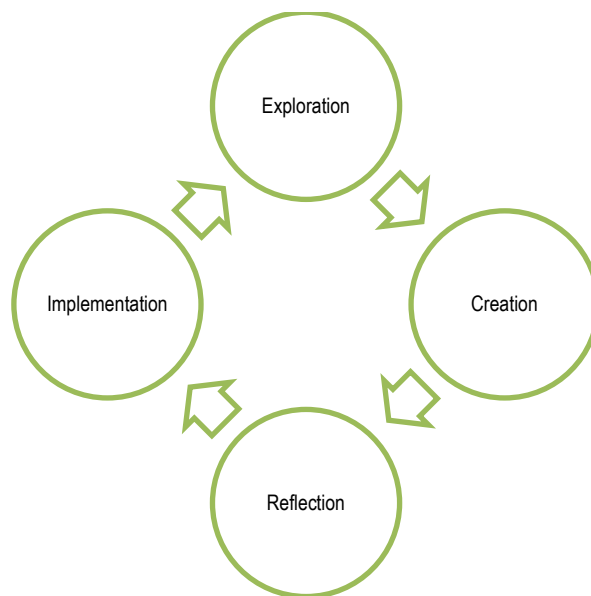
Figure 2 Service design process Cramer's model (2021).

According to Whicher & Walters (2017) and Cramer (2021), these phases are explained as following:

Discover/ Exploration phase: Using service design methods to identify a problem that needs to be solved. For this, the developers can use customer feedback that can be collected with research

methods like questionnaires or interviews. The aim is that, in this phase, the developers learn to understand the people that they design for.

Define/ Creation phase: This phase can be called also as an ideation phase. It is important to produce many ideas, even crazy ones. With many ideas, the developers have more material to continue working towards the innovation. In the early stage of the development process, the stakeholders should be included. This way it is possible to avoid creating something that will not work with the end-users.

Develop/ Reflection phase: Developers create and demonstrate the prototype of the product or service to the customers and/or end-users. Developers collect feedback of it and, based on the feedback, the product or service is either further developed or it can be a ready product to be released on the market. Feasibility and user experience can be assessed in this phase.

Deliver/ Implementation: The developed product or service is ready for the end-users. Even after this phase, developers continue to collect the feedback and they can make changes for the product or service later.

In this thesis the Cramer's (2021) model was used to describe the service design process of the S-BOS.

2.6   User experience as part of the development process

User experience describes the people's interaction with a product or a service. User experience can have better outcome if the products and services are developed with service design methods. Developing the user experience means that the researcher or other developer has knowledge of consumers' or end-users' opinions of the product. This requires that the consumers' or end-users' voice has been heard during the development process. (Stickdorn et al. 2018.)

User-experience can be tested with the end users of a product or service. Usually, interviews or questionnaires are used to collect the data from the users of the product or service. Based on the results, the developers can decide whether they make changes to a product or service. Development of products and services is a continuous process. Time affects everything and users' needs and opinions can change. From the markets' perspective, products and services should be

the kind that engage the users and create needs for them. To achieve this, the user experience should be studied. The better the product or service is planned and developed, the more it creates satisfaction and the users become loyal to the service provider. (Wilson 2010; Goodman et al. 2012.)

User experience in education development is needed to modify the learning and teaching methods for students with different learning types (Stowers 2022). There is little evidence of the use of user experience in nursing education. Now that the online learning is increasing, the user experience should be involved with the development process of different online teaching methods (Khan et al. 2019.) According to McCutcheon et al. (2015), the user experience contains elements that describe all aspects that influence the users' opinion of the teaching product. These are:

- Usability of a teaching product or service
- Accessibility of a teaching product or service
- Visual design of a teaching product or service
- Content of the teaching product or service
- Consistency of the teaching product or service

System Usability Scale (SUS) is a widely used scale when assessing the user experience (Brooke 1995). It was founded by J. Brooke already in the 1990s. Nowadays, it is often used when measuring the user experience and user satisfaction with websites, software, products, and services. The use of validated scales, such as SUS, to measure the user experience, can help to develop products and services. SUS is well known, and it has been used in every area of development projects. SUS questionnaire is easy to use, and answers are easy to give in Likert scale format. It is also possible to modify it for different purposes. (Laubheimer 2018.) SUS is one of the instruments that the developers can use to optimize user experience (Brooke 1995). In addition, in education development SUS can be used to measure the user experience. By doing this, it enables to develop online teaching methods as engaging products that help students to memorize and combine theory with practice. (McCutcheon et al. 2019.)

In this thesis, SUS was modified and used to measure the user experience of the S-BOS. This was done in the research part of the feasibility study. Chapter 4 describes the feasibility and the user experience of the S-BOS that was created as a result of this development project.

2.7   Description of the online course Nursing in acute and critical situations

To understand the development process of the Story-Based Online Simulations (S-BOS), it is important that its foundation is explained. Therefore, here is a short description of the online course *Nursing in acute and critical situations* (the course was taught in Finnish and named as *Hoitotyö akuuteissa ja kriittisissä tilanteissa*). S-BOS is one of the assignments on this course.

Nursing in acute and critical situations is a course offered by Seinäjoki University of Applied Sciences (SeAMK). The course, as well as the S-BOS, was created by the author Marjut Asunmaa and Senior Lecturer Tiina Koskela. Both teachers have worked over 10 years in the acute care nursing field, and they update their knowledge all the time, so the information provided to students is modern and based on evidence-based nursing practice. Teachers have created this course equally and peer-reviewed their online material. Because there is also Tiina Koskela's material part of this course and SeAMK is one of the stakeholders, this thesis represents only the main picture of the course (figure 3). The author respects the stakeholders' interests and copyrights.

Lately, the course has been ongoing as a non-stop course in Campus Online. Campus Online is a digital portal of courses from all Finnish universities of applied sciences. From campus online, students can choose courses that they are interested in. So far, 1 235 campus online students have completed the course Nursing in Acute and Critical Situations. In summer 2021, the S-BOS was added as one assignment of this course. During that summer, it was completed by 271 nursing students. The results of this thesis describe nursing students' perspectives of the feasibility and their learning experiences of the S-BOS.

The Nursing in acute and critical situations - course can be done independently on SeAMK Moodle platform. The amount of work for a student is three ECTS, which means that the student works approximately 81 hours. The course is aiming for deepening and advancing nursing students' competencies in the field of acute care nursing. The course (figure 3) contains the most common patient situations that a registered nurse may face while working in acute care nursing.

Figure 3 The content of the course Nursing in acute and critical situations

The most common acute care nursing situations are: patients with airway and breathing problems, patients with circulation problems, and patients with neurological problems. Patient assessment, preliminary diagnosis, most common nursing interventions and evaluation of the care of an acutely ill patient are taught on this course. At the end of the course, the students complete the Story-Based Online Simulations (S-BOS). The S-BOS tests nursing students' ability to transfer theoretical knowledge into action. The creation of the S-BOS and how service design methods were used as part of its development, are explained in the next chapters.

3   AIM AND DESCRIPTION OF THE DEVELOPMENT PROJECT

This development project aimed at using service design as a development method when creating new online teaching method for nursing students. In the next chapters, this development project is represented following these service design phases: *I Exploration, II Creation, III Reflection, and IV Implementation* (Cramer 2021). Chapter 3.3 *Reflection* presents the methodology of the research and chapter 4 presents the results. Data was collected in summer 2021 from Campus Online students who participated in the course: *Nursing in acute and critical situations*. The purpose of this research is to describe nursing students' user experiences and learning experiences of the S-BOS. This evidence-based knowledge can be used when developing new online teaching methods and simulations for nursing students.

A development project and the use of service design methods produced Story-Based Online Simulations, S-BOS. Service design was followed according to Cramer (2021) model (figure 4). In this thesis, the author uses the name of the created innovation, S-BOS, all the time to make it more clear for the readers. In the first phase of the development project, the teachers did not know the name of the product that was innovated by using service design methods.
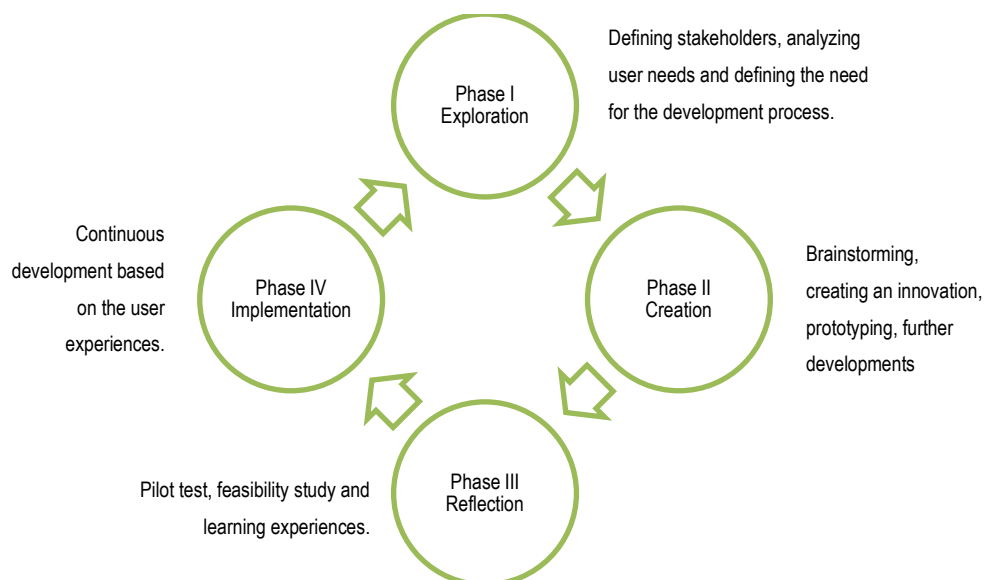
Figure 4 Service design process of the development of the S-BOS

