How Can we Use Simulation to Improve Competencies in Nursing?

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Foreword

Healthcare systems are complex and their complexity is increasing. Simulation has a large potential to help on different levels to deal with this complexity in the interest of patients and their treatment, in the interest of healthcare professionals and their life-long well-being, and in the interest of the system that needs to balance available resources with the tasks at hand. The book you hold in your hand discusses the role of simulation with a wealth of information.

The ten chapters describe the long-standing tradition in the nursing profession to work with simulation for a long time. You get an overview of the history of simulation, how internal and external stakeholders can influence simulation activities, and can read about different learning theories that can help you to adapt your simulation activities to your target group and teaching setting. The match between requirements and wishes from the outside with the available resources are a key in making progress with simulation and the chapters help you in optimizing this match.

The chapters give you an overview of the process of designing, implementing, and evaluating simulation activities—using a wealth of examples from different settings and simulative methods. You can read about the role of simulation in oncology, in the operating room, and in palliative care. You learn around the preparation of simulation, about its conduct in different setup, and debriefing. Empirical studies supplement the theoretical perspective—around different simulative modalities, including, for example, mannequins, role play, case studies, 360° videos, and virtual reality systems.

The student's perspective is foregrounded, by investigating their perspective in the different settings. You can read about their reactions to simulation, and also how they can be included into their own learning. Here the idea of working target-group oriented is illustrated nicely.

The book also brings an international perspective to supplement the Norwegian viewpoint with the Danish perspective. The book looks at learners, facilitators, facilitator trainers, and external stakeholders.

In summary, the book describes both new and tested approaches that are relevant to teach nurses and nursing students and to help them to perform in the interest of

patient safety while taking care of themselves. The many examples, I trust, will help you in applying the chapters' core points in your own setting.

Enjoy reading this rich book.

February 2, 2022

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Preface

This Open Access book applies to teachers in higher healthcare education, and especially within nursing and midwifery who plans to use simulation as a learning method. The book contains ten chapters, and each chapter discusses different topics within simulation.

Chapter "Simulation: A Historical and Pedagogical Perspective"

This chapter concentrates on historical and pedagogical perspectives of simulation as a learning method in nursing education. Simulation as a learning method builds on pedagogical adult learning theory, with an emphasis on David A. Kolb's and Donald Schön's concepts experience-based learning, reflection-on-action, and reflection-in-action.

Chapter "How to Use Simulation as a Learning Method in Bachelor and Postgraduate/Master Education of Nurses and Teachers in Healthcare"

In this chapter, results from three different studies about simulation as a learning method are presented and discussed alongside relevant pedagogical theory and other research. These studies were conducted at a university in Norway from 2018 to 2020 and include students from bachelor's in nursing, public health nursing, and teacher training (healthcare).

Chapter "Facilitating Learning Activities in Further Education and Master's Program in Oncology Nursing"

In this chapter, the author describes how simulation is an effective supplement to traditional lectures in oncology nursing programs, giving students the opportunity to rehearse their skills and learn where they need more practice. Oncology nursing

students must be trained to see situations comprehensively, act when a patient's situation worsens, and communicate effectively with the patient and the patient's relatives.

Chapter "Simulating Preoperative Preparations with Focus on Non-technical Skills in an OR Nursing Education Program in Norway"

This chapter describes the planning, implementation, and evaluation of non-technical skills simulations in an operating room (OR) nursing program in Norway. Three scenarios of preoperative preparations in the OR were simulated, each of which was followed by facilitated debriefing sessions.

Chapter "Training Interprofessional Teamwork in Palliative Care: A Pilot Study of Online Simulation Activity for Registered Nurses and Nursing Associates"

In this chapter, the authors present how simulation activity with participants physically present was transformed into an online learning situation. A brief presentation of students' and teachers' reflections on the pedagogical advantages and disadvantages of such a transition is also included.

Chapter "The Use of Critical Response Process as a Debriefing Structure in Simulation Activity in Nursing Education"

In this chapter, the authors present a structure for feedback (Critical Response Process) which can help the facilitator to achieve their main objective of enabling the participants to achieve learning. They include a short summary of what is known about simulation, debriefing, and feedback.

Chapter "Learning Without a Teacher: Perceptions of Peer-to-Peer Learning Activities in Simulation Training"

This chapter reports from an experimental study carried out at the University College Copenhagen. In the experiment, 5th-semester nursing students were subjected to an intensified simulation intervention, combined with supporting elements designed to increase collaborative and peer learning.

Chapter "Train the Trainer Course: How Can the Skills of a Facilitator Benefit Academic Staff in Nursing and Other Health Education Programs?"

In this chapter, the authors look closer at the nature of train the trainer courses, what separates a facilitator from a lecturer, the significance of a common language and framework, as well as how the side effects and synergies of the facilitator's skills might benefit academic staff in nursing and other health education programs.

Chapter "Playful Learning with VR-SIMI Model: The Use of 360-Video as a Learning Tool for Nursing Students in a Psychiatric Simulation Setting"

This chapter provides knowledge about the practical use of 360-degree video in VR, insight into technical potential, as well as challenges. Background information on why this method is suitable for promoting nursing students' competence in mental health work will be presented. The chapter has a particular focus on how this can be used as a tool for nursing students in psychiatric simulation settings.

Chapter "Virtual Reality (VR) in Anatomy Teaching and Learning in Higher Healthcare Education"

This chapter provides information for teachers in higher education who are interested in collaborative learning combined with the use of immersive virtual reality (VR). It presents an introduction to VR and experiences from implementing and using VR in training midwifery students in the master's level and radiography students in anatomy in the bachelor's level.

We want to extend a huge thank you to all the authors for their contributions in the different chapters. Many thanks to Professor Peter Dieckmann for writing the foreword. Also, we are thankful to the Norwegian University of Science and Technology, The Faculty of Medicine and Heath Sciences for supporting the Open Access of this book. Finally, thank you to Springer and especially Nathalie Lhorset-Poulain for giving us the opportunity to publish this book.

Trondheim, Norway — Iben Akselbo
Trondheim, Norway — Ingvild Aune
February 2, 2022

This publication is a peer-reviewed scientific anthology.

Contents

Simulation: A Historical and Pedagogical Perspective

Hanne Karlsaune, Therese Antonsen, and Gørill Haugan

1 Introduction

The workday of nurses is increasingly marked by complexity, variation, unpredictability, mutual dependence, and cooperation with other professions. The growing complexity in health services requires nurses to be able to respond quickly and adequately in different situations, act flexibly, and adapt to achieve the desired outcomes and quality of health services [1]. To prepare nursing students for their future everyday work, the nursing education has implemented new pedagogical methods. To satisfy the abovementioned requirements, student active learning methods have received more attention during the last decade; these learning methods are considered necessary to meet society's demands for proper nursing competence. Consequently, a growing trend of making active learning methods a natural part of the nursing education is seen [2]. In the health services, errors do occur and sometimes with fatal consequences. In the USA, the third most common cause of death is medical errors, with only cardiac disease and cancer being more frequent causes [3]. Reports indicate that 44,000–98,000 deaths per year in American hospitals result from unwanted action, with human errors representing the most common reason [4]. Because of this, comprehensive measures, recommendations, and changes in the health services have been suggested [5]. The World Health Organization (WHO) defines patient safety as "the freedom for a patient from unnecessary harm or potential harm associated with healthcare" [6]. Measures that

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reduce the risk of patient injuries caused by health staff members, surveillance procedures, and analysis of results, as well as measures that identify new areas of risk, are decisive factors in promoting the quality of health services [7].

In this context, simulation has a key role in training healthcare providers in various procedures to prevent errors and unnecessary injuries. Research indicates that simulation leads to better cooperation skills, improved ability to make decisions in teams, and enhanced critical reflections among nursing students [8]**.** As a result, patient safety will be increased.

Simulation is a technique for practice and learning that can be utilized in many different disciplines as well as for trainees. Simulation is a technique (not a technology) aiming at replacing real experiences with guided ones; that is, it represents a context in which students can exercise and explore various aspects of a specific practical skill. Accordingly, simulation-based learning signifies a useful approach to develop health professionals' knowledge, skills, and attitudes while protecting patients from unnecessary risks [7].

Through simulation as a learning method, the students can enhance their skills without the risk of causing injuries or damages to patients, colleagues, or equipment. To learn clinical skills under safe conditions enables nursing students to achieve mastery and at the same time have the energy to systematically reflect on their own action and discover the best approaches. Hence, the university lecturer's role is to facilitate a safe and supportive environment based on fruitful interaction with, as well as between, the students. More effective learning is possible in a context that allows for mistakes, i.e., learning through trial and error [9].

Simulation as a learning method also involves observation of the student's interaction with the patient and cooperation with colleagues; those students who participate in simulation exercises can observe behavior, communication and patterns of action among other people. Students working and learning together make it possible to exploit the potential for learning.

This chapter concentrates on simulation as one of several active learning methods that are now applied among nursing students throughout the world.

2 History of Simulator Development

The history of simulator development related to competence development is several centuries old, with its earliest use taking place in the fields of warfare, aviation, and nuclear energy [2]. The military use of simulation dates back to the eighteenth century [10], whereas the aviation industry was instrumental in the modern use of simulation through its focus on safety precautions [11]. Nowadays, pilots are trained in simulators, and this kind of simulation-based training is deemed necessary to protect the safety of passengers.

In the history of medicine, the earliest simulators were the mannequins of father and son Grégoire from Paris; these were primarily meant to assist in the training of midwives. Miss Chase, a life-sized mannequin, was one of the first simulators. She was built by a doll maker named Martha Jenkins Chase, so that nurses can learn how to

dress and undress patients during transportation and how to turn patients over in bed (Weir 2012). In their training, nursing students used Miss Chase, other dolls, or fellow students to learn various techniques regarding injection and other basic skills [12].

The health disciplines underwent significant changes during the twentieth century. The knowledge base and learning moved from simple training to scientific principles and eventually toward more demanding methods that required competence in the specific field of knowledge, skills, and implementation. In the 1980s, we witnessed the first high-tech simulators in the health sciences, and in the 1990s, more modern patient simulators were used in the anesthesiology program. At the same time, simulation as a learning method became part of the curriculum of anesthesia nurses [7].

Later in the 1990s, David Gaba transferred the "Crew Resource Management" (CRM) concept from aviation to his specialist area of anesthesiology. CRM was based on the idea that successful interaction requires that the cooperating parties communicate effectively and work toward commonly identified objectives. Doctors and nurses of anesthesiology received training in coordination, communication, teamwork, and leadership with the help of advanced simulators [13].

Simulation as a student-active learning method has now reached a stage where one needs to consider what is technically possible and what is effective in terms of learning. With more recent technological development, it is now possible—using 360-degree video and VR glasses—to move around the room when, for instance, receiving trauma patients.

3 What Is Simulation?

There is currently an increasing use of simulation in nursing program [14]. Simulation can be defined as an active learning method where the objective is to enable the students to acquire a deeper understanding, competence, and capacity for critical reflection [15]. According to Prince (2004, p. 223), student-active learning can be described as:

> […] *any instructional method that engages students in the learning process. In short, active learning requires students to do meaningful learning activities and think about what they are doing. […] The core elements of active learning are student activity and engagement in the learning process. Active learning is often contrasted to the traditional lecture where students passively receive information from the instructor.*

Simulation is based on phenomena and activities that resemble a clinical context in which one can learn procedures, make decisions, and reflect critically, with the help of role plays, video, and simulators. Simulation can serve as an effective educational method to provide experience and opportunities to learn—in a secure environment—about how to provide efficient nursing care in various clinical cases. In simulation, complex patient situations are replicated, and nursing students get the opportunity to observe, recognize, interpret, and apply relevant information and knowledge to consider which course of action would be most appropriate—before the student reaches a decision and acts in accordance with his/her professional knowledge. During

simulation, the situation is only a realistic replication of reality where students interact while making use of skills and communication in a safe environment, without any risk of causing injury to the patient [1].