Phase I, *Exploration*, describes stakeholders, the need of the users and the need of the development process. Phase II, *Creation*, describes the development process of the S-BOS. Phase III, *Reflection*, describes the research part from the methodology aspects that were used in this thesis. It includes the feasibility study and the study of the nursing students' learning experiences. Feasibility was studied from two themes: 1. Nursing students' user experience of the S-BOS, and 2. S-BOS as a pedagogical approach in the context of the acute care nursing. Nursing students' learning experiences of the S-BOS were studied using a qualitative method. The results of the feasibility and the nursing students' learning experiences are represented in chapter 4. Phase IV, *Implementation*, is the ongoing process that continues all the time. The *implementation* phase is described in chapter 5.1.

3.1   Phase I Exploration

Exploration phase included: defining the stakeholders, user needs analysis, and defining the need for the development process.

Defining the stakeholders

Stakeholders are related to S-BOS either directly or indirectly (figure 5).
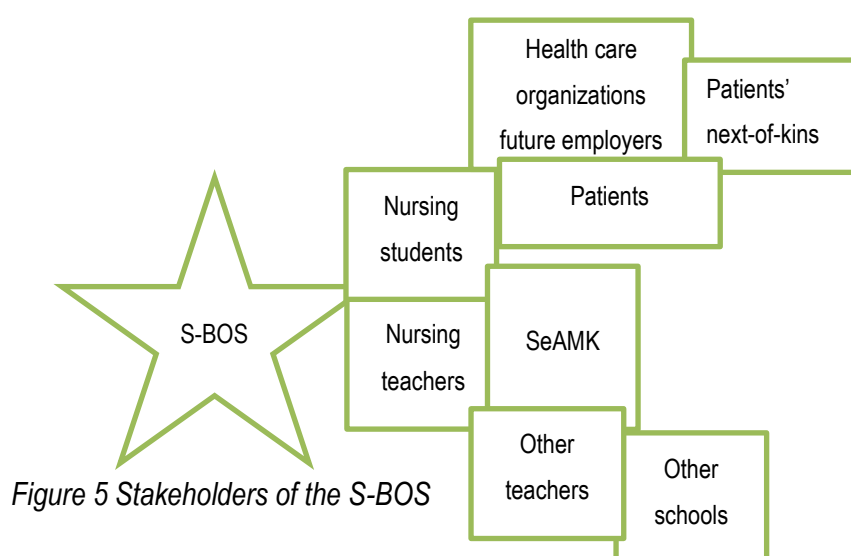
Figure 5 Stakeholders of the S-BOS

25

The most relevant stakeholders are the nursing students and nursing teachers. Via nursing students, the S-BOS affects patients and health care organizations. If the S-BOS succeeds to improve nursing students' professional competencies, it benefits the patients as the delivered care improves. Health care organizations benefit because errors with patient safety will be avoided, hence the nursing students have better competency in taking care of the patients. Furthermore, patients' next-of-kin are more satisfied with patient care. Secondly, S-BOS can have an impact on nursing teachers by increasing their competency in using online teaching methods and service design. With good results, other teachers will hear about this teaching method and may want to develop their own online simulations or some other pedagogical approach by using service design. Teachers' knowledge of online pedagogy increases at SeAMK and other universities of applied sciences might become interested in the pedagogical approach and may develop it further. Teachers and administrative staff in universities of applied sciences have networks and they share ideas, so good innovations can create new ones. Shared learning benefits all.

User needs analysis

In spring 2021, the teachers collected feedback from students that had completed the course *Nursing in acute and critical situations.* Feedback was used as a data to analyze the user needs to develop online teaching for the course. Based on the feedback, the nursing students felt that the course was already good (result 4.5 on a scale 1-5), but the teachers were able to find some things that needed to be developed. The teachers analyzed the feedback, and the outcome was:

- Nursing students needed more online assignments they can do independently.
- Nursing students wanted to learn more about patients' care pathways.
- Nursing students wanted assignments where they can use critical and ethical decision making.
- Nursing students felt that simulations are a good teaching method in acute care nursing.

Defining the development needs

After defining the stakeholders and the users' needs, the teachers realized that the problem that needs to be solved is: **New online assignments for nursing students** that meets with the inclusion criteria (figure 6). Inclusion criteria were set because there were certain limitations that the teachers had to consider when innovating a new teaching method.

Inclusion criteria:

1 The innovation has to be cost effective.

2 The innovation can be implemented on Moodle platform.

3 The innovation has to be the kind that students can do it independently without time or space limitations.

4 The innovation has to be motivating and engage students into the learning process.

5 The innovation has to be repeatable.

Figure 6 Inclusion criteria

3.2   Phase II Creation

In this development project, the creation phase included brainstorming, creating an innovation, prototyping it and further development of the innovation.

Brainstorming

After the user needs analysis, the teachers started brainstorming. Brainstorming is one of the methods of service design when creating an innovation (Wilson 2010). Brainstorming produced 11 new ideas, but the teachers knew that they must select ideas that are worth of further development. The goal was that in the end the teachers have one idea of an educational innovation, and it will be developed as a new online teaching method.

Creating an innovation

After brainstorming, the teachers had an *idea of an online simulation*. This idea met with all inclusion criteria and the teachers knew that the simulations have good learning results among nursing students. At this point, the teachers combined users' needs and their own idea of online simulations (table 1) (Brinck et al. 2010).

Table 1 Idea of online simulations meeting the needs of the end-users

Who are the users?	**Nursing students' who want to learn acute care nursing online**
Identify user goals:	Users want motivating and interesting online assignments that are not tied to time or to a place. The users feel that the simulations are a good learning method.
Why do the users need this?	Nursing students need motivating learning experiences and to learn about patients' care pathways as well as clinical and ethical decision making.
Set the usability objective	Results of the research: user experiences and nursing students' learning experiences.
Identify the design constrains:	Timeline: Online simulations must be ready by May 1st 2021. Project team: The author Marjut Asunmaa and senior lecturer Tiina Koskela. Resources: Both teachers can use 20 hours of their work time. The teachers have computers and access to the internet and ICT skills that are needed. The teachers have pedagogical skills.
Define functional specifications:	The online simulations must be possible to implement on the Moodle platform. The online simulations must be repeatable. The online simulations cannot increase the costs of the teaching. The students' have skills to use the online learning methods (to do the assignments).

The teachers knew their limitations that were mostly time, limited budget and that they must use the Moodle platform. Besides these, the teachers knew the goal that they were aiming at with the online simulations. That was to produce modern, motivating online simulations for nursing students who want to study online. The learning goals of the course must be achievable while the student is participating online simulations.

Based on the results of the user needs analysis and the limitations set with inclusion criteria, the teachers decided to start the process of modifying the online simulations. The teachers had the Moodle's digital toolbox to create online assignments and they wanted to produce repeatable online simulation, that can be done independently.