Simulation can be defined in different ways; the definitions embrace both general descriptions and specific virtual tools. A commonly used general definition of simulation is "an imitation of some real thing, state of affairs, or process" for *the practice of skills, problem-solving, and judgment* [16]. In nursing and other health disciplines, one often relies on the definition of Pamela Jeffries (2005):

> Simulation involves "*activities that mimic the reality of a clinical environment and are designed to demonstrate procedures, decision making, and critical thinking through techniques such as role-playing and the use of devices such as interactive videos or mannequins*" [17].

The term fidelity is used to describe the complexity of the simulation learning activity [18]. Fidelity is subdivided into low, medium, and high fidelity. Low fidelity means that one aims to obtain basic nursing skills, like the placement of urinary bladder catheters. Here, the focus is only on the procedure itself, but when moving on to medium fidelity, one expands the complexity of the learning activity requiring more advanced knowledge and techniques. For instance, the placement of urinary bladder catheters takes place in a scenario where the patient suffers from dementia and refuses to be catheterized. High fidelity involves advanced and realistic simulations in anatomy and clinics; here, the perspective is comprehensive and includes communication, decisions in complex clinical situations, interaction in teams, as well as leadership skills [9]. For instance, a scenario may involve a patient with dementia and permanent urinary catheters who also has symptoms of sepsis requiring immediate nursing intervention.

4 The Structure of Simulation

The level of fidelity relates to the complexity of the situation, or what is termed the "scenario"—which aims to cover a specific clinical reality. The level of fidelity is determined by the environment, the materials and equipment used, and factors associated with the students [19].

> *Simulations range from simple to complex. Simple simulations involve decision environments with low-level uncertainty that can be constructed with high or low levels of relevant information. Information at a high level is easily obtainable and relationships among the key decision variables are highly predictable and very stable* [17].

When used as a learning approach in the nursing education, a preparation is needed. That is, a scenario depicting a specific realistic clinical situation is created on beforehand based on the students' defined learning outcomes [9]. The scenario should include the necessary information to the nursing students, including an outline or description of the required preparations, equipment, case, order of action, as well as the distribution of roles and responsibilities among the participating

students. Based on the learning objectives and defined outcomes, the scenario offers a context that is as realistic as possible, including the expected trajectory and pattern of behavior by the students [19]. Establishing a psychological safe environment is vital to ensure that the students feel comfortable to express thoughts without feeling awkward or fearing negative consequences [20]. When simulation is applied as a learning method in nursing, it is common to rely on a structure that consists of four phases: (1) preparation, (2) briefing, (3) patient description/case, and (4) action debriefing [18]. The first phase of preparation based in the described scenario helps the students identify, interpret, and assess various appropriate courses of action [21]. The preparation which often is termed "Prebriefing" involves preparation and briefing, ensuring that simulation learners are prepared for the simulation learning activity. Prebriefing activities are intended to establish a psychologically safe learning environment by:

1. Situating the learners into a common mental model and preparing learners for the educational content of the simulation-based experience (preparation).
2. Conveying important ground rules for the simulation-based experience (briefing) [22]. Research shows that a good structure for the briefing is important to achieve the learning outcomes [1].

The literature on simulation presents different models used in the de-briefing phase, among them the diamond [23] which is a frequently used simulation model. The diamond de-briefing model implicates that the participants reflect on their experiences during the simulation learning activity. The students identify factors that influence their priorities and thinking in the concrete situation, evaluate the usefulness of their action, and eventually reflect on how the experiences may be used in other situations. The reflection is meant to promote in-depth learning that will enable the students to realize the connection between theory and practical action [23]; this indicates that they understand the reasoning behind their own actions. The reflection is based on the defined learning outcomes resulting from the simulation exercise. Awareness of one's own body language, either disseminated through concrete responses from the observing participants, the others taking part in the simulation, or video recordings of the exercise, represents an important source of feedback.

5 Pedagogical Perspectives

5.1 Learning as Transformation of Experience

A well-known theory of learning related to simulation is Kolb's "Experiential Learning Theory" (ELT) [24]. According to Kolb (1984, p. 38), learning is based on experience representing a process whereby knowledge is created through the transformation of experience. Consequently, human beings learn through experience, implying that what people experience denotes the foundation of their learning processes. Transferred to nursing students, they observe, reflect, and try to find new courses of action which

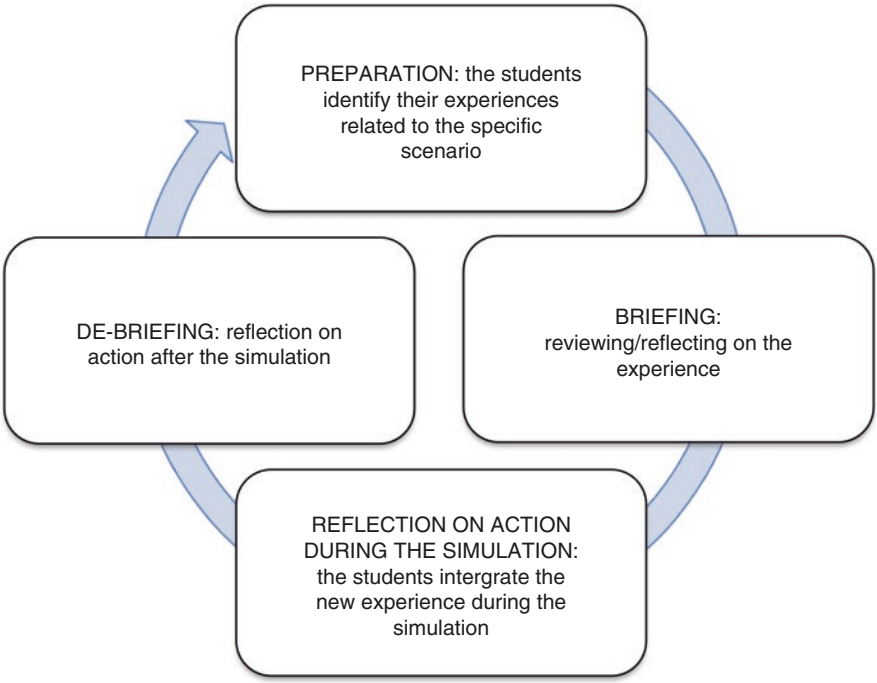

Fig. 1 The new knowledge creates the opportunity for abstract conceptualization, which means that the students are challenged to organize and generalize what they experienced during the implementation of the simulation. Subsequently, the students use abstract reflection to produce new theories and hypotheses that could provide solutions to similar problems at a later stage [14]

in turn generate new experiences that can be reflected upon. In this way, learning has the character of a continuous cycle. Kolb argues that learning is a circular process that consists of four stages of learning, which is portrayed in Fig. 1. Even if it may sound natural to begin with concrete experience, Kolb's model rather takes the shape of an open circle or spiral, with no beginning or end. Figure 1, developed by the authors, shows that in simulation as a learning activity, we ordinarily start the process with briefing and a concrete experience or a scenario. This is followed by a de-briefing phase where the students reflect on the experience and view the implementation from different perspectives. This represents the cycle in a simulation exercise. Through the reflection in the de-briefing stage, the students will be able to realize the significance of the knowledge and skills they have acquired.

5.2 Reflection-on-Action and Reflection-in-Action

Donald A. Schön [25] developed the concepts *reflection-on-action* and *reflection-in-action.* According to Schön, a professional practitioner is marked by the ability to reflect while acting, that is, doing both things at the same time. If a patient during a

simulation exercise gets respiratory problems, the nursing student might be reminded that the patient should be placed in a semi-sitting position. Based on knowledge about anatomic and physiological conditions, a professional practitioner knows this and will implement the required action after observing the patient's symptoms. Following the simulation, those responsible for the action will by engaging in the scenario be able to reflect individually and together with the other participants. During simulation, the nursing student may carry out the right action but still be unaware on the reasoning behind it. In the de-briefing stage, the lecturer/facilitator or one of the other participants would get the chance to ask, "Why did you place the patient in upright sitting? Why did you carry out exactly this action? Could you have done anything else and achieved the same effect?" Through reflection on action, students raise their awareness. Repetition acts as a key to learning. Hence, if the same scenario is repeated several times, the student will preserve his/her experiences from the first round of implementation and reflection into the next rounds. In this way repetition is important for learning to take place through experience. The de-briefing is most successful when the participants themselves articulate what they handled well and what they need to work more on to act responsibly in similar situations [23–25]. To reflect on the action of oneself and others and to receive feedback on your action are central parts of the learning method of simulation.

In the four-stage experiential learning theory, reflection is implicitly present, as concrete action is at the heart of the learning process (Kolb 1984). If the students do not participate in all four stages, the potential for learning will be reduced. In simulation, the lecturer challenges the students to reflect on what they have experienced and observed during the simulation process [24]. Simulation as an active learning method and skills development are closely related to the concepts of Kolb and Schön, namely, *experience-based learning, reflection-on-action, and reflection-in-action* [14, 25, 26].

6 Simulation and Adult Learning

Simulation is rooted in adult learning theory [27]. Nursing students are seen as adults. What distinguishes adults from children is that adults can draw on the experiences of a lifetime when entering the classroom or a learning situation. Nursing students are adults with clear expectations toward the role of their lecturers as disseminators of knowledge. Adults, and therefore nursing students, tend to learn through interaction with others, and active participation helps reinforce the learning [28]. The sociocultural perspective on learning is based on how communication and language affect learning processes in general. In other words, the foundation of learning is that it happens through active participation, cooperation, and interaction in a social context [29]. Nursing students must realize the necessity of acquiring specific knowledge when solving a problem, a process which is also a source of motivation. In simulation, they need to participate actively and justify their action during the de-briefing stage [30].

Studies indicate that students might experience better learning outcomes, acquire more knowledge, and develop higher skills from high-quality simulation exercises compared to other learning methods, which can be explained by scenarios that appear closer to reality [31–33]. These scenarios require the ability to develop and apply clinical knowledge and skills to assess, examine, and communicate with patients, implement procedures, and use clinical reasoning. It has been claimed that simulation leads to improved knowledge and clinical skills while promoting patient safety, teamwork, and professionalism [34]. It may also help develop a deeper understanding (deep learning) and consequently develop critical thinking skills among nursing students. Simulation exercises offer complex scenarios which the students can use to learn action competence [35].

Professional nursing requires knowledge and skills to deal with a number of challenges; well-planned and organized simulation exercises could help in developing students' critical reflection and clinical competence [36]. Some research emphasizes how de-briefing and reflection are crucial in successful simulation. Along with experienced facilitators, this may enhance students' learning experience and ability to assess consequences related to the relevant scenario [36]. Simulation represents an important supplement that accords with the best educational standards and ethical principles of the health sciences [37].

Simulation exercises create many opportunities, but do not necessarily imply a guarantee for learning. Students' learning outcomes depend on the quality of the planning, implementation, and evaluation of the entire simulation exercise. For instance, even if the student has participated and reflected well in the de-briefing stage following simulation, the technical skills are not automatically achieved. The learning outcomes of high-fidelity simulation involve complex settings that demand more than a separate skill, such as the placement of urinary bladder catheters. For example, CRM and confirmatory communication (closed loop) in cardiopulmonary resuscitation (CPR) require that the technical skills are mastered in advance. This means that high-fidelity simulation demands that the students have completed skills training and learned the procedure prior to the simulation.

In the abovementioned example concerning learning CPR, the practical skill training involving compression techniques and the CPR algorithm should take place before the simulation. In case the students have not learned to perform compressions and CPR, their focus is likely to be on carrying out CPR techniques and not on the learning outcomes of CRM and closed loop communication. Accordingly, simulation as a learning method involves a learning process based on a quite simple practical procedure, which will be followed by increasing complexity. When the student is able to apply the practical skills, simulation helps the student *reflect when implementing the action* and cope with the complexity of the situation [25]. This method allows the students to shape their own experiences and reflections while realizing how things are connected [26]. In the CPR simulation exercise, one can observe both effectiveness and cooperation. The reflection following the implementation stage enables the students to become aware of their action, justify their choices, and discuss other possible ways of handling the situation.