Since 2019, teachers had used story-based pedagogical approach when teaching patient safety for nursing students. They knew that stories are an effective learning method, so the teachers decided to try to story-base the online simulations. Story-based learning methods can make a real feeling and help the students to understand entities. Stories are easy to remember, and they can help to combine the theory with action. (Ironside 2015.) The teachers decided to integrate story-

based teaching methods with online simulations, and it was named as *Story-Based Online Simulations, S-BOS.*

Prototyping

After the teachers decided to create the S-BOS, they started prototyping it. This development process is described in figure 7 and explained in this chapter.
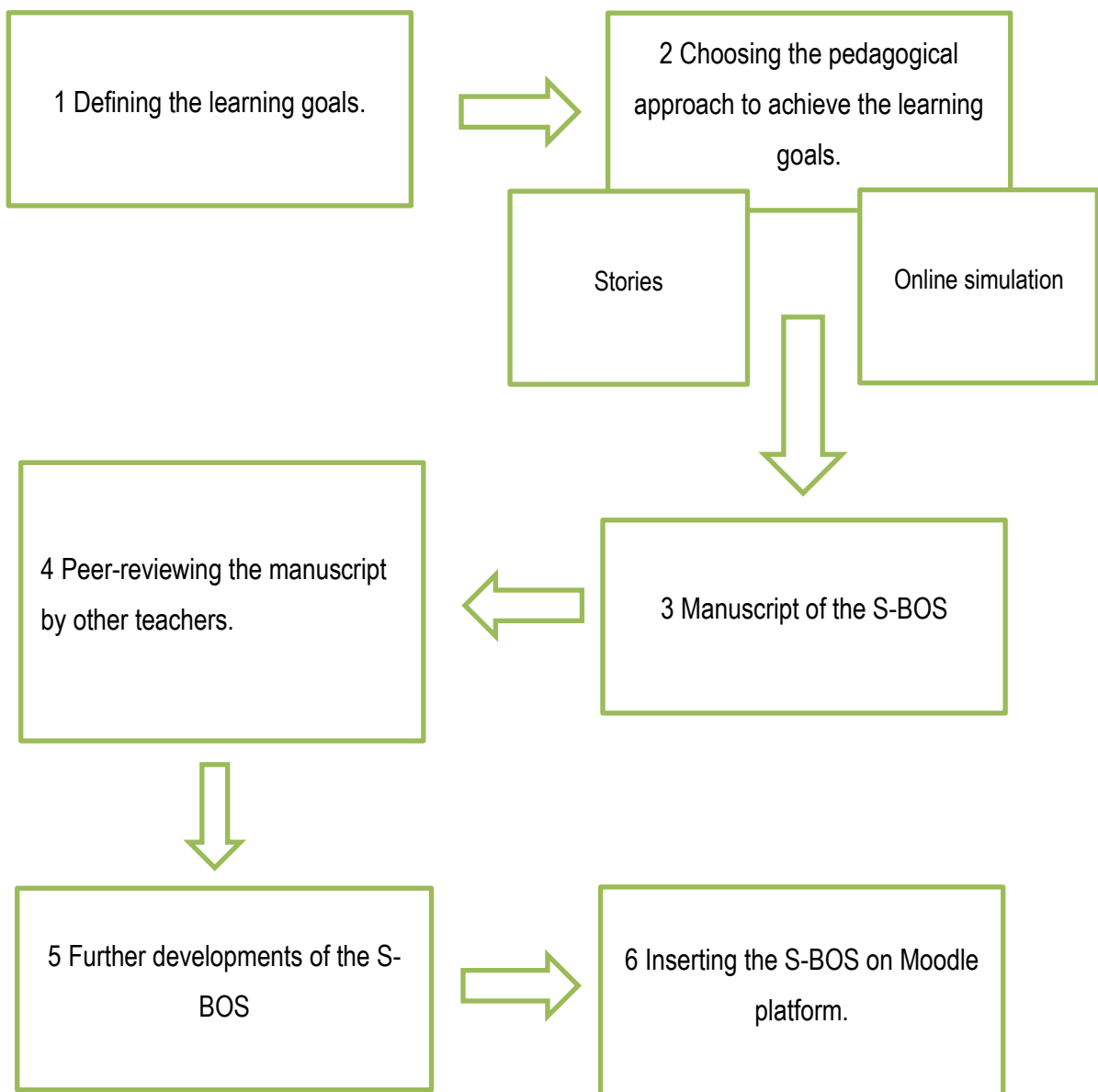
Figure 7 Prototyping the S-BOS

1 Defining the learning goals: As with all assignments that students are doing as part of their studies, also S-BOS had learning goals that the teachers wanted the students to achieve. The learning goals came from the SeAMK Nursing curriculum (SeAMK 2019) of the course *Nursing in acute and critical situations.* The learning goals were:

- The students learn to assess and to take care of an acute care patient that they can face in the field of the acute care nursing.
- The students understand the service pathway of the acute care patient.
- The students understand the co-operative systems and responsibilities of different authors as part of the acute care patient's care process.
- The students learn to use evidence-based knowledge in clinical and ethical decision making while taking care of the acute care patient.
- The students learn to maintain patient safety in all phases of the acute care nursing.

2 Choosing the pedagogical approach to achieve the learning goals: Simulation pedagogy has good learning results. It is a collaborative learning method where students learn to give and get feedback. Simulations concentrate on learning entities of the nursing process. (Berndt et al. 2015) Story-based learning methods have good results in all grades from elementary to higher education. Stories can motivate the learner and give a full understanding of a subject to be learned. (Ironside 2015)

3 Manuscript of the S-BOS: The teachers made a full manuscript of the S-BOS (figure 8), how it begins and how it ends and who are the characters in it. To maintain the students' interest and to motivate them, the teachers planned some highlights in some parts of the S-BOS. These were the kind of situations where the patient's situation got worse, and the students needed to make decisions in patient care. (Chase 2023.) Creating a manuscript was very interesting and teachers could use their expertise of acute care nursing. Both teachers had good patient cases in their mind of which they could choose what is the situation with the patient, what is the care pathway and how the situation and care continues.
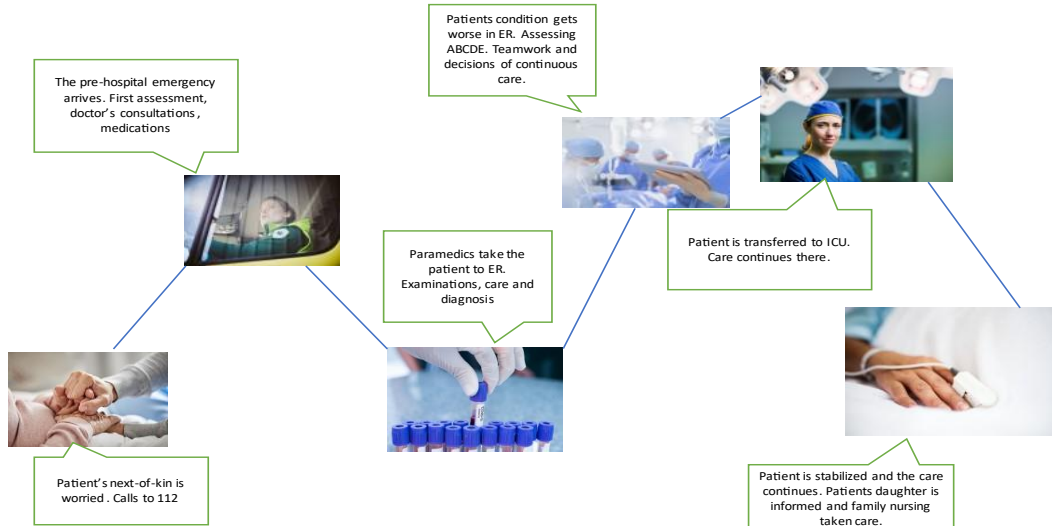
Figure 8 Draft manuscript of the S-BOS

4 Peer-reviewing the manuscript by other teachers: After the teachers had written the manuscript for the S-BOS, two other acute care nursing teachers peer-reviewed it. Comments given by the teachers were:

- Some of the pictures turned upside-down.
- Some of the medication related questions were not easy to understand.
- One of the questions related to doctor's consultations, was not easy to understand.
- The manuscript was interesting and motivated the reader to read it further.
- The manuscript offered learning experience with a full patient scenario.
- The manuscript's length was appropriate and there was a number of questions that can demonstrate the differences between students' knowledge.
- The time limitation must be re-thought. How much time does the student need to complete the S-BOS?
- The points of the questions were divided equally the way that more difficult questions gave more points.
- Some questions with lethal consequences of the medications had to be re-assessed.

5 Further developments of the S-BOS: After the feedback from peer-reviewing, the teachers made the corrections that were suggested. The pictures were corrected, and teachers made sure that all the questions are easy to understand. One question with a lethal consequence of a medication was removed from the S-BOS. Time limitation was not easy to know before the piloting, so the teachers

decided that this time students were given 120 minutes to complete the S-BOS and the use of time is asked separately from the students when collecting data for this research. After these changes, the S-BOS was ready to be piloted.

6 Inserting the S-BOS on Moodle platform. After the S-BOS was well prepared, it had to be transferred on the Moodle platform. For different question types, the teachers used Moodle's question and assignment modifications. Furthermore, the experts of the digital pedagogy at SeAMK helped the teachers to design the S-BOS. Inserting the S-BOS on Moodle was extremely time consuming, even though it was well planned, and the question types were designed beforehand. All pictures, videos and links had to be inserted separately, and that was time consuming.

Description of the Story-Based Online Simulations

The learning goals were defined before the manuscript was written, and besides that, the digital learning methods and online simulations had some principles that the teachers had to follow. The teachers tried their best to do the S-BOS easy to use, the questions understandable, and to create a motivating and interesting learning method for the students. Because the S-BOS is still in use and ongoing, the S-BOS is represented only partially in this thesis. For the same reasons, pictures and videos of the S-BOS are not published here. With all the videos, pictures and text, the student has 120 minutes time to complete the S-BOS. It includes 42 questions of a patient case that is the story of the S-BOS. Before starting the S-BOS, the student can read and/ or listen the *instructions* of the S-BOS:

> *Welcome to test our new pedagogical approach story-based online simulations (S-BOS). S-BOS is a simulated patient scenario. In this learning experience, you work as a registered nurse in acute care patient situation. S-BOS includes patient case with pictures, videos and text that are designed to help you to understand the patient's situation and what kind of care the patient needs. You can use course material and search information from Terveysportti, Pharmaca Fennica, and from all other reliable sources while you are completing the S-BOS.*

> *You have 120 minutes to complete the S-BOS. Please note that you cannot go back between the questions, you must answer to each question at the time you see it.*

After completing S-BOS, you can see how much points you got. If you are not satisfied with your result, you can do it again.

S-BOS includes multiple choice questions where one or several options can be correct. If you answer incorrectly, you will lose points. S-BOS includes also questions with lethal incorrect options. For these questions, an incorrect answer can cause serious harm or death of your patient, so be careful with your answers. If you choose a lethal option, you need to redo the S-BOS.

In all phases of the S-BOS, the teachers described the situation as well as possible. They tried to convey the authentic atmosphere of the patient's situation. Multiple choice questions were used to measure the student's knowledge. In some questions, the student could choose many of the options, in some only one. If the student's answer was incorrect, the S-BOS gave minus points. The teachers made some questions more difficult than others. The more difficult the question was, the higher points it had.

One of the learning goals was that the students learn to assess and to take care of an acute care patient that they can face in the field of acute care nursing. Here is one example of a multiple-choice question. This question is easy and usually all students manage to provide the right answer here. The meaning for this kind of easy questions is to relax the student and give them a feeling that they have the skills to take care of the patient in this case. (figure 9).

Paramedics perform an examination using ABCDE-protocol. What investigations do they carry out?

Valitse yksi tai useampi:

☐ a. *I don't know, I will ask from my colleague*

☐ b. At D, all the rest is assessed.

☐ c. At C, it is important to take blood pressure and radial pulse, by which the patient's blood circulation is assessed.

☐ d. AB means assessment of airways and breathing, including breathing frequency and saturation among others.

☐ e. At A, blood pressure is taken.

Figure 9 Example of a multiple-choice question

The students' ability to use evidence-based knowledge in clinical and ethical decision making while taking care of the acute care patient was measured with some of the questions (figure 10). It was not expected for students to memorize everything, so in instructions it was explained that while completing the S-BOS, they can use all the information they can find from moodle or nursing databases, but they had to be sure that it is evidence-based and acquired from reliable sources.

Mirva finds her mother's old medication list and gives it to the paramedics.

Metformin 500mg 1x3

Marevan 5mg according to instructions

Bisoprolol 5mg 2x1

Lipitor 10mg 1x1

Linatil 10mg 1x1 started 3 days ago

Nitrofur-C 75mg in the evening, stopped 1 month ago

Paracetamol 1g if needed

About medication:

Valitse yksi tai useampi:

- ☐ a. Marevan is not a contraindication for cerebral infarction thrombolysis therapy.
- ☐ b. *I don't know, I will ask from my colleague*
- ☐ c. It is safe and recommended for asthmatics to use beta-blockers.
- ☐ d. Nitrofur C is an antibiotic used for urinary tract infections as well as pneumonia.
- ☐ e. Paracetamol 1g is an over-the-counter medication. The patient can decide the dose, and there is no risk of overdose.
- ☐ f. Lipitor is a beta-blocker.
- ☐ g. Bisoprolol is a beta-blocker

Figure 10 Example of a question where information search is needed

S-BOS included questions that measured how well students understand the care pathway of the acute care patient and the co-operative systems and responsibilities of different authors as part of the care process. Different patient types are important to know, and one example of different patient groups are aged patients. It is important to recognize older peoples' physiological changes and the student must have knowledge and skills to take care of aged patients. Therefore, the S-BOS contained questions that were modified especially for this (figure 11).

Maria is now intubated and transferred to Oxylog ventilator. In order to maintain sedation, Propofol infusion is used, and as pain killer an Oxynorm-infusion. The concentration of Propofol is 10mg/ml and for Oxynorm 10mg/ml.

For the anaesthesia of an elderly patient, it must be considered:

Valitse yksi tai useampi:

☐ a. *I don't know, I will ask from my colleague*

☐ b. Kidney function accelerates with age, so kidneys filter medication faster.

☐ c. In the lungs of people over 65 may easily appear atelectasis, which can hinder implementation of ventilation treatment.

☐ d. Liver functions change with age, so liver's metabolizing capacity of certain drugs lengthens. Propofol and Oxynorm are such drugs.

Figure 11 Example of a question where knowledge of a certain patient type is needed

Patient safety is an important part of nursing and one of the key areas in registered nurses' competencies (Kajander-Unkuri et al. 2020), so the students were expected to maintain the patient safety in all phases of the patient care. S-BOS contained many questions that were related to maintaining the patient safety (figure 12).

The nurse transfers the patient to Intensive Care Unit (ICU). The nurse must ensure patient security during the transfer. For this patient transfer, the following aspects must be considered:

Valitse yksi tai useampi:

☐ a. enough staff for the transfer

☐ b. timely and friendly reporting to ICU, as well as updating patient records before patient transfer

☐ c. enough drug- and fluid infusions during the transfer

☐ d. *I don't know, I will ask from my colleague*

☐ e. The ER nurse is responsible for the patient until the moment the patient is received by the ICU staff for care.

☐ f. Intubation tube must stay in place and secure oxygen sufficiency and ventilator function during the transfer

Figure 12 Example of a question where the student is expected to have knowledge of the care process

S-BOS was created the way that it measures registered nurses' professional competencies that are needed in acute care nursing. Many of these competencies are needed in all nursing areas, but especially clinical decision-making skills when patient's life is threatened are competencies that stand out in acute care nursing.

3.3 Phase III Reflection

The reflection phase describes the research methods of this development project. S-BOS was pilot tested with Campus Online students in summer 2021. The research part of this development project includes feasibility study with themes 1. Nursing students' user experience of the S-BOS and 2. S-BOS as a pedagogical approach in the context of acute care nursing. Third research question is for the qualitative study of nursing students' learning experiences of the S-BOS. The purpose of this research is to describe nursing students' perspectives of the feasibility and learning experiences of the S-BOS. This evidence-based knowledge can be used when developing new online teaching methods for nursing students.

Research questions:

1. What is the nursing students' user experience of the S-BOS?
2. What is the nursing students' experience of the S-BOS as a pedagogical approach in the context of acute care nursing?
3. What learning experiences do nursing students have of the S-BOS?

3.3.1 Methodology and data collection

This research is a mixed-methods study, and it uses both quantitative and qualitative methods. (Kyngäs et al. 2020). Mixed methods are suitable for this research because by combining different research types, it is possible to answer complicated research questions. This research aims to represent quantitative data as feasibility of the S-BOS with the first and the second research questions. Qualitative methods were chosen to explain students' learning experiences with the third research question. (Gray 2017.)

The opportunity to participate in this research was given to all students who took part in the Campus Online course *Nursing in Acute and Critical Situations* in summer 2021. Purposeful sampling was used (Sutherland 2017) and inclusion criteria were: 1) The student has participated in the course Nursing in acute and critical situations in summer 2021. 2) The student has completed the S-BOS

and 3) the student is willing to answer the questionnaire. The questionnaire was chosen as a data collection method because the author is the teacher at the course and interviewing the students could have created a conflict of interest. The author assessed that the students answer more honestly to the questionnaire than they would answer in interviews. (National Board on Research and Integrity 2019.)

A number of 271 nursing students completed the course Nursing in acute and critical situations in summer 2021. A total of 166 (n=166) nursing students answered to questions that answered to the first and second research questions: *What is the nursing students' user experience of the S-BOS?* and *What is the nursing students' experience of the S-BOS as a pedagogical approach in the context of the acute care nursing?* The response rate was 61 %.

A number of 65 (n=65) nursing students answered to the open-ended question *"What improvements need to be done for the S-BOS?"* The response rate was 24 %. The results are used to further develop the S-BOS. This data was used to complete the first and second research questions.

A total of 65 (n=65) nursing students answered to the open-ended question that collected data for the third research question: *What learning experiences do nursing students have of the S-BOS?* The response rate was 24 %.

3.3.2 Feasibility study

Feasibility study is an assessment method of a developed product. The purpose of the feasibility study is to find out all critical aspects that may affect the use of the developed product or service. (Firdaus & Zakiah 2021.) According to Bridges (2023), feasibility study can be done before, during, and/or after the project, but there must be time left to do changes for the product based on the results. Feasibility can be studied from different angles, such as:

- Technical feasibility
- Economic feasibility
- Legal feasibility

- Market feasibility

After the development of the S-BOS was ready, the feasibility was studied from the market's aspect. In this case, the nursing students represent the market. From the students' perspective, the feasibility of the S-BOS was studied with the research questions: *What is the nursing students' user experience of the S-BOS? and What is the nursing students' experience of the S-BOS as a pedagogical approach in the context of the acute care nursing?*

The feasibility was studied with a questionnaire that was developed as part of this development project. When developing a questionnaire, there must be a theory base (Gray 2017). In this feasibility study, both aspects had different theory bases. The theory base of theme 1: Nursing students' user experience of the S-BOS, was the System Usability Scale (SUS), that was developed by Brooke already in the 1990's (Laubheimer 2018). SUS studies the usability as a post-test after using the product or service (Laubheimer 2018), in this case after completing the S-BOS. SUS was modified the way that Likert scale questions had alternatives from 1 to 5, where 1 is 'totally disagree' and 5 is 'totally agree'.