Fero et al. (2010) claim that an early identification of the patient's clinical changes requires high competence and alertness on the part of the nurse. It is also important that the nurse is capable of critical reflection, good communication skills, and problem-solving skills. The link between critical reflection and concrete action may not be obvious to all nursing students. Here, simulation could contribute to develop analytical skills and improved knowledge among the students, who get the chance to operate in a solution-focused and decisive way while reflecting on their action [17, 36].

7 Summary

In today's nursing educational program, simulation is used to learn technical skills along with non-technical skills like cooperation, critical thinking, and decision-making before using these skills in a scenario. The opportunity to perform exercises in real-life settings will lead to more patient safety, a greater scope of nursing action, and better quality of nursing care. Simulation is considered a suitable and effective pedagogical learning method that promotes commitment and curiosity among the students. By allowing nurses and other health professionals to train in a secure environment, with no risk of injury to patients, patient safety is enhanced—which is highly warranted.

Action and experience represent the foundation of Kolb's learning cycle: in simulation-based leaning, both are reflected upon before the next stage of action and assessment takes place. Schön stressed the importance of reflection-in-action and reflection-on-action, as these are required to obtain more knowledge. Simulation exercises could help the transition from nursing student to clinical professional go more smoothly, as well as improve the quality of the early phase of nursing careers. Through interprofessional simulation experiences, nursing students can prepare for future collaborative practice [38].

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How to Use Simulation as a Learning Method in Bachelor and Postgraduate/ Master Education of Nurses and Teachers in Healthcare

Iben Akselbo and Ingvild Aune

1 Introduction

The World Health Organization has stated that health education institutions should use simulation in the education of health professionals [1]. The 2018 report *Simulation in Nursing and Midwifery Education* emphasizes that "evidence from multiple studies shows that simulation is a highly valuable strategy for training nurses and midwives" [2]. Simulation has been utilized increasingly often as a teaching strategy in nursing education programmes. Pamela Jeffries defined simulation as "activities that mimic the reality of a clinical environment and are designed to demonstrate procedures, decision making, and critical thinking through techniques such as role-playing and the use of devices such as interactive videos or mannequins" [3].

Randomized controlled studies have been conducted to measure the learning effect of simulation as a didactic method [4, 5], and these studies support the use of simulation in the preparation of graduate nursing students. It has been shown that simulation, used as a pedagogical tool, prepares students for realistic situations [6–8]. Research also indicates that some parts of practical learning sessions can be replaced with simulation while achieving the same learning outcomes in relation to skills and knowledge [9]. Students are exposed to difficult situations during a simulation, which they may not have encountered in the clinical arena [10]. Reduced numbers of placements, and inconsistency in the quality and availability of learning

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experiences, have made learning in clinical studies more challenging [11]. When emergencies occur in the clinic, students are often not first in line to respond and thus do not gain sufficient experience in learning how to deal with these situations [6]. Simulation has the potential to complement learning in clinical and classroom settings and may therefore help students develop the required skills [10, 12–14]. Students should not enter real-life situations that they are not qualified to handle [15]. Simulation is considered a safe method of instruction for students learning to cope with unforeseen situations in relation to technical and non-technical skills and, thereby, improve management abilities [16].

There is a growing body of literature concerning the subject of simulation in nursing education, and several learning theories have been developed to determine if the use of simulation in nursing education results in successful action competence. Studies have utilized different theoretical frames of reference in this context, such as Kolb's experiential learning theory [17], Schön's reflection theory [18], Benner's theory of clinical imagination and relevance evaluation [19], and Bandura's social cognitive theory [20]. The selection of learning activities and didactic methods should be related to the learning outcomes that are the foundation of nursing education. Theories about reflection and experience can help describe how students accomplish learning when participating in situations that are imitations of clinical situations; in other words, simulations in which they will make decisions and exercise critical thinking [21].

When choosing learning methods in academia, one must plan activities that relate to the learning objectives. The bachelor of nursing program focuses on both theory and practice. One method that can be used to combine these two areas of learning is healthcare simulation; however, it is expensive and time-consuming [22, 23]. This dilemma necessitates justification for simulation as a learning method, as well as proof that simulation provides students with a more realistic approach in solving practical challenges than traditional teaching.

Careful preparation to facilitate psychosocial learning environments is a basic condition for a successful simulation. According to the International Nursing Association for Clinical Simulation and Learning [24], all simulation-based experiences begin with the development of measurable objectives designed to achieve expected outcomes. The description of learning outcomes in the program is often highly abstract and, thus, difficult to evaluate concretely. Therefore, objectives must be operationalized to give the simulation clear and measurable expectations [25]. These objectives are presented to the students before the simulation, along with the scenarios and schedule for implementation of the simulation training.

Certain prerequisites for simulations must be fulfilled for them to be perceived as good learning tools: professional and pedagogically skilled supervisors, students who are well prepared and motivated, suitable facilities with adapted equipment, and sufficient time [6]. Simulated practice of nursing assessment and patient management prior to a student's clinical nursing practicum is known to be a strong educational method when used in conjunction with other methods of teaching [26].

There are increasing demands and expectations that healthcare professionals provide safe and secure services. The campaign "In Safe Hands" aimed to reduce

unnecessary patient injuries in health services, contribute to the construction of long-term systems and infrastructure for patient safety, and improve patient safety culture in health services [27]. In the national education plan for bachelor of nursing programs in Norway, programs are required to include clinical practice [28]. Emergency preparedness involves competent health professionals, updated instructions, and procedures to be followed in serious situations. Students can acquire this experience via simulation in curricula-based theoretical sequences wherein the aim is to ensure patient safety and fulfil the requirements of professional healthcare services [29].

In this chapter, results from three different studies in Norway [6, 30, 31] about simulation as a learning method are presented and discussed alongside relevant pedagogical theory and other research.

2 Students' Experiences Related to the Use of Simulation

2.1 Simulation as an Educational Method

Students emphasize that simulation provides a higher degree of realism and seriousness than skills training. The simulations more accurately portray the severity of a situation and thus capture the students' full and immediate attention. Students state that they learn more from a simulation followed by debriefing than they do from an entire day of lectures [30, 31]. Students remember better and have better learning outcomes when they simulate what they are going to learn [32, 33].

> *I think it's easier when I can relate to a situation. Then I can think back to what happened, instead of just sitting and looking at a PowerPoint or in a book* [30].

The severity of a simulated scenario prompts the students to concentrate on the tasks at hand and inspires them to discuss their actions afterward. They express that the simulation gave them a better understanding of the physiological and communicative challenges in an emergency than either traditional lectures or training in large groups with fellow students [30]. This is in accordance with Akselbo et al. [6] and Cant and Cooper [26], who express that students feel more competent and able to cope with real-life emergencies following simulation. The students express that they learn something new about themselves in terms of how they behave and deal with situations (e.g., in relation to stress and communication). As a simulation takes place in a safe environment, making mistakes is not a matter of life or death. This sense of security gives the students the opportunity to practice and learn from their mistakes before applying their skills to real-life emergencies [30]. Therefore, students appreciate the opportunity to address an emergency in a controlled environment. The students' experience of stress should be a driver of learning, rather than an obstacle [34]. Theories of reflection, such as Schön's reflection theory, describe how students who participate in simulations of clinical situations can make decisions and exercise critical thinking [21]. Schön's theory may help explain precisely

what occurs during the debriefing and reflection processes. He introduced the concept of the reflective practitioner, which distinguishes between the reflection that happens during the act and the critical reflection that occurs after the act [35]. When the students are in an unfamiliar situation, such as a new simulated scenario, the actions appropriate to the scenario require knowledge that they have not yet. They are forced to rely on the competence and knowledge they possessed prior to the start of the simulation. This leads to what Schön terms "reflection-in-action." During the debriefing, in which the students reflect on the actions they took to solve the problem in the simulated scenario, further knowledge is developed. Schön terms this process "reflection-on-action" and claims that such reflection enables one to bridge the gap between theory and practice. The ability to reflect in action during simulation is a key factor in ensuring the best possible patient care in an emergency [35].

2.2 The Significance of the Briefing

Students point out that the information provided by their teachers prior to a simulation contributed to more knowledge and confidence in the simulation itself. The teachers' commitment and positivity were transmitted to the students [31]. The students report that they were worried before the simulation, but with information and time for questions, the worry was lessened. This was expressed as follows by a student:

> *We prepared for what the simulation was. The teacher made us reflect on the theme of the case. She worked to ensure that everyone understood what simulation was, and that different emotions could arise* [31].

Public health nursing students highlight that if simulation is to be perceived as a good learning tool, there are some prerequisites that must be fulfilled. For instance, instructors must be committed not only to facilitate a set of resources but also to create a complete environment for learning [6]. Gibson [36] introduced the concept of "affordance," which elaborates the relationship between the design of learning environments and how the design supports the learning experience.

2.3 Communication and Actions During the Simulation

Communication and interaction are important factors in nursing practice [37]. International research on professional education shows that simulations have great potential for developing professional communication skills [38]. Students feel that simulation is an educational method in which they experience realistic feelings and stress in an acute situation. They recognize the importance of having a leader who communicates with all participants. Students highlight that good communication in an emergency is important to make the right decisions. They also state that poor communication makes the situation difficult to follow, leading them to become insecure and almost unable to act. Students have learned that the ability to communicate well is tested in critical situations because of the stress involved, and they have

learned how they respond to stress as an individual in a safe environment. After the simulation, they feel greater security, action competence, and coping ability for real-life situations:

> *We got to know this stress you can get in such situations and how hard it can be to keep your head cold, give clear messages, and have a clear leader* [6].

Effective communication and collaboration are essential components of nursing, and simulation can be a useful teaching strategy to improve these skills. The more often such simulations occur, the greater the progress is likely to be [37]. Students report that they become more aware of their own behavior when meeting other people. After the simulation, they reflect on their own communication skills, such as the use of pauses in a conversation, how to ask good questions, active listening, body language, non-verbal communication, empathy, and how to capture the patient's attention. Students make it clear that communication skills are crucial for doing a good job. To develop as a professional, it is important that students receive practice in communication [31]. Students learn that good communication is important in an emergency to make the right decisions [6]. The curriculum learning outcomes in nursing are largely related to communication and interaction. Effective communication and collaboration are essential components of nursing, and simulation can be a useful teaching strategy to improve these skills [37].

2.4 Preparedness for Later Practice

Aside from practice, students perceive simulation to be one of the most effective ways of preparing themselves for the nursing profession. Students acknowledge the usefulness of acting out an emergency, noting that it helps them feel like their body is equipped to cope with stress and that they know what to do [30].

> *You remember better, it is a bit limited what you remember from the curriculum books all the time. Especially a book that has a lot of text. So, it's kind of … such situations are remembered better later* [30].

Students emphasize that simulations prepare them to handle real emergencies. When emergencies occur in clinical practice, it is unlikely that students will be first in line to handle them. The debriefing is important for initiating discussion of serious situations that may be encountered and how to deal with them:

> *Simulation awakes more processes and thoughts in us and prepares us better than if we had read this in a book* [6].

2.5 Stress and Leadership

Students find the video recording of the simulated scenario uncomfortable but recognize the learning outcomes associated with it [30]. Students also identify challenges by having a group that observes the scenario [6]. At the same time, they learn

a lot from being part of the observing group themselves. Standing outside of such a situation creates positive learning outcomes regarding the observation of strengths and weaknesses in the actions taken. They discover the importance of cooperation in stressful situations to avoid misunderstandings that may lead to serious treatment failure [6]. In this way, the facilitator must be aware that students may feel stress and anxiety when performing in front of others, either in role play, during the conversation afterward, or via video clips [39]. Studies show that this becomes worse when more fellow students are involved [40].