Theme 2: S-BOS as a pedagogical approach in the context of the acute care nursing, had theory base from the suitable competency areas from general competency areas of registered nurses (Silen-Lipponen & Korhonen 2020). They are presented in chapter 2. SeAMK's curriculum with the content of the course *Nursing in acute and critical situations* (SeAMK 2019) was also used as a theory base of the questionnaire. The learning goals are presented in chapter 3.2.

The feasibility of the S-BOS was studied from two themes: 1. Nursing students' user experience of the S-BOS and 2. S-BOS as a pedagogical approach in the context of the acute care nursing. The data was collected with a questionnaire that had 25 Likert scale questions (theme one was studied with 13 questions and theme two with 12 questions). In the end of the questionnaire was open ended question that was created to complete the feasibility study. *"What improvements need to be done for the S-BOS?"*

Before the data collection, the questionnaire was pre-tested with five (n=5) SeAMK nursing students who participated in the course in spring 2021 and did the S-BOS (Goodman et al. 2012). These five students provided feedback for the questionnaire, and there was no need to make changes to it. After this, the questionnaire was inserted on Moodle platform on Campus Online course *Nursing in acute and critical situations*. The students who took the course in summer 2021,

were asked to answer to the questionnaire. There were 271 (N=271) nursing students in the course and 166 (n=166) of them participated this research. A percentage of 61% of the students participated in this research, so the results can be considered reliable. The response rate increases the validity of this research (Sutherland 2017). Likert scale questions were analyzed with statistical methods. The aim of this research is not causality or effect of an intervention, so it is enough to present the results with percentages and mean values. (Sutherland 2017)

3.3.3   Qualitative study

Qualitative study methods are often used in human research when the aim is to explain phenomena (Kyngäs et al. 2011). Qualitative methods can be used when there is no previous research of the topic that is about to be studied. Data for qualitative research can be collected, for example, by interviewing people or by essays that the people write about their experiences. (Kylmä & Juvakka 2012; Kyngäs et al. 2020.) In this research, the qualitative data was collected with an open-ended question: *What learning experiences do nursing students have of the S-BOS?* Students answered by writing their own experiences.

After the data collection, qualitative research continues with analysis process (Kylmä & Juvakka 2012; Kyngäs et al. 2020). Content analysis is a process where the researcher searchers answer to the research question. In this thesis, inductive content analysis was chosen as a data analysis method. Inductive content analysis is suitable when the aim is to describe a phenomenon. (Kyngäs et al. 2011.) Inductive content analysis starts by reading and organizing the data. The aim is for the researcher to be able to summarize data and create sub-concepts, concepts and main concepts that answer to the research questions. (Kyngäs et al. 2020.)

In this research, the third research question was: "*What learning experiences do registered nursing students have of the story-based online simulations?*". The data was collected with a questionnaire that had open ended question *"What learning experiences did you have after completing S-BOS?"*. A number of 65 (n=65) participants answered to this part of the research. Even though there were many students answering to this question, their answers were quite short, and it was possible to analyze this qualitative data with inductive content analysis. This analysis method was chosen

because there was no previous knowledge of the use of story-based online simulations in nursing education (Kyngäs et al. 2020).

The author started the inductive content analysis by reading the data. There were many answers, but the participants had answered with short sentences, so it was rather easy to code the data. First, the author searched for sentences that answered to the research question: *What learning experiences did nursing students have of the S-BOS?* A number of 67 original expressions could be found. These expressions were narrowed down, and similar reductions were assorted into groups. After this, the groups were organized under sub-concepts and all sub-concepts were named. Then the sub-concepts were assorted into concepts that were assorted under the main concepts. Inductive content analysis provided eight (8) sub-concepts, four (4) concepts and two (2) main concepts. The example of content analysis is given in table 2.

Table 2 Example of inductive content analysis in main concept "Learning the content of the acute care nursing."

Research question: *what learning experiences registered nurse students have of the story-based online simulations?*			
Reduction	**Sub-concepts**	**Concept**	**Main concept**
To assess patient	Patient assessment and care	Learning about the technical skills in acute care nursing.	Learning about the content of acute care nursing.
To check vital signs			
To take care of septic shock			
To take care of acute patient in ER			
Patient triage			
Controlling fever with medications	Planning and implementing medication and fluid care		
To give medications			
Side effects of the medications			
Consulting the doctor of the medications			
What are the reasons to start fluids for septic patient			
Calculating medication doses			
Reporting to other nurses	Documenting the nursing interventions		
Documenting to patient's files			
Documenting care procedures			
Documenting discussions with next-of-kin			

More results are represented in the next chapter.

4 RESULTS OF THE DEVELOPMENT PROJECT

This part presents the results of the research part of this development project. Chapter 4.1 describes the participants, that it would be possible to redo this research with a similar group of participants. Chapter 4.2 describes the results of the feasibility study. Chapter 4.3 describes nursing students' learning experiences of the S-BOS.

4.1 Description of the participants

166 (n=166) nursing students answered to Likert scale questions and 65 (n=65) nursing students answered to open ended questions. All participants provided the background information of themselves, so this description of the participants is expressed from 166 (n=166) nursing students.

The participants were aged between 20 – 35 years old. They had completed approximately 150 ECTS of nursing studies. 59 % (n=98) of them had a previous profession in the nursing field. Most often it was practical nursing. Many of the participants had earlier work experience, some even many years in the nursing field. All had completed at least one clinical training as part of their nursing studies.

All participants had high interest in acute care nursing. When assessed how interested they were in acute care nursing, the mean value was 8.8 out of 10. They expressed a wish to work in acute care field in the future. Possible workplaces they mentioned were pre-hospital emergency care, Emergency Room, and Intensive Care Unit. Some of the participants were interested in perioperative, pediatric, or mental health nursing.

A total of 84% (n=140) of the participants had previous learning experience with traditional simulation lessons. Most of the participants had participated in simulation lessons that were taught at school in a simulation classroom. Almost all participants felt that simulations are a useful part of nursing education, but it can cause stress for the students if the preparations are not done properly, and the learning goals are not clear to the students. The participants felt that simulations support

registered nurse students' clinical trainings, and that it is possible to learn new things in simulations. This research addressed the story-based online simulation (S-BOS) that none of the participants had completed before.

4.2 Nursing students' experiences of the feasibility of the Story-Based Online Simulations

S-BOS was a new kind of teaching method, and the teachers wanted to develop it further after having feedback from the students. Therefore, feasibility of the S-BOS was studied as part of this research. The feasibility was studied with two themes and the results are presented according to these themes: 1. Nursing students' user experience of the S-BOS and 2. S-BOS as a pedagogical approach in the context of acute care nursing.

4.2.1 Nursing students' user experience of the Story-Based Online Simulations

Nursing students' user experience of the S-BOS was measured with 13 Likert scale questions. The results indicate that the overall user experience of the S-BOS was positive (table 3). Most of the nursing students (n=166) answered as 'partially agree' or 'totally agree' to all claims that measured the user experience of the S-BOS. The mean value of the claims was 4.2, which is very good considering the maximum score was 5.

The claim *Moodle learning environment was suitable for S-BOS* had the highest value, 4.5, and the claim *While I was doing S-BOS, it didn't feel like an exam* had the lowest value 3.1. It is typical for students to feel that simulations are designed to test them. S-BOS can be used as an exam, but it was not the purpose of this pilot test.

Table 3 Nursing students' user experiences of the story-based online simulations

n=166	1 = totally disagree and 5 = totally agree					
Claim	1	2	3	4	5	mean
S-BOS improved my learning experience.	1.2%	2.4%	10.3%	34.3%	51.8%	4.3
S-BOS was well planned.	0.6%	1.2%	13.2%	41.0%	44.0%	4.3
Moodle learning environment was suitable for S-BOS.	0.0%	1.8%	9.0%	28.3%	60.9%	4.5
S-BOS had questions that were easy to understand.	0.0%	2.4%	17.5%	42.2%	37.9%	4.2
S-BOS had well written instructions.	0.6%	0.6%	12.2%	40.9%	45.7%	4.3
S-BOS was logic from start to the end.	0.0%	0.6%	9.0%	37.4%	53.0%	4.4
S-BOS was easy to use.	0.0%	0.6%	15.1%	33.1%	51.2%	4.3
S-BOS simulated a real patient case.	0.0%	1.2%	8.4%	35.0%	55.4%	4.4
S-BOS is a learning method that I would like to use in the future.	0.6%	3.7%	13.3%	33.3%	49.1%	4.3
I am pleased with the structure of the S-BOS.	0.6%	1.2%	11.5%	38.8%	47.9%	4.3
Visual design of the S-BOS was at least good.	0.6%	1.8%	22.0%	39.0%	36.6%	4.1
While I was doing S-BOS, it didn't feel like an exam.	10.4%	25.0%	25.6%	25.6%	13.4%	3.1
S-BOS learning method is suitable for other nursing studies.	1.2%	1.2%	12.3%	33.8%	51.5%	4.3

Structure and visual design of the S-BOS

Nursing students expressed that S-BOS was well planned. It was created to Moodle online learning environment, and the students felt that this was a good decision, and the Moodle environment was suitable for S-BOS. Visually, S-BOS was at least good, and it was well structured.