In the simulated emergency, the student plays the role of the nurse and is therefore responsible for making the right decisions and acting reasonably. In this situation, students experience both physical and mental stress. They note that this experience allows them to understand how a real-life emergency would feel [30].

Prior to the simulation, students are uncertain and nervous. They note that they expend a lot of energy due to physical and mental stress. They comment that the simulation causes them to read more than usual and that afterwards, the simulation was not as scary as many had thought it would be. Some students indicate that the stress they feel during the simulation makes it difficult to manage the situation. A lack of knowledge of the situation and anxiety about managing other students sometimes keeps them from taking the lead [30].

> *It surprised me to watch the video and know how stressed you were in your head and then it didn't show. And you still manage to do all you need to do. One feels that one manages to perform even if one is stressed* [30].

Students feel that experiencing physical stress (e.g., a higher pulse and increased sweating) helps them better remember the skills learned in the simulation. They also feel that the situation is chaotic at times because everyone (or sometimes no one) takes the lead but that it is instructive to discuss management in the debriefing (e.g., what makes you a good leader and how to help each other succeed and communicate effectively). Although the video recording is stressful for some, others appreciate that the respondents are not sitting in the same room but rather following the simulation through streaming video. However, during the scenario, the students tend to forget about the video recording and concentrate on the tasks [30]. Taking leadership in emergencies requires the nurse to rapidly analyze a complex environment. The nurse must assess where and what sort of help is required and be able to communicate effectively to deliver that help [41]. Students express high levels of stress, both before and during the simulation, due to low self-confidence from lack of knowledge and experience with emergencies. They express a desire for a greater number of simulation opportunities throughout their education, as they feel this learning method will help ease their stress and produce positive learning outcomes [30]. Indeed, low self-confidence is associated with high levels of anxiety and delay in implementing expected actions, as well as increased errors [42]. The competence gained through simulation (e.g., knowing what is going to happen and how) helps raise student confidence and reduce stress levels [43]. Repeated simulation experiences increase students' self-confidence levels [42], and the more students work in situations requiring critical thinking, the greater their ability to refine and build on

their performance strategies [44]. Gaining emergency experience in a controlled environment is important for feeling autonomous and improving confidence [45–47].

Nursing students feel that simulation is an educational method where they get to experience the feelings of stress brought on by a realistic emergency. Simulations place students in new and unexpected situations. As with situations in clinical practice, it is necessary to be calm in the midst of action, which requires that the individual intuitively knows what to do (knowledge-in-action). Nursing students feel they must act without having complete control over the situation. Therefore, this is considered knowledge-in-action according to Schön [35].

2.6 The Significance of the Debriefing Process

Students believe that debriefing is effective for clarifying the whole course of events, since the situation during the simulation may be chaotic and difficult to follow. By reviewing the simulation, awareness of their actions increases and concerns topics such as what could be done differently, what was done well, communication, interaction, and priorities. Students experience learning by describing the course of the events themselves and obtaining feedback from other students to reveal the gaps in their knowledge [6].

> *We have made mistakes without hurting human beings, and we have reflected on both mistakes and strengths in our actions. This is the lesson we remember for a long time* [6].

Schön distinguishes between reflection-in-action and critical reflection after the action is performed. By reflecting on what solved the problem, new knowledge is developed (reflection-of-action). The reflection occurs in debriefing after the scenario. However, critical reflection occurs if the chosen solution is problematized, the action is explained, and there is an awareness of the motives behind the decisions. In an unexpected situation, one must make decisions based on new information and think quickly through several alternative actions to execute the most appropriate decision [35]. This is what happens in the debriefing phase, where nursing students are challenged to reflect on their actions and to provide professional clarification. If they are not content with their actions, they are encouraged to think about alternative solutions [6]. During the analysis phase of the debriefing stage, the facilitator can use his/her expertise to conceptualize the communication [48]. Debriefing, involving reflection and feedback from both the teacher and other students, is important for the students. Being able to discuss the simulation and highlight effective actions means that the students experience a broader and deeper understanding of the event. The students also recognize the gaps in their own knowledge and can discuss with their teacher how to obtain the knowledge they feel they are lacking [6, 30]. Students feel that the facilitator has a significant role in leading the conversation after the scenario. Students value that the facilitator is engaged, provides confidence, and asks clear questions and challenges reflection [31].

She asked many good questions that made me reflect on the different situations during the simulation, and we were forced to put it into words [31].

Students emphasize the usefulness of co-learning. They highlight the importance and value of dialogue and reflection in relation to one's own learning and development. It is emphasized that fellow students give good reflective feedback. Students learn from each other by putting into words what they would have done in the same situation [31]. According to Lave and Wenger [49], knowledge is rooted in specific situations, and learning takes place in a social community where individuals learn from each other.

3 Conclusion

Simulation provides a higher degree of realism and seriousness than skills training. It is an educational method providing a realistic scenario in which students experience feelings and stress similar to what they would experience in a real emergency. Simulation is perceived to be one of the most effective ways of preparing for the profession of nursing. During the debriefing process, students become aware of why they handled the situation the way they did, what could be done differently, and what was done well, in addition to learning communication, interaction, and priority management. Feedback from other students and the teacher helps reveal students' gaps in knowledge.

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Facilitating Learning Activities in Further Education and Master's Program in Oncology Nursing

Sven Inge Molnes

1 Introduction

Cancer cases are expected to increase in the next few years. Caring for patients with cancer is becoming more common in acute and critical care settings. In 2020, 35,515 new cases of cancer were registered in Norway [1]. A number of factors may underlie this trend, such as population growth, an increase in the proportion of the elderly, better diagnostics and screening, and an actual increase in the risk of certain types of cancer. Complex disease patterns and complex needs are increasing, resulting in greater challenges for both municipal and specialist health services. Patients who were previously treated in the hospital can now receive advanced treatment and nursing at home. According to the Coordination Reform [2], patients with cancer require a comprehensive health service. Due to the increase in patients with cancer and guidelines from government agencies, health and care services face new challenges. There will be an increased need for professional competence, skills development, and collaboration, and patients will ideally experience a holistic service and a coordinated patient process. Collaboration is important for the patient to receive the optimal care and treatment and for the patient's relatives to receive adequate support [3].

According to the national cancer strategy "Living with cancer" 2018–2022 [3], Norway will be a pioneer for positive patient outcomes by pursuing the national objectives of more user-oriented cancer care and enhanced cancer prevention. More people will survive and live longer with cancer, and cancer patients and their families will enjoy the best possible quality of life.

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2 Objective for Education

There are increasing demands for quality in the municipal and specialist health services, and therefore educational institutions must prepare qualified oncology nurses.

Oncology nurses must be prepared to care for cancer patients of all ages and in all phases of the disease. This means that their education must lead to competence: the oncology nurse must be able to meet cancer patients and their relatives at different stages of navigating the municipal health services and specialist health service and in all phases of their illness. Oncology nursing education consists of theory taught at an educational institution and practice studies in the municipal health service and specialist health service [4]. Oncology nursing focuses not only on pain management but also on safety management, the side effects of chemotherapy, and emergency situations [5]. The oncology nursing student needs training to see situations comprehensively, take action when the patient's situation worsens, and communicate effectively with the patient and their relatives. The bachelor's education program in nursing does not have the opportunity to provide in-depth training on nursing for cancer patients. Therefore, additional education is needed to ensure optimal professional competency in oncology nursing. Much of this training will take place during the students' practice studies, but these periods are short, and there are many aspects of nursing for students to focus on. It can be challenging to combine basic and partly advanced theoretical knowledge with practical knowledge. There is thus a need for educational institutions to develop pedagogical methods that help students combine theory and practice through concrete exercises relevant to patient situations.

3 Simulation in Oncology Nursing

The implications of waning nursing competency and the requirement to deliver safe care have led to the investigation of simulation education modalities. Simulations can assist nurses with knowledge acquisition and the maintenance of oncologic competencies [6]. Self-learning, return demonstration, and skills fairs do not provide the same learning efficacy and competency assessment as simulating via a human patient simulation [7]. Simulation scenarios provide students the opportunity to develop their confidence as they learn to control their fear and panic when faced with clinical emergencies [8].

Since 1950, simulation as a pedagogical method has been used with good results in nursing education [9]. Simulation has proven to be an effective clinical adjunct to hands-on patient care [10]. Simulation can contribute to the conscious use of didactics, which can increase students' learning [11]. Through simulation, students become more confident in their own profession, retain more information, and achieve a better learning outcome [12, 13]. Learning involves both relevance and realism. It is therefore important that teaching is anchored in practice so that the students experience learning situations that are as relevant as possible [14]. Simulation has proven useful in connection with skills training, decision-making, situation understanding, patient safety, communication training, skills development, teamwork, and management [15–18]. Through simulation, students can practice

situations that require mastery in a safe environment. Through simulations' attempts to imitate reality, students have the opportunity to recognize themselves in the situation, allowing them to reflect on their own skills and critically analyze their own and others' actions in a scenario [10]. Participating in simulations can reduce students' anxiety about current practice situations and provide a good opportunity to use theoretical knowledge and acquire new knowledge [19].

Benner [20] describes how nurses undergo a process of development in their clinical knowledge, progressing from novice to expert. Benner [20] divides this development into five competence levels: novice, advanced beginner, competent, knowledgeable, and expert. Reflection is a prerequisite for students to achieve expert level. The pedagogical basis for simulation is learning through action, which comes from Dewey's [21] "learning by doing." It presupposes a learning process characterized by reflection on theoretical and practical knowledge processing [22]. Schön [23, 24] distinguishes between two types of professional reflection: "reflection in action," where the professional uses a combination of knowledge, experience, and intuition in parallel with action, and "reflection on action," where the professional reflects on the process and the consequences after the event. These processes pertain to the connection between how the professional thinks and acts. Reflection allows professionals to create new proposals for solutions or gain an understanding of the challenges they face so that the next time they encounter a similar situation, "reflection in action" is triggered. The professional will then be better able to produce the new knowledge or behavior they have planned to use [23, 24].

Simulation requires a combination of learning methods. Students must acquire theoretical knowledge, which is fact-based, through research, theories, models, laws, and rules that form the basis for understanding how and why they should respond in various forms. Furthermore, they must acquire practical knowledge, which means having the necessary skills required to perform nursing. This concrete knowledge is developed through experience and practice. It is also important that students possess ethical knowledge, which means integrating the nursing subject's values so that ethics are reflected in the nurse's actions and attitudes. The nurse's values, attitudes, and views help influence decisions about what should be done or not done. During a simulation, nurses can enter the role they want to have in practice with the patient and can perform a job as realistically as possible. Simulation can prepare the student for developing problem-solving and critical thinking, seeing connections in practice, collaborating in groups, and reflecting on skills.

Simulation aims to prepare students for various situations they will encounter in practice and prevent students from encountering real patient situations without adequate preparation. In addition to action-competent nurses, society demands a greater degree of patient safety. High-fidelity simulation may provide a suitable method for refining important skills. In high-fidelity simulations, students can identify patient needs and perform relevant nursing measures while simultaneously mastering patient treatment and communication with patients, relatives, and other health professionals. Furthermore, students develop the ability to process and relate to new information that they receive during the scenario. In this way, students have the opportunity to practice realistic situations that may arise in practice without exposing actual patients to risk [6, 25].

4 Examples of Scenarios

Simulation scenarios must reflect the learning outcomes and have a clear aim. Simulations should build qualifications and competence around the concepts students should be able to understand or the tasks students must be able to perform.

Administering chemotherapy can be practiced through simulation. Chemotherapy is one of the methods increasingly used to treat cancer. The administration of chemotherapy is a complex task that involves many safety issues due to the narrow safety margin of the cytotoxic medications used in the therapeutic regimen [26]. Chemotherapy medications are classified as high-alert medications due to the potential harm if an error occurs [7].

Communication is another fundamental competency of oncology nurses. It enables them to assess, teach, counsel, question, intervene, and validate the myriad problems that affect patients' health and care for relatives [27–30].

Here are some examples of scenarios that are used in further education and master's program in oncology nursing.

4.1 Patient with an Allergic Reaction to Chemotherapy

Scenario	Linda (40 years old) has breast cancer. Today she will have her first treatment with chemotherapy at the outpatient clinic. She suffers from nausea
	Status start-up:
	– Blood pressure 120/80
	– Pulse 80
	– Saturation 98%
	– Respiratory rate 12
	– Temperature 37 °C
	– Skin color normal
	– Glasgow coma scale (GCS) awake
	– Height 165 cm
	– Weight 70 kg
	– Pollen allergy
	Linda works as a nurse. She likes to go hiking and enjoys being out in nature. Linda has a boyfriend, but he is traveling for work
	Linda does not want to talk; she is nervous and just wants to finish the treatment
	After Linda receives chemotherapy, her status will change, and she will get worse. She will have an allergic reaction to the chemotherapy. New values during the scenario
Learning outcomes	– Observe according to ABCDE methodology and implement relevant measures
	– Recognize symptoms of anaphylactic shock
	– Communicate systematically with doctor or other personnel based on ISBAR (Identify, Situation, Background, Assessment, and Recommendation)
Patient	Manikin (SimMan 3G) and actor/role player

4.2 Palliative Care to a Patient with Prostate Cancer

Scenario	Magnus (72 years old) was admitted to the hospital 2 days ago, as he has severe pain in his back, hips, and shoulders. Magnus has prostate cancer, and the cancer has spread to the skeleton. Palliative chemotherapy has been started to limit the disease and keep it "in check" if possible
	Status:
	– Blood pressure 120/60
	– Pulse 92
	– Saturation 96%
	– Respiratory rate 14
	– Temperature 37.3 °C
	– Severe pain in the back, hips, and shoulders
	– Nausea, poor appetite
	– Dehydrated
	– Height 182 cm
	– Weight 61 kg
	– Blood tests: available during simulation
	– Medication: available during simulation
	Magnus is a retired teacher who worked in secondary schools. His wife, Marie, is also retired and worked as an accountant. The couple has three adult children who all have their own families and children. In total, Magnus and Marie have seven grandchildren from 3 to 12 years old. The unity in the family seems good
	Magnus clearly has great pain as well as nausea, discomfort, and lethargy. The pain is becoming more and more troublesome. He is tired and exhausted. His wife is desperate about the situation
Learning outcomes	– Observe according to ABCDE methodology and implement relevant measures
	– Be able to use Edmonton Symptom Assessment System (ESAS) as a tool in mapping the patient's situation
	– Inform/talk about planned treatment with patient and relatives
Patient	Manikin (SimMan 3G) and actor/role player
Relatives	Actor/role player

4.3 A Consultation with a Patient with Colon Cancer and his Next of Kin

Scenario	Daniel (48 years old) has colon cancer which spread to the liver. He is receiving chemotherapy. There is a plan to assess the effectiveness of the cure after cure number 4; today, he will receive cure number 2
	Daniel works as a bank adviser. He has a wife, Brit, and two children, Tobias (16 years old) and Trine (18 years old). His wife works in a kindergarten. The children have many friends, and both are busy with schoolwork and playing football
	Daniel is clearly concerned about things being done right. He can be a little restless and asks many questions about whether he is getting the right treatment. He does not settle for the fact that the spread to the liver is inoperable. He is not happy with receiving only chemotherapy
	He has searched the Internet and looked at various treatments abroad. He and his wife have talked about wanting to try other treatments, but this will be expensive, and they may have to take out a loan to make it happen. He has also found natural medicine that he wants to try.

Learning outcomes	– Observe according to ABCDE methodology and implement relevant measures
	– Be able to meet the patient's need for psychosocial support and care at all stages of the cancer
	– Have insight into how one's own values govern actions in encounters with cancer patients and their relatives and be able to reflect on ethical issues and dilemmas
Patient	Actor/role player
Relatives	Actor/role player

5 Preparation and Implementation of Simulation

The first time the students participate in a simulation, they receive a theoretical review of the simulation as a pedagogical method and tour the simulation center. It is important for instructors to be clear about what is expected of the individual students, and great emphasis is placed on the duty of confidentiality. Prior to the simulation, information from the current literature is posted on a digital learning platform to be reviewed along with a description of the scenario. This ensures that the students gain an understanding of simulation as a pedagogical method and insight into the various practice exercises. Central to the simulation experience is the students' attainment of mastery. By letting the students know in advance which topics will be the subject of the simulation, they have the opportunity to review the syllabus and think about the situation. Having the opportunity to prepare can increase the feeling of mastery during the simulation. Mastery experiences unlock the mind for learning, while experiences of lacking control can block learning.

Before the simulation, students receive a briefing about the situation they will encounter. They then have some time to prepare mentally, reflect, and get acquainted with the "workplace" environment before the action begins. It is important that students are assigned roles that match their practice; an oncology nursing student does not get the role of a doctor, for instance. Students should be aware of the responsibilities of their role for the simulation to be successful. Therefore, students should not have a role they do not have competence in, and the participants should not play roles different from their actual practice. This would not provide an effective learning situation.

Some students feel uncomfortable during simulations. They have no control over the situation, and insecurity characterizes the activity [6]. When an educational program carries out simulations, it is usually two students who participate. When two students work together, it provides safety for the students, as they are not alone in the situation. It is important to focus on the students' learning and ensure that the students experience mastery in the situation. Students who do not participate in the simulation have the role of observers and are given the task of observing their respective learning outcomes. The actual scenario takes 10–40 min, depending on how the scenario develops.

Debriefing is an important aspect of simulation as a pedagogical method. One of the facilitators' tasks is to build a bridge between simulation and practice in the

debriefing, as it is through the reflections that the students learn [11]. During the debriefing, the students' critical reflections on their own behavior are highlighted. If the debriefing is to be able to promote student reflection, it is important that the facilitator structures the debriefing so that the reflection is meaningful [11].

Debriefing methods used in simulation in nurse education can vary widely, and there are many different debriefing methods. According to Steinwachs [31], debriefing takes place in three phases. The first is the description phase, in which the students describe what happened without interpretations so that everyone can identify the action. Next comes the analysis phase, in which the predefined learning outcomes govern the professional reflection that takes place. The students who were active in the scenario describe two or three things that they did well and justify their assertions. Then they have the opportunity to reflect on what they could do differently if they encountered a similar situation in practice. Finally, the observers are given the opportunity to explain what they thought was done well and what could have been done differently based on the learning outcomes. During the final phase, the application phase, each student reflects on how they will utilize this experience to improve their knowledge and skills. The utilization of high-fidelity simulations in nursing has been shown to increase learner knowledge, self-confidence, satisfaction, and self-efficacy in managing critical oncologic infusion emergencies [26].

6 Experiences and Feedback from the Students

In the bachelor's education in nursing program, there is rarely much focus on teaching oncological content. This represents a missed opportunity for students who intend to study oncology nursing, as they have little knowledge of the field before they start their studies. There are many areas where the oncology nurse must have expertise. The competent oncology nurse can effectively manage the complex cancer patient, their disease process, modalities of cancer treatment, multidisciplinary care teams, and the patient's psychosocial and symptom management [4].

According to the education program, simulation and skills training create commitment and active students while at the same time allowing them to face a variety of situations and practice competence [32]. Some students who participated in simulations became more active, and this may be because they felt secure in what they were supposed to do. Some students felt some pressure at first, dreading to expose themselves academically and personally to fellow students. On the feedback after the simulation, it emerged that these students were very engaged by the simulation situation and that they eventually forgot those who were observers. In one example, the situation with the patient and relatives became the focus [32]. Experience so far suggests that the educational program sees the importance of offering an arrangement to students that provides the opportunity to acquire competence by practicing real situations [32]. The debriefing increases the learning effect, and reflection creates space for discussion, questions, sharing experiences, improving actions, and processing experiences. Feedback from the students after the simulation was unanimous that it was very useful. The students want more

time for simulations [32]. During the further education and master's program in oncology nursing, several days of simulation, skills training, and other exercises will be implemented.

7 More Focus on Oncology Nursing for Children and Collaboration

In Norway, the incidence of cancer in children and young people has been stable for the past 40 years. There are approximately 140 new cases annually in the age group 0–15 years [3]. Globally, more than 300,000 children are diagnosed with cancer each year [33], and according to the National Cancer Institute [34], the incidence of childhood cancer has improved over the past 40 years. Oncology nursing students have little knowledge of nursing for children from their previous education, and this is something the education program wants to strengthen in the coming years in further education and master's program in oncology nursing. Treatment for cancer in children includes chemotherapy, radiation therapy, and/or surgery [35]. Nurses lack training and confidence in caring for pediatric oncology patients [36], and simulation is well suited for helping nurses acquire knowledge and training in caring for children.

A large increase in the number of patients living with cancer and who have undergone cancer treatment is also expected in the future. Some of these patients will continue to require significant health and care services. This increase will place great demands on capacity and competence in the specialist health service and in the municipal health and care service. There are increasing demands for collaboration between hospitals and between the specialist health service and the municipal health service. Patients' complex needs must be managed in a coordinated and competent way while ensuring as much home time as possible for the patients [3]. Further education and master's program in oncology nursing must have a greater focus on collaboration, and health services must be coordinated so that the patient and their family experience security and continuity. Simulation can be a well-suited method for such training, provided that roles and expectations for each participant are clear.

8 Conclusion

Simulation as a pedagogical method in further education and master's program in oncology nursing is an effective learning activity to achieve desired learning outcomes. The challenges nurses will face through their work are significant. By having the opportunity to practice in different situations, they will gain a feeling of safety, greater room for flexibility, and better-quality education. Oncology nurses work in hospitals, home health care, home nursing, and other institutions. They are often faced with situations that must be handled independently, and it is therefore important that they have the knowledge and skills to solve problems and complete tasks. This is important for both quality assurance and patient safety. Simulation as

a pedagogical method is suitable and effective, as it stimulates engagement and curiosity among students in the field of practice and with colleagues. Simulation helps oncology nursing students train from simple to more advanced procedures, and it ensures that patient safety is given priority by training within a safe framework that does not expose the patient to risk.

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Simulating Preoperative Preparations with Focus on Non-technical Skills in an OR Nursing Education Program in Norway

Kjersti Natvig Antonsen and Janne Kristin Hofstad

1 Introduction

Norway offers one of the world's most comprehensive educations in operating room (OR) nursing. The postgraduate program consists of 90 European Credit Transfer and Accumulation System (ECTS) credits and covers three full-time semesters comprised of half theoretical and half clinical studies. All universities will offer an optional extension of the course with a fourth semester, which results in a master's degree (30 ECTS credits) from 2022. Admittance to the program typically requires a bachelor's degree in nursing (180 ECTS credits). Theoretical studies offer a variety of pedagogical methods, including lectures, group work, academic writing, seminars, workshops, skills training, and simulation. Norwegian OR nurses have therapeutic, pedagogical, and administrative roles, as well as responsibilities for research and professional development [1]. The OR nurse fulfills the functions of both scrub and circulating roles. Alternating between the two roles, the OR nurses work in teams of two who interact constantly with each other. The OR nurse performs technical tasks, and patient care in complex situations, and must master both technical and non-technical skills to ensure patient safety in interdisciplinary collaboration within the surgical team [2]. To achieve the best standard of care, OR nurses must be proficient in the responsibilities and functions of both OR nursing roles, including teamwork and other non-technical skills. Mastery of technical and non-technical skills go hand in hand [3]. In the highly technological surgical environment, the OR nurse is part of a professional surgical team. In preparing the patient and OR for surgery, the scrub and circulating nurses work in close collaboration with nurse anesthetists. Most adverse events that jeopardize the safety of hospitalized patients occur in the surgical setting, and near-misses and unintended harm caused by human

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factors are potentially avoidable [4]. OR nurses have long been familiar with the non-technical skills essential to their role, but the knowledge has been tacit. The Norwegian adaptation of the Scrub Practitioners' List of Intraoperative Non-Technical Skills (SPLINTS-no) system provides OR nurses with a common vocabulary and structure of non-technical skills. Using SPLINTS-no as a supportive training tool improves communication and descriptive skills between OR nurses, increasing awareness of non-technical skills, and encouraging reflection [5]. This chapter will describe the planning, implementation, and evaluation of non-technical skills simulations in an OR nursing program in Norway. The simulations were run as a sequence of two low-fidelity scenarios (in which the OR nursing students prepared the patient and the OR for surgery) and a third high-fidelity scenario of preoperative preparations involving both OR and anesthetic nursing students. SPLINTS-no was used as a tool for reflection and learning for the OR nursing students in debriefing sessions.