Usability

Nursing students expressed that the S-BOS simulated a real patient case, it was easy to use, and the questions were easy to understand. Instructions were given clearly. Most nursing students had used Moodle learning environment before, and it made it easier to complete the S-BOS. Students felt that even though they were pleased with S-BOS, it did feel like an exam, but more like a learning situation than a traditional exam.

4.2.2 Story-Based Online Simulations as a pedagogical approach in the context of acute care nursing

Nursing students' experiences of the S-BOS as a pedagogical approach were measured with 12 Likert scale questions. The results indicate that nursing students' overall experience of the S-BOS was positive (table 4). Most of the students answered 'partially agree', 'agree', or 'totally agree' to all of the claims that measured the S-BOS as a pedagogical approach in the context of acute care nursing. The mean value of the claims was 3.8, which was good considering the maximum score was 5.

The claim: *S-BOS measured theoretical knowledge in acute care nursing* had the highest value 4.4 and the claim: *S-BOS taught legislation in social and health care sector* had the lowest value 3.1. Legislation was not one of the learning goals, so it is understandable that it was not one of the learning results either.

Table 4 Nursing students' experiences of the S-BOS as a pedagogical approach in the context of acute care nursing

n=166	1 = totally disagree and 5 = totally agree					
Claim	1	2	3	4	5	mean
S-BOS helped to apply acute care nursing theory into practice.	0.6%	1.2%	15.2%	42.7%	40.3%	4.2
S-BOS measured theoretical knowledge in acute care nursing.	0.0%	0.6%	9.7%	42.4%	47.3%	4.4
S-BOS taught legislation in social and health care sector.	5.9%	18.8%	40.9%	21.4%	13.0%	3.1
S-BOS taught the clinical skills in acute care nursing.	3.2%	6.4%	18.1%	40.0%	32.3%	3.9
S-BOS taught prioritizing patient care in acute care nursing.	0.6%	2.6%	21.2%	42.9%	32.7%	4.0
S-BOS taught patient safety in acute care nursing.	1.9%	4.5%	26.5%	40.6%	26.5%	3.9
S-BOS taught professional interaction when communicating with a patient.	3.2%	11.6%	34.8%	31.0%	19.4%	3.5
S-BOS taught professional interaction when working with other professionals.	1.3%	5.1%	37.8%	32.7%	23.1%	3.7
S-BOS taught use of evidence-based nursing.	1.9%	4.5%	32.5%	39.0%	22.1%	3.7
S-BOS taught ethical problem solving.	3.9%	5.8%	30.9%	36.8%	22.6%	3.7
S-BOS taught management of different care situations in acute care nursing.	1.3%	3.8%	19.2%	46.2%	29.5%	4.0
S-BOS taught ability to adapt different care situations in acute care nursing.	1.3%	5.1%	20.5%	42.3%	30.8%	4.0

Combining theory and practice

The students felt that the S-BOS had helped them to apply acute care nursing theory into practice and that the S-BOS had measured their theoretical knowledge in acute care nursing. Nevertheless, teachers knew that it had been difficult to include all aspects of acute care nursing into S-BOS, so it is understandable that some questions reached lower score than others.

Nursing procedures and interventions

Clinical skills, prioritizing patient care in acute care nursing, professional interaction and adaptation into different care situations, were the skills that the students considered they learned most from the S-BOS. The students felt the most motivated with these aspects of acute care nursing, and it

can be one reason why they expressed they had learnt the most of it. This can partially explain this result.

Overall, the feasibility of the S-BOS was assessed as very good by the nursing students. Therefore, it seems that the S-BOS does not need many changes with the content of acute care nursing. Next chapter represents the suggestions that the nursing students had in order to improve the feasibility of the S-BOS.

4.2.3 Improvements that nursing students suggested for the Story-Based Online Simulations

The questionnaire had the open-ended question: *"What improvements needs to be done for the S-BOS?"* Sixty-five (n=65) participants answered to this question. The response rate was 24%.

The main concept **better feasibility of the S-BOS** includes the sub-concepts of s*tructure improvements, audio-visual improvements,* and *content improvements* (figure 13)*.* They were created with inductive content analysis. All together, these concepts included 56 suggestions that the nursing students had for improvement of the S-BOS feasibility.
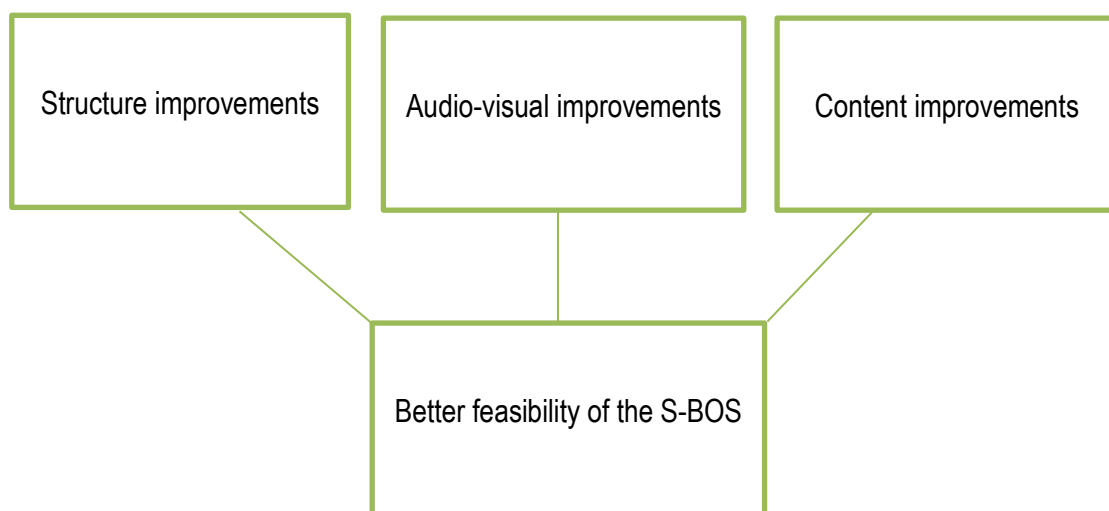

Figure 13 Better feasibility of the S-BOS

Structure improvements included suggestions of decreasing the number of the questions related to the patient case. Furthermore, by decreasing the amount of written text, the structure of the S-BOS could be improved. A few students suggested that there should be some kind of essay assignment as part of the S-BOS and, by reducing the number of true-false questions, the user experience could be improved. One important factor is that none of the participants felt that the S-BOS should be longer, or that it needs more questions, or there was not enough time to do the S-BOS.

Audio-visual improvements included different kinds of pictures, videos, sounds, and podcasts that the students suggested to be added in the S-BOS. With pictures, the students meant pictures of the monitors, care procedures, infusion bags and medications so they could adapt the situation more easily. Pictures of the patient care environments like hospital rooms, operating theatres, intensive care units and picture of the inside of an ambulance were mentioned. Students were hoping that videos where teachers teach about the care of the acute or critically ill patient could be added on S-BOS. Some students mentioned that real life sounds and voices, like people talking, patient moaning, dog barking on scene or radio phones giving the alarm sound were added on S-BOS. These were mentioned as "adding the real feeling even more". A few students mentioned podcasts. They were hoping that the podcasts could be the kind where acute care nursing experts discuss about the patient case and how the care should be provided to the patient.

Content improvements included adding assignments or web links to the S-BOS. Assignments were asked to be the kind that include drug calculations. This is understandable since it is known that drug calculations are a big part of nursing and there are students that have difficulties with them. Web links were suggested, such as THL, Terveysportti, Hotus and Pharmaca Fennica's web pages. These were asked to be added to those assignments where such information searching skills are needed.

4.3 Nursing students' learning experiences of the Story-Based Online Simulations

The third research question was: *What learning experiences do nursing students have of the S-BOS?*

Inductive content analysis provided results about registered nurse students' learning experiences of the S-BOS. They are divided into two main concepts: **learning the content of acute care nursing** and **learning about myself as a learner** (figure 14).