2 Choosing Simulation as a Pedagogical Method

In higher education, the choice of learning activities and pedagogical method is determined chiefly by measurement and comparison of educational outcomes. It has been argued that the purpose and quality of education, rather than its effectiveness, should be the primary considerations when designing educational processes. Education can be described with three purposes: qualification, socialization, and subjectification. Qualification refers to knowledge, skills, and understanding acquired as a result of education, while socialization relates to how education allows students to become part of social, cultural, and political orders. Subjectification is described as the opposite of the purpose of socialization—a way of remaining independent from such orders by becoming autonomous and trusting one's own decisions [6].

In OR nursing education, we suggest that all three of these purposes must be considered when designing learning activities. An OR nurse must acquire a specific set of skills and knowledge and become a functional part of a surgical team through designated learning activities and experience in clinical practice [2]. In addition, OR nurses must be capable of making independent decisions in (sometimes critical) situations to ensure patient safety [7]. Despite this, leadership and decision-making skills are sparsely recognized in OR nursing literature, and further research and development is needed for educational training and pathways for both circulating and scrub nurses [8].

Simulations are increasingly being used as an approach to learning in OR nursing, as they allow students to improve their teamwork and communication skills in a safe environment [9]. Simulating OR scenarios with interdisciplinary student groups improves team behaviors [10] and attitudes [11], enabling the students to develop a better understanding of each other's roles in achieving a

common goal. Interdisciplinary simulation promotes trust within the team [12] and has the potential to break down silos in the OR [11]. The learning process in a simulation activity is reinforced by proceeding directly to feedback and debriefing following the simulation [13]. Feedback literacy is described as the student's ability to understand, utilize, and benefit from feedback processes [14]. When students are more actively involved in the feedback process, it develops their capacity to judge the quality of both their own work and that of others and to make informed decisions in their own practice [15]. Peer feedback has been shown to be particularly valuable in developing these skills, as it encourages students to more carefully evaluate the actions of others and thus reflect on their own performance [14].

3 SPLINTS and SPLINTS-no

The first classification tools for evaluating non-technical skills in healthcare were developed originally for anesthesiologists [16] and surgeons [17] and were followed by evaluation tools for nurse anesthetists [18] and OR nurses [3, 19–21]. The Scrub Practitioners' List of Intraoperative Non-Technical Skills (SPLINTS) assessment tool was designed specifically for scrub nurses during surgery [20], listing non-technical skills under the categories of situation awareness, communication and teamwork, and task management to provide a common framework and language [21].

Norwegian OR nurses work in pairs and alternate between the scrub and circulating nurse roles, both of which are essential for ensuring patient safety in the OR. Non-technical skills assessment tools should be adjusted to the culture in which they are utilized [22], and customized to fit the target group of professionals [23], but few studies have identified the non-technical skills of circulating nurses [8]. To attempt to remedy this, the SPLINTS-no assessment tool was launched in 2017 [24]. SPLINTS-no describes good and poor professional behavior of both scrub and circulating nurses [25]. To make this tool more comprehensive, further adaptation is required to capture the non-technical skills of both OR nursing roles and functions, and further research into the non-technical skills of the circulating nurse is needed [26].

SPLINTS-no is well accepted by OR nurses as a supportive tool in supervising and increasing awareness of non-technical skills during OR student nurse clinical placements, and frequent training is required to become sufficiently familiar with SPLINTS-no to use the rating system correctly [5]. SPLINTS-no has three categories of non-technical skills, situation awareness, communication and teamwork, and task management, which are further divided into a total of nine elements (Table 1) and was used to provide the OR nursing students with a common framework and language for the simulation exercises.

Table 1 Categories and elements of SPLINTS-no adapted from Mykkeltveit and Bentsen [24]; Sirevåg et al. [5]

Situation awareness	Communication and teamwork	Task management
Gathering information	Acting assertively	Planning and preparation
Actively seeking information in the OR by observing, listening, asking questions, and recognizing cues	*Taking initiative in seeking clarification and adapting behavior that promotes effective teamwork*	*Organizing and customizing demands so that tasks can be performed with flow and without interruption*
Recognizing and understanding information	Exchanging information	Implementing and maintaining standards
Recognizing and understanding information from the OR team, combining information with own knowledge to assess the current situation	*Seeking and giving good information to ensure mutual understanding among team members*	*Catering to patient and personnel safety by following laws, standards, and guidelines for good practice*
Anticipating and predicting	Coordinating with others in the team	Handling stress
Thinking ahead in order to remain ahead and predict what will be needed in the next course of events	*Sharing thoughts/ideas and performing technical tasks to promote a better flow in the course of events*	*Handling stressful situations by keeping calm, understanding demands, and pressure on other team members*

4 Planning the Simulations

Prior to beginning simulation activities, several meetings were held between the nurse anesthetist and OR nursing teachers, during which learning outcomes and goals for the two study programs were discussed. Teamwork and patient safety in the OR were identified as common ground, and it was agreed that non-technical skills would be the focused learning objective for the simulations. It was important for the teachers involved that the learning objectives of the simulation activity were few in number, focused, and clearly stated [13]. The teachers agreed to use the non-technical skills assessment tools SPLINTS-no and Nurse Anesthetists' Non-Technical Skills (N-ANTS) as frameworks for the simulations and to create a scenario involving two nurse anesthetists, a circulating nurse, and a scrub nurse. Information on learning objectives, groups, time schedule, and meeting points was published on the students' digital learning platform prior to the simulations.

The OR nursing teachers decided to run two separate professional scenario simulations with the OR nursing students prior to advancing to the third, more complex, interdisciplinary simulation that included the nurse anesthetist students. The collegial team agreed on three scenarios for simulations that could be run using available resources and were engaging to the students, allowing them to achieve the intended learning outcomes of teamwork and non-technical skills in the OR (Fig. 1).

Creating a gradual progression in difficulty level in the simulation training has been shown to enable more effective learning [27]. To optimize the learning benefits

SCENARIO 1	SCENARIO 2	SCENARIO 3
35-year-old female. Weight: 65 kg. Height: 170 cm. Allergies: Unknown. Medication: Unknown. The patient has a painful, cironic infected ingrown toenail on the left hallux. Outpatient surgery with partial permanent removal of the toenail in local infiltration anesthesia. The patient has arrived in the OR and lies in the supine position on the OR table. The patient is motivated for surgery and can't wait to get her toe fixed. The team consists of a scrub and a circulating nurse. The OR nursing team prepares the patient, equipment and OR for surgery and summons the surgeon.	Young female. Weight 70 kg. Height: 174 cm. Allergies: Unknown. The patient has a suspect mole on her right nates, asymmetrical in shape and with a change in color. Outpatient surgery with excision of the mole in local infiltration anesthesia. The mole will be sent to pathological examination. The patient has arrived in the OR and lies in the supine position on the OR table. Although embarrassed of the mole's placement, the patient is motivated for surgery and relieved to have the mole removed. I he team consists of a scrub and a circulating nurse. The OR nursing team prepares the patient, equipment and OR for surgery and summons the surgeon.	Middle aged male. Weight: Unknown. Height: Unknown. Allergies: Unknown. The patient came in this morning with necrotizing fasciitis in the left tibia, rubor and severe pain from the affected area. The resident on call has signed the patient up for emergency surgery with an extended revision of the left tibia in general anesthesia. The patient has arrived at the OR and lies in the supine position on the OR table. The patient is awake, but his general condition is deteriorating. A nurse from the emergency room has just left the OR after giving the team a handover report. The team consists of two OR nurses and two nurse anesthetists. The nursing team prepares the patient, equipment and OR for surgery and summons the surgeon.

Fig. 1 The three scenarios used for simulation

of the third simulation (which involved preparing for an advanced emergency surgery case of necrotizing fasciitis), the OR nursing students first underwent two simulations in a basic presurgical OR setting with two simple outpatient cases, which required the use of non-technical skills within the OR nursing team. It has been shown that simulations flow more smoothly when the students have had prior experience of the simulation setting [28].

It is widely recognized that the debriefing process is essential for achieving a deeper understanding of the skills developed during a simulation [29–31], and sufficient time must be allowed for this [13, 32, 33]. The expected duration of each of the three scenarios was 30 min. A further 40 min was set aside for debriefing, as the literature suggests this is given at least the same amount of time as was spent on the scenarios [13, 32, 33].

Knowledge of the professional field is essential to provide students with adequate support throughout every stage of the simulation activities [13]. To ensure this, the teachers involved in the simulations were all either OR nurses or nurse anesthetist professionals, as well as experienced teachers, trained facilitators, and simulation technicians. As simulations can often run unpredictably [13], the experience of the teachers involved ensured that any unexpected events were handled in a professional manner and that the simulation laboratory was set up comprehensively with the equipment required for the activity.

The literature describes simulation group sizes within the range of 4–14 participating students [32, 34]. Whether the students participate by being directly involved in the simulation or by simply observing the scenario, their learning should not be affected provided that they all participate in the briefings and debriefings [11]. For the first two scenarios, groups of four OR nursing students alternated in pairs as simulating or observing students. This was repeated for the third scenario, this time including four nurse anesthetist students who were also alternating in pairs.

It is our belief that the best teaching practices evolve from the collaboration of collegial teams. A collegial team is characterized by two or more colleagues working in partnership toward a common goal. The collaboration develops through

discussion and sharing of knowledge and experiences with teaching methods. The collegial team is creative, with colleagues challenging each other through critical reflection and views on pedagogical approaches [35].

This pedagogical teamwork makes the planning, implementation, and evaluation of learning activities interesting and professionally stimulating for teachers. Critical reflection within the collegial team requires a good working environment, with a culture of sharing and mutual respect between the teachers. Being a "critical friend" requires colleagues to be encouraging, as well as willing to identify and address problems that may occur, and to suggest different solutions and other ways of thinking [35].

5 The Prebriefing

Prebriefing may also be referred to as simulation orientation, introduction, or briefing [36]. It establishes what is to come by providing students with an overview of the learning objectives for the course and simulation exercise, as well as the knowledge required [37]. The prebriefing gives the students an introduction to the essential nursing skills needed for the scenario and an explanation of their expected performance [28]. The main objective of each scenario was to prepare the OR and patient for the upcoming surgery while using the non-technical skills described by the three categories of SPLINTS-no. The simulating students were prepared for their tasks in the prebriefing and were given an outline of their expected performance of non-technical skills (Fig. 2).