Learning the content of acute care nursing includes the concepts of *learning about technical skills in acute care nursing* and *learning about non-technical skills in acute care nursing.* **Learning about myself as a learner** includes the concepts of *understanding personal competencies in acute care nursing* and *recognizing personal learning methods.*
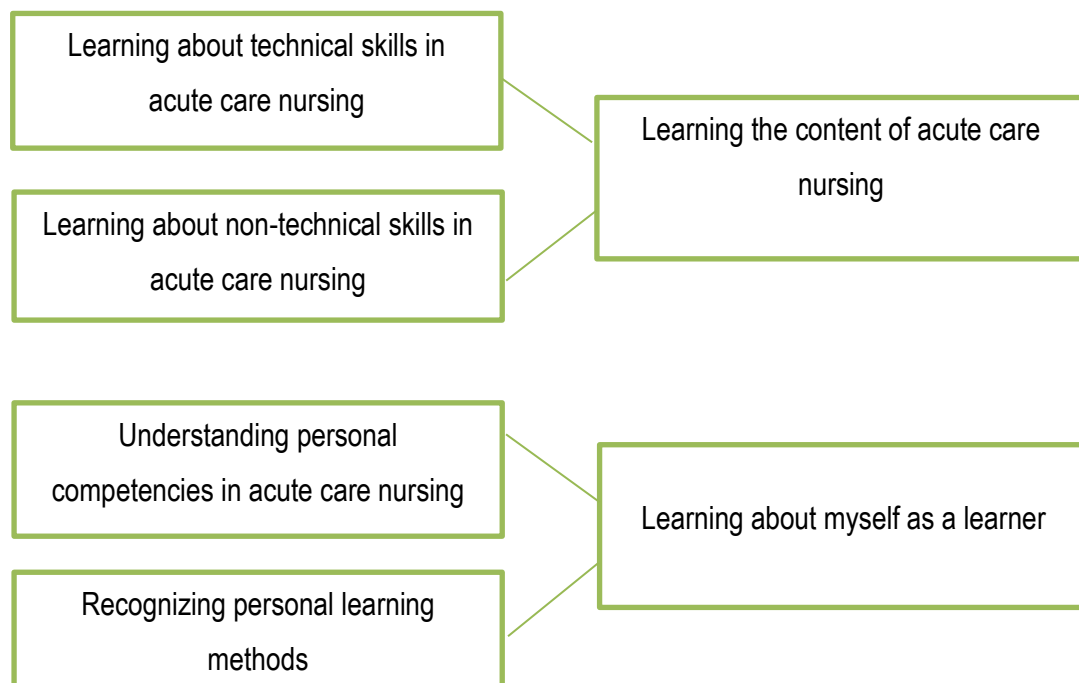
Figure 14 Nursing students' learning experiences

4.3.1 Learning about technical skills in acute care nursing

Learning about technical skills in acute care nursing includes sub-concepts of *patient assessment and care, planning and implementing medication and fluid care* and *documenting the nursing interventions.*

Patient assessment and care is one of the most important parts of acute care nursing. Registered nurse students described many learning experiences that were part of the patient assessment and care. In S-BOS, the first contact with the patient included patient assessment, recognizing the need of care, and starting the most important care procedures. One nursing student described the learning experience as: *".... completely understanding what happens to an acute patient".* Another one wrote: *"… gaining more understanding of different aspects of acute care nursing such as patient care pathway and collaboration system with different authors like police and social workers."*

Furthermore, other wards like Operating Theatre and Intensive Care Unit were mentioned as part of patient assessment and care. Many students described that they learnt about patient triage in pre-hospital emergency and in Emergency Room, and that they understand now better how and why this triage must be done for each patient that is acutely or critically ill.

Planning and implementing medication and fluid care is an important skill for a Registered Nurse in acute care nursing. Perhaps these situations were easy to find in S-BOS while students were doing it. There were many answers describing learning experiences in planning and implementing medication and fluid care for an acute care patient. Many students described that they do not have enough competencies in planning and implementing medication and fluid care. They also noticed they need to study more about different medications, infusions and doses that can be given to an acute care patient. Also drug calculations were noticed as one important thing that needs to be developed before graduation. One of the students described the learning experience as: *"my eyes opened how much I need to know about the medications".* Another student described the learning experience by writing: *"you really needed to have the knowledge of the medication's effects, side-effects, and reasons to give it to your patient. S-BOS made me realize how important it is to understand everything about the patient's situation."*

Documenting the nursing interventions is one of the most important parts of patient assessment and care. Documenting here means both oral and written documentation. Registered nurse

students described their learning experience that they now understand how much this influences care continuity and patient safety. It is important that the Registered Nurse documents everything on paper or on computer and reports to a doctor and to other nurses.

4.3.2 Learning about non-technical skills in acute care nursing

Learning about non-technical skills in acute care nursing includes the sub-concepts of *leadership and teamwork skills, decision making in care situations* and *maintaining the patient safety.*

Leadership and teamwork skills were highlighted as part of acute care nursing, because very often the patient needs fast actions, and to be able to deliver fast care, there must be a leader in a situation. Some of the students recognized that they did not have leadership competencies and it would be difficult to give orders to other nurses in care situations. At the same time, they understood how important it is that there is someone who can lead the patient care and tell others what to do in acute situations. As well as leadership, the teamwork skills were seen as important part of acute care nursing. One student described it as: *"You cannot just play it for yourself, you have to do it for the patient, and you cannot do it alone".* Another one had written: *"It would be difficult to be a leader, but I am glad that someone more experienced nurse is. Maybe one day I will be too. I just need to gain experience of taking care of acutely ill patients".*

Communication between the team members was seen as an important factor in successful patient care. S-BOS helped students to understand how important communication is and how it can be practiced at school in simulations. S-BOS helped the nursing students to notice the situations where the team members should have communicated more efficiently or where communication was good and followed the nurses' communication protocol ISBAR. Still, the nursing students felt that it needs more practice to get good communication skills. They also noticed that it is easier to learn communication when you are observing how it is done correctly, than try to do it by yourself. S-BOS was seen as a learning method that provides good opportunities to observe communication situations and to learn from them.

Decision making in care situations was seen as a big part of patient care and in patient coping afterwards. Nursing students described that if decisions are not made, the patient does not get the care that the patient needs, and it can cause serious harm to the patient. Decision making was seen as one of the most difficult situations in nursing care. However, S-BOS had helped students to recognize situations when they need to make decisions according to the patient care. Some students expressed that they had difficulties to recognize such situations before, but now, after completing the S-BOS, they understand that decisions must be made all the time while taking care of the patient. This motivated some of the students to seek their job possibilities from acute care nursing, because after completing the S-BOS, they noticed that acute care nursing is the field of nursing where they want to work. Decision making was described by one of the students like this: *"After completing the S-BOS, I understand how many decisions I have to make in nursing."* Another on described it like this: *"Decision making can be one of the hardest things in acute care nursing. Especially if your patient is in critical situation and you need to make a decision that can have huge impact on patient's life."*

Several students had recognized that S-BOS influenced their learning from the aspect of *maintaining patient safety*. S-BOS was seen as a learning method that students can use to practice patient safety. This can be seen in the following comment by a student: *"We have been talking about patient safety quite a lot, but S-BOS had something concrete that enlightened it to me."*

The students recognized patient safety from internal and external views and one of the nursing students described it like this: *"How you speak to your patient, what information you give […] it can help them to understand their situation and that you are just trying to take care of them."* External aspects were seen by nurses' and doctors' actions and knowledge of the topic as seen here: *"If you don't know what you should do or how you should do something, it can jeopardize everything."*

While completing the S-BOS, the students noticed how their own actions, as well as other nurses' and doctors' actions, may influence positively or negatively patient safety. One aspect was how important it is to get good knowledge of the patient situation and to make a good anamnesis. If something, for example about the previous diseases or medications, is not known, it can jeopardize the patient safety. One student expressed this with the following comment: *"If you don't ask, you don't know."* Nursing students had realized how much patient safety includes care responsibility, and it was one of the learning experiences. One student described it by writing: *"Before completing the S-BOS I really didn't know that it is my responsibility to take care of the acute patient until I*

have given the report of a patient to another nurses in Emergency Room or in Intensive Care Unit."
Another one described it like this: *"This S-BOS made me realize how big responsibility I have on passing the information to other nurses."*

4.3.3   Learning about myself as a learner

Learning about myself as a learner includes the sub-concepts of *understanding personal competencies in acute care nursing* and *recognizing personal learning methods.*

After completing the S-BOS, u*nderstanding personal competencies in acute care nursing* became a significant aspect of students' learning experiences. Some students realized they were not on the point yet to understand complex diseases and how medications and care may affect the patient. Some students noticed they lack skills in anatomy and physiology, and they need to study more so that they are able to recognize how the body systems work for acutely ill patients, and that they are able to understand why something is done for the patient. However, even if the students noticed that they do not have the competencies yet, this was seen as a positive thing, and seemed to increase their motivation to study. One student described the lack of competencies like this: *"This opened my eyes; I have to study more."* Another one expressed it like this: *"I do have the motivation to study and now even more. I want to become a good nurse and to work in Intensive Care Unit."*

S-BOS included multiple choice questions. If the student did not know what to do, they could choose an alternative "I don't know, I will ask my colleague". The students were satisfied that there was this option, but it also made them notice that they are missing the theoretical knowledge of taking care of acute care patients. One student expressed it like this*: "It worries me how many times I had to choose the alternative: I don't know I will ask from my colleague. This helped me to understand how much more I need to study."*

Recognizing personal learning methods was one of the study findings. Many students described that they used many different learning methods while completing the S-BOS. Students sought information from databases such as Terveysportti and Pharmaca Fennica. They used the references that were mentioned on a course literature. For example, these were SanomaPro books:

Ensihoito and Tehohoitotyö. Quite fast after starting the S-BOS, the students noticed that questions are related to each other. This increased their need to make notes, which became one of the most used learning methods.