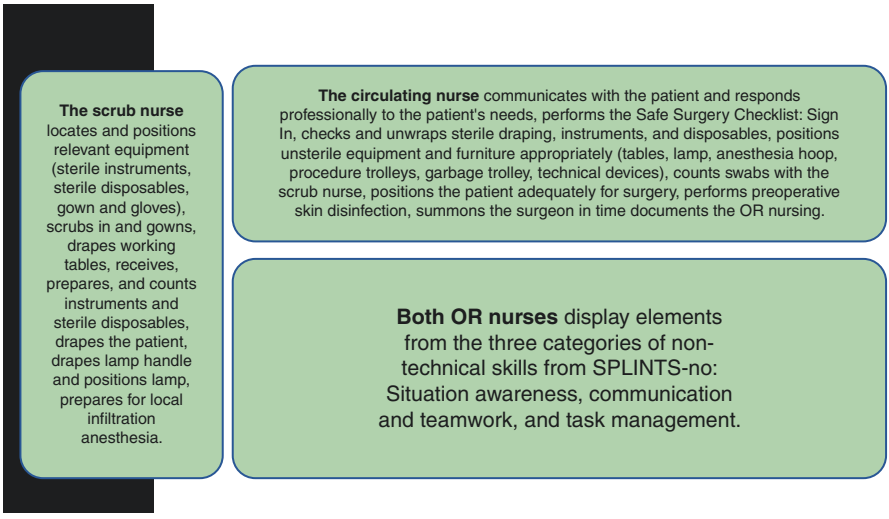

Fig. 2 The expected performance of students in the simulation

Students are more competent, self-confident, and satisfied with the simulation when provided with a structured prebriefing that includes practical information and a hands-on introduction to the simulation environment [38]. Students are also more likely to stay focused on the objectives of the simulation when the environment and equipment are known to them beforehand [13]. The prebriefings in this study were given on-site in the OR simulation laboratory and allowed the students to familiarize themselves with the simulation environment and equipment [37]. The students were encouraged to locate, touch, and examine the available equipment and simulation mannequin. They were given the opportunity to clarify any uncertainty regarding OR nursing skills, and the facilitator offered to demonstrate these skills on request.

Despite the accurate depiction of the OR environment in the simulation, students will still be conscious that it is a simulated environment, and it cannot therefore be guaranteed that they will behave in exactly the same way as they would if the situations were experienced in real life [34]. To step out of their comfort zone and willingly take on the roles allocated for the simulation, students are dependent on a sense of psychological safety. An effective prebriefing establishes a climate where students feel sufficiently psychologically safe to commit to the scenario, accept critical feedback, and welcome new ways of thinking in the debriefing [36]. The students were reminded of the confidentiality maintained by the group and were informed that the simulations would be livestreamed to their peers observing in the debriefing room. The simulations were not videotaped.

Literature describes prebriefings lasting from 3 to 5 min, as well as up to 45–60 min, depending on the duration of the simulation session and the level of detail required by students in the orientation [36]. The prebriefings took place immediately preceding the simulations. The first prebriefings were completed in 45 min. The prebriefings for the second scenario were shorter, as students may only require a quick walk-through between repeating simulations [36].

Establishing ground rules related to the simulation also helps keep learning focused [13]. The facilitator clarified simulation etiquette, norms, and roles prior to commencing and set clear boundaries and expectations [36]. The facilitator introduced the simulation by explaining the scenario and role of each student [28], as well as the beginning, end, and duration of the simulation [36]. The facilitator followed a prebriefing checklist to ensure that all important elements were covered (Fig. 3).

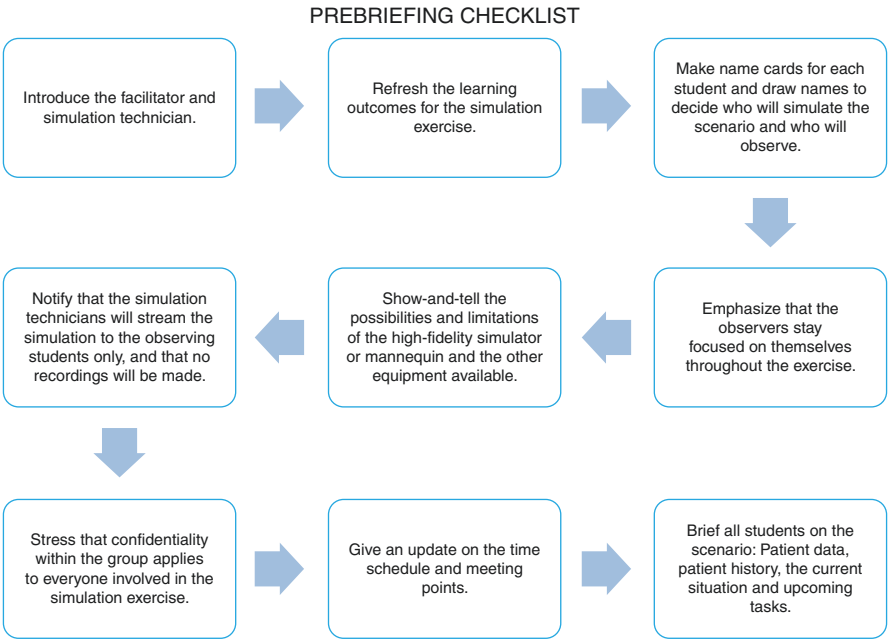

Fig. 3 Prebriefing checklist—adaptation of the simulation prebriefing checklist from the Health Sciences Simulation Unit (EHS) at Norwegian University of Science and Technology (NTNU)

6 The Simulation

OR nursing student groups of four spent 4 h on the simulation activity with the two single professional scenarios. Each student served as either simulating student or observer for the first scenario and then switched their role for the second scenario. Mixed groups of eight OR nursing and nurse anesthetist students participated in the interdisciplinary activity. This third scenario was simulated by half of the interdisciplinary student group; this half then became observers, while the other half of the simulating students repeated the scenario.

6.1 Expected Performance

Situation awareness is demonstrated by the ability to achieve the necessary awareness of a situation in a given context [39]. The OR nurse is expected to display situation awareness by checking the patient's identity and obtaining necessary information from the patient [24]. To do this, the circulating nurse must take on a leadership role and perform the World Health Organization (WHO) Surgical Safety Checklist Sign In prior to induction of anesthesia for each surgical procedure. This involves checking the patient's identity and consent, confirming the surgical site and procedure, and noting patient allergies and predicted blood loss during surgery [40].

Situation awareness is shown in collecting, recognizing, and understanding information from the surroundings by maintaining an overview of the continuously evolving situation in the OR. The OR nurse prioritizes tasks, shifting effectively between them, while taking into consideration verbal and nonverbal cues from other team members, as well as any changes in the patient's needs.

Team familiarity can improve non-technical skills [41] and helps predict the needs of others [42]. Effective use of situation awareness skills can help predict what instruments and equipment might be required, coordinate requests and tasks with other team members [24], and encourage anticipation of what will, can, or should happen next. The team's collective situation awareness is defined as "the degree to which every team member possesses the situation awareness required for his or her responsibilities" [43]. Team members seek a shared awareness of the situation with others in their team, when relevant to the performance of their own role [44].

Insight into other team members' roles and functions, and an understanding of their tasks, increases effective communication between professionals in the OR [45]. Expedient OR nursing skills include communicating clearly and appropriately for the situation and using nonverbal communication when needed. The OR nurse provides and receives essential information in mutual exchanges with other team members, requesting clarification and displaying leadership skills when necessary [24]. These skills can prevent adverse events in the OR. The vigilance of the circulating nurse is critical for the prevention of potential errors, particularly concerning establishment and maintenance of the sterile field [46]. The OR nurse establishes and secures the sterile field, following knowledge-based OR nursing standards and encouraging others in the team to do likewise [25].

OR teams spend almost half of their time multitasking [47]. OR nurses are expected to communicate change, effectively prioritizing simultaneous demands from other team members and reacting appropriately to interruptions. They are essential in providing support by offering help and assistance, giving positive feedback, contributing to a calm atmosphere in the OR, and delegating tasks to reduce stress [24]. The main task for the OR nursing students in all three scenarios in our simulation was to prepare the patient and OR promptly for the upcoming surgical procedure while displaying non-technical skills. Failing to adequately plan the preoperative preparations has been shown to have a negative impact on OR team performance, making breakdowns in both the coordination of tasks and team communication more likely [48]. OR nurses should prioritize tasks, making efficient use of time and opportunities to prepare for the next step whenever possible [24].

6.2 The Observers

The OR nursing students who were observing the simulation used the behavioral rating measurement system SPLINTS-no to assist them in identifying what skills to look for and how to describe them. Following the prebriefing, the observers entered

the debriefing room, where they watched a livestream of the simulation and were asked to take notes according to each of their allocated tasks as observers: *What would I have done if I were to participate in the scenario? Would I have done the same? Why? Would I have done anything differently? If so, how and why?* It is helpful to observe the actions and events that occur in simulations through a common predetermined list of non-technical skills [39], and the observers used the behavioral rating measurement system SPLINTS-no to assist them in identifying what skills to look for and how to describe them. The debriefing room was accessible only to the students and teachers involved in or observing the simulation, thus ensuring the confidentiality of the exercise [32, 49].

6.3 The Facilitator and the Simulation Technician

During the simulations, the simulation technician was situated in an adjoining or remote room, connected to the simulation laboratory through audio and video. The simulation technician was responsible for voicing the patient remotely and was therefore able to adjust the patient's verbal responses to the actions taking place. For the third scenario, the nursing mannequin was replaced by an advanced high-fidelity simulator, allowing the simulation technician to adjust vital physiological responses and monitor parameters in response to the actions of the students. The simulation technician was connected to the facilitator with a headpiece, making direct and discrete communication with the facilitator possible for the duration of the simulation.

The facilitator and simulation technician both observed the simulations for significant events related to non-technical skills. They compared notes directly following the scenario, before continuing to the debriefing stage. These notes could then be used in the debriefing if necessary [50].

7 The Debriefing

Literature on this subject agrees that a debriefing session using a systematic approach encourages reflective learning, when planned well [13, 32, 49]. Debriefing models advise focusing on the preset objectives of the simulation [32, 49] and using a structured approach rather than informal discussions to promote reflection and learning at this stage [32, 33, 49]. It is important that teachers feel confident with all elements of the simulation activity, in order for the students to benefit most from this exercise [13].

Directly following the simulation, the simulating students were asked not to discuss their participation in the scenario until they were joined by the observers for the debriefing session. The structure of the debriefings was based on Steinwachs' debriefing model [50], which all teachers involved had been familiarized with

DESCRIPTION	ANALYSIS	APPLICATION
• Facilitator repeats the learning goals set for the simulation activity. • Simulating students describe what they experienced at the onset of the scenario (patient, environment, equipment). • Observers supplement the description. • Simulating students describe what actions they took, without judging or assessing their actions. • Observers join the dialogue, without passing judgement or assessing the simulating student's actions. • Facilitator summarizes the description phase.	• Simulating students share actions they are satisfied with from the simulation. • Simulating students share what, if anything, they think they should have done differently and why. • Observers are encouraged to stay focused on themselves and reflect on the three questions: *- What would I have done if I were to participate in the scenario?* *- Would I have done the same, and why?* *• Would I have done anything differently? If so, how and why?*	• Simulating students and observers describe what they have learned. • Simulating students and observers articulate how their new knowledge can be transferred to other situations. • Facilitator contributes by linking what the students describe they have learned to specific future situations, such as another simulation activity, or their next period of clinical studies. • Facilitator summarizes the debriefing with respect to the learning goals described for the simulation activity.

Fig. 4 Three phases of debriefing, adapted from Steinwachs [50]

during facilitator training. The facilitator guided the students through the three phases of debriefing: description, analysis, and application (Fig. 4).

Steinwachs describes the debriefing session as "a structured, facilitated conversation with the primary goal to encourage the students to share their reflections in order to discover together" [50]. The facilitator should begin the debriefing by reiterating the learning goals of the activity and avoid lecturing the students on what they should have done in the simulation. The facilitator's role is to be a good listener and stimulate conversation, allowing the students to share their experiences, perspectives, and understandings with their peers. In our simulation teachings, the facilitator helped the students stay focused on non-technical skills throughout the debriefing and ensured a balance of speaking time for both the simulating students and the observers. The SPLINTS-no system gave the students a common language for non-technical skills relevant to OR nursing, which assisted them in identifying issues from the simulation relevant to the learning objectives for the simulation activity. Together, the students analyzed the events of the simulation by taking turns to describe what they observed. They examined issues that occurred in the simulation, gave feedback, and drew parallels between what they learned from the simulation and potential future applications of this knowledge [50].