5 CONCLUSIONS

This chapter presents the implementation phase of S-BOS and modifications that were done based on the feasibility study. In addition, ethicality of the research and reliability considerations are discussed in this chapter. The need for further research is discussed in the last chapter of this thesis.

5.1 Phase IV Implementation

The fourth phase of the Cramer's (2021) service design process is *implementation*. The implementation phase of the S-BOS started after the pilot test. Some changes were made based on the feasibility study. They are described in chapter 5.2.

The development of S-BOS continues, and teachers have created more story-based simulations after the success of this first S-BOS. It seems that S-BOS is an engaging learning method for nursing students. Many nursing students who have completed the S-BOS ask if there are more assignments like this. This indicates that S-BOS can be an effective learning method, but more research is needed to prove that.

Acute care nursing is a field of medical care that is renewed quite fast. New procedures, protocols, care recommendations and medications come often, and S-BOS must be renewed and updated based on them. Therefore, it can be said that in a way, S-BOS will never be ready. In the same way as the change of acute care nursing modifies the content of S-BOS, digital learning approaches and methods modernize all the time. Therefore, S-BOS is developed with new digital learning methods every time the teachers evaluate that there is a need for that.

5.2 Modifications to improve the feasibility of Story-Based Online Simulations

After pilot testing the S-BOS, the teachers were surprised how much the students enjoyed it. Students' learning experiences were much more than the teachers had expected. The results of this research indicate that the overall feasibility with the user experience and the learning experiences was very good. This motivated the teachers to improve S-BOS and to create more story-based online simulations. Even though feasibility was assessed to be on a good level, the teachers made few improvements based on what the students suggested.

Structure improvements: The teachers understand that there are many kinds of learners, and some feel that the essay assignments are useful in learning. However, essays would need much time from the students while doing the S-BOS. Furthermore, when thinking about the fact that there were 271 students participating at this course at the same time, it would not be possible for teachers to read essay assignments and give written feedback. Therefore, there will not be any essay assignments added in the S-BOS.

Audio-visual improvements: All the ideas that students suggested are very good and useful. So far, the teachers have added pictures of patient monitors, videos of a moving ambulance (patient transfer), and videos of care procedures. Besides pictures and videos, students asked for podcasts. In the future, they will be added as part of the course Nursing in acute and critical situations, but not as part of S-BOS. The reason for this is that the aim is to keep S-BOS short so that it would take maximum 120 minutes to complete it and podcasts would make it longer. There is also a risk that the podcasts interrupt students' concentration.

Content improvements: included adding assignments like drug calculations. Teachers have added this kind of assignment as part of Nursing in acute and critical situations - course. Learning drug calculations is not the only learning goal of S-BOS, and the teachers know how much stress drug calculations may cause for students. Therefore, this can be learned separately from S-BOS.

The students asked the teachers to add web links to S-BOS. This suggestion is noticed, but the teachers think that one of the learning goals is that students learn how to seek for evidence-based knowledge from nursing databases, and how to use it. Furthermore, students need to learn how to distinguish reliable information from unreliable. Therefore, teachers will not add links on S-BOS.

The teachers were satisfied with the students' learning experiences. Positive feedback of S-BOS surprised the teachers, although they knew that S-BOS was well planned and developed to fill the user needs. A conclusion can be made that S-BOS is a suitable teaching method in the context of acute care nursing.

5.3 Service design method's suitability for developing Story-Based Online Simulations

The results of the feasibility study show that designing S-BOS was a success. Good feedback and versatile learning experiences indicate that service design is a suitable method when teachers want to develop and produce new innovative teaching methods.

The author used service design before, and it is possible that it had an influence in this good result. It is known that the use of service design needs practice (Stickdorn et al. 2018). This good result with S-BOS is also a result of a teamwork and meticulous planning of the steps that were taken while planning S-BOS. The amount of work was substantial, but now that the students' feedback is analyzed and the results are so good, the teachers are glad they started this development work.

In the future, the author is going to use service design methods also with other courses in nursing education. It is clear that the students' perspectives should be included in education development more often.

5.4 Ethicality of the development project and the research

This development project and the research part of it followed the ethical guidelines of the National Board on Research and Integrity (2019). While writing this thesis, other researchers' work was respected, and the thesis does not contain plagiarism. It is clearly described that S-BOS is not created by the author alone, as Senior Lecturer Tiina Koskela's input in the development part is described. However, the author did the research part of this development project.

All sources are marked carefully into the text. Before starting the data collection, the research permission was applied from Seinäjoki University of Applied Sciences. The participants were informed before the data collection, and they could stop answering the questionnaire if they wanted to do so. The data was collected anonymously, and participants' informed consent was asked before collecting the data. (National Board on Research and Integrity 2019.)

The author is the teacher of the course, so the data collection method was chosen the way that the students were not feeling pressured to participate in this research. The author was the only person who had access to the data and after analysis, the data was destroyed. Research report is presented the way that the participants can maintain their anonymity. Direct quotes are chosen carefully, and no one can be recognized. (National Board on Research and Integrity 2019.)

5.5   Reliability of the research

The reliability of this research is reviewed according to Noble and Smith (2015). Before starting this research, the questionnaire was pre-tested with five (n=5) SeAMK nursing students. Research data was collected from nursing students who participated in online course Nursing in acute and critical situations, and they had done the S-BOS, so the participants had knowledge of the topic. This increases the reliability of this research. There were 166 (n=166) nursing students participating in the feasibility part of this research. The response rate was 61%. A number of 65 (n=65) nursing students participated in the qualitative study and the response rate was 24%. The number of participants increases the reliability of this research. The participants of this research are described carefully, and it is possible to repeat this research to similar groups of participants.

The used questionnaire was pre-tested, and it had influences of the System Usability Scale (SUS) (Laubheimer 2018). This increases the reliability of the feasibility study because SUS is known to be a reliable questionnaire when studying feasibility of a product. The data for the feasibility study was collected with quantitative and qualitative methods, and this kind of methodology triangulation increases the reliability of the research (Noble & Smith 2015).

The author had used qualitative study methods before and done inductive content analysis, so the bias with the analysis process was minimized (Kyngäs et al. 2020). However, it must be considered that the author is the teacher of the course and has developed the S-BOS, so it may have influenced in inductive content analysis that the author had preliminary knowledge of the topic.

One thing that may affect to the reliability of this study is that the data was collected and the analysis was done in Finnish. The author has translated the results into English. The author's first language is Finnish, and it is possible that the language barrier has had some influence while writing the report of the research results. However, this was attempted to be taken into consideration in the analysis phase and the sub-concepts, concepts, and the main concepts were named the way that it was possible for the author to translate them.

Transferability of the results cannot be done directly into another context. This research concerns only the feasibility of S-BOS and the nursing students' learning experiences of S-BOS, so the results cannot be transferred to some other online teaching method. However, the used service design method and the questionnaire can be modified and used in some other context.

5.6   Further research topics

As mentioned, based on this research, service design methods can be used to develop new teaching methods. It is not known how much teachers use service design when they plan and implement study material for their students. Therefore, there is a need for research of teachers' competencies in using service design, how much teachers use it, and if they have received training how to use service design methods.

Another important research topic is nursing teachers' competencies in online teaching. If online studies are well planned, students can learn from them and there is a possibility to increase the study motivation and commit the students to studying (McCutcheon et al. 2015).

In the future, it would be good to study the difference between nursing students' learning experiences with simulations that take place online and in classroom. In addition, virtual reality is

one important topic to study to find out if it has possibilities to increase students' learning experiences and learning results. One aspect of it is to find out how simulations could be developed with virtual reality. Furthermore, effectiveness of story-based teaching methods should be studied to collect evidence of its efficacy.

The author wants to clarify that even though the pedagogical approaches are transforming more and more into online mode, it is important to provide face to face teaching as well. Traditional teaching in classroom is valuable and needed in nursing education. Online teaching alone cannot fully replace that. Nevertheless, online teaching is needed too, and teachers should keep themselves updated with new teaching technologies and find combinations of blended teaching methods that engage nursing students into the learning process.

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