7.1 Ethical Considerations

The students were informed that their answers to the questionnaire could be used for development and research. The data material was not linked to any IP addresses or other identifying information, and correspondence with the Norwegian Centre for Research Data (NSD) confirmed that using the data for this study attended to the participating students' anonymity.

8 Evaluation

Following the simulation, the collegial team held a structured evaluation meeting to discuss the simulation activity. The success of the simulation planning, briefing, and level of student preparedness were evaluated, and the level of student engagement and effective learning in the debriefing session was used to determine the success of this pedagogical learning method. The students' perspective is essential for the teacher's evaluation of simulation exercises as a successful pedagogical method for achieving learning outcomes and to justify the extensive use of resources required to run the simulations.

To receive feedback on the simulation activity, it is essential to evaluating the students' learning outcomes [13]. To assess whether the OR nursing students enjoyed the training and felt it was valuable to their learning, the Debriefing Experience Scale [51] was prepared as an anonymous, secure online questionnaire. The questions were provided as a Norwegian translated version [52] and answered on a scale consisting of five options that ranged from *strongly agree* to *strongly disagree*. The students were granted access to the questionnaire after the third simulation activity was completed. Excerpts from the results are illustrated in Fig. 5.

The students' responses indicated their subjective experiences of the simulation exercise with respect to their reactions and learning (knowledge, skills, and attitude). These are the first two levels of simulation evaluation, according to Kirkpatrick's widely used model of training evaluation from 1959 [53]. Kirkpatrick's next two levels of simulation evaluation—impact (change in behavior over time) and results—were not evaluated in our questionnaire. The results from the questionnaire revealed that most of the students agreed or fully agreed that the three phases of debriefing were helpful and rewarding.

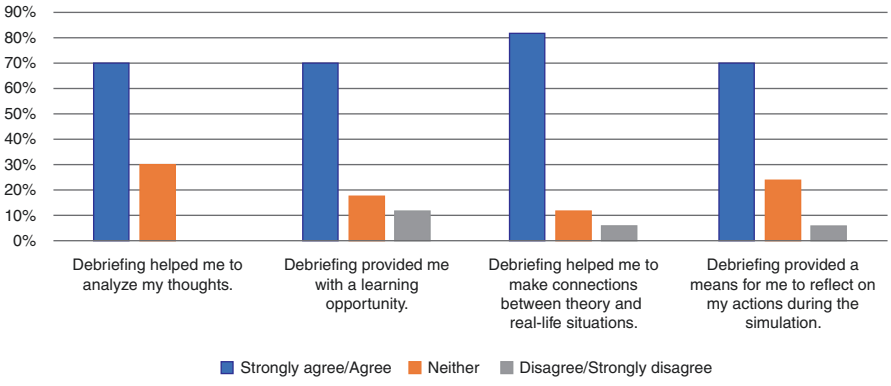

Fig. 5 Debriefing experience

9 Conclusion

Three scenarios of presurgical preparations in the OR were simulated, each of which was followed by a facilitated three-phase debriefing session. These debriefing sessions were pedagogically grounded in the three intertwined dimensions of education: qualification, socialization, and subjectification. They helped the students analyze their thoughts and provided a structure for reflection, encouraging them to make connections between theory and real-life situations in the OR that involve autonomous decision-making. The SPLINTS-no behavioral rating tool was used for reflection and learning throughout the pedagogical activity, providing the students with a common language for feedback, analysis, and reflection. As a pedagogical activity, simulation of non-technical skills in the preoperative OR can be rewarding for OR nursing students. Learning outcomes can be achieved using both low- and high-fidelity simulations, provided that they are identified clearly to all involved and that the activity is planned effectively.

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Training Interprofessional Teamwork in Palliative Care: A Pilot Study of Online Simulation Activity for Registered Nurses and Nursing Associates

Astrid Rønsen and Randi Tosterud

1 Learning Interprofessional Teamwork in Palliative Care Education

Successful interprofessional teamwork is essential in palliative care to achieve quality in patient care. During their education, the students need to train and gain knowledge about the different professions they are going to cooperate with [1].Taking an interprofessional approach to palliative care education has been found to be effective in the live setting [2]. It is stated that "Palliative care is, by the nature of its practice, collaborative" [3]. Previous studies have used live standardized patient simulation to teach interprofessional teamwork with a focus on palliative care topics and communication [4]. Interprofessional simulation in palliative care study programmes often takes place within the faculty and focuses on cooperation with other professional groups such as doctors, occupational therapists and physiotherapists. Nursing associates educated in educational institutions outside academia are a professional group that is often part of the palliative care team. So far, we have not found studies where the cooperation of a registered nurse (RN) with a nursing associate (NA) is in focus.

Addressing didactical questions about how to enable students to train and achieve interprofessional competency during education is an ongoing process. Learning using simulation activity offers such possibilities. As teachers in a postgraduate study programme in palliative care, we have tried out simulation as a learning approach with success both from the teachers' and students' point of view. They report that they value such training and claim it is an efficient way to learn. Several challenges and questions have been raised as to how to facilitate simulation activity to achieve collaborative, student-centred, experimental and clinical practice-based

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learning. In higher education, student-active learning is also emphasized—this entails challenging the students emotionally, cognitively and in action [5].

To achieve quality in the learning process using simulation activity, the International Nursing Association for Clinical Simulation and Learning (INACSL) Standards Committee has prepared recommendations on how simulation activity can be implemented. This is published as INACSL Standards of Best Practice: Simulation SM [6]. The standards describe recommendations for the required criteria and elements in all aspects and phases of simulation activity. It is emphasized that the expected outcomes must be determined and constructed and should be specific, measurable, achievable and realistic. Moreover, time-phased objectives must be given based on expected outcomes. In developing learning outcomes related to technical skills in palliative care, these criteria seem to be appropriate. However, such criteria are quite challenging when it comes to identified core competencies in palliative care such as "Respond to the challenges of clinical and ethical decision-making in palliative care", "Develop interpersonal and communication skills appropriate to palliative care" or "Practice self-awareness and undergo continuing professional development" [7]. Students need training to be aware of the need to develop competency in handling a situation based on their ability to continuously explore the situation from different perspectives. Learning to use simulation activity offers such possibilities. However, the INACSL's criteria for learning outcomes might be inexpedient and challenging to fulfil.

1.1 Simulation Activity Based on Learning Outcomes as Themes

We have tried out simulation activity as a setting based on a theme and not on predetermined, measurable, specific learning outcomes as recommended. About a week before the simulation activity day, the students are challenged to write down situations retrieved from their clinical practice that illustrate the selected theme for the simulation activity. The facilitator transfers the situations to scenarios. When the students gather for the simulation activity day, short extracts from the scenarios are presented, and the students decide jointly which one to use. The student who has ownership of the scenario describes it and conveys their lived experiences from the situation to the others. The students join learning groups and decide how each role in the scenario will be played out. This means that when one student takes a role, it is on behalf of the group. The scenario is prepared and implemented, and sometimes the owner of the scenario participates or sometimes it is implemented by other students.

The debriefing includes a discussion and reflection session based on what the students perceive as important for their learning, alternative problem-solving, fellow students' own experiences from similar situations and the perspective of the different roles in the scenario. We use a structure for debriefing which emphasizes and facilitates for student engagement, activity and responsibility for giving feedback. This structure is briefly described below. New questions and challenges are raised ("what if…"), leading to the creation and implementation of a new scenario.

With intermittent debriefing, the simulation activity evolves during the day as a dynamic process based on the students' needs for learning, ideas, proposed solutions, exploration and experimenting with different solutions. These perspectives are transferred into new scenarios developed by the students.

The facilitator role is to facilitate, be a group leader, pay attention to the group dynamics, contribute questions and subject input and help keep focus.

The students evaluate this type of simulation activity as very instructive, directly relevant to clinical practice, challenging and engaging. Since they are continually involved both emotionally, cognitively and actively, it is also exhausting.

2 Background for Piloting the Online Simulation Activity Project

A vocational college in Norway received external funding for establishing simulation projects, including the programme in palliative care for nursing associates. On this basis, the vocational college invited students in the postgraduate study programme in palliative care at Norwegian University of Science and Technology (NTNU) to take part in a collaborative project. Although these two professional groups have close cooperation in their everyday clinical work, the two educational institutions have not collaborated in a simulation project like this before.

The primary collaborators included four faculty members, two from the vocational college and two from NTNU, and a researcher who was an educationalist specialized in simulation activity as a learning approach.

The project was approved by the Norwegian Social Science Data Services (NSD), and both educational institutions gave permission. The students received written and oral information. Confidentiality and voluntariness were emphasized. The students gave written consent to participate in the filming.

In spring 2020, as was the case worldwide, we went into lockdown due to the COVID-19 pandemic. Physical presence of students and teachers in the Simulation Centre was impossible. To meet online was the only option, and we decided to try transferring simulation activity to an online setting. Because of the pandemic, students and teachers were already familiar with online lecturing and discussions, but not across the degree programmes. How could we implement our previous simulation activity experiences in an online format? Different challenges and decisions had to be made to organize this new situation.

In the following, we will describe how we conducted online simulation activity and how we transferred student involvement to an online setting.

2.1 The Participants and the Setting

Two groups of students participated in the project; one group consisted of 17 nursing associates who were taking part in a study programme in cancer care and palliative care at a vocational college part-time over 2 years (NA). The second group was

composed of 28 registered nurses, a social worker and a learning disability nurse, all postgraduate bachelor's degree students in a part-time interdisciplinary postgraduate programme in palliative care on a master's level (RN).

Because both study programmes are part-time, all the participants were experienced clinicians, working bedside in parallel with education.

3 Implementation

The simulation activity process was divided into three phases (Table 1).

3.1 Phase 1 Developing Narratives

The first phase was a preparation phase that provided a basis for online simulation activity. Both groups of students received information about the transformation of physically implemented simulation activity to online implementation.

Interdisciplinary teamwork in palliative care/end-of-life care was the focus for this project and should be reflected in the scenarios. The NA students were asked to share their experiences concerning this focus through narratives. They brought three different stories/cases to the table. The following was chosen by the students:

Table 1 The online simulation process

Phase	Activity	Participants
1. Developing narratives	Sharing narratives based on clinical experiences	All students
	Selecting a narrative for simulation activity	
2. Developing scenarios for a learning resource bank for online activity	Implementation of simulation activity in the Simulation Centre (Film 1)	Five students
	Identifying main issues	
	Developing scenarios based on identified main issues	
	Simulation activity (Film 2, 3, 4, 5, 6, 7)	
3. Simulation activity online	Watching the introduction scenario (Film 1)	All students (47)
	Monoprofessional and interdisciplinary group discussions	
	Plenary discussions	
	Identifying main issues	
	Choosing relevant issues for further exploration	
	Watching Film 3 and 6 including group and plenary discussions	

The patient, Jim, in his 50s with incurable lung cancer, is on a short-term stay in the local nursing home to recover after his last hospital chemotherapy treatment. His cancer treatment has been ongoing for years, and it has been a long, complicated and difficult journey. The side effects of treatment and the burden of his disease have been enormous.

Jim is married and a father of 2 boys, 15 and 19 years old. He has started to talk openly about his situation to some members of the nursing staff, but he says it is difficult to talk with his wife and sons.

He has lost his appetite and does not want any nutritional supplements. It is difficult for the young, newly employed registered nurse to accept this. She thinks there is more that can be done. A much older and more experienced nursing associate perceives that Jim's decision has to be accepted. These different perspectives cause a negatively charged conflict in the team.

We challenged the students in both groups to come to the Simulation Centre to develop relevant and practical scenarios that could be taped and used as a learning resource bank for online activity.

3.2 Phase 2 Developing a Learning Resource Bank for Online Activity

Five students (three from the vocational college and two from NTNU) volunteered to come to the Simulation Centre to videotape scenarios. Necessary infection control measures were safeguarded.

The session started with a group discussion about the content of the chosen case. After exploring this case, the students decided to make a scenario focusing on the conversation bedside with the patient where the RN and the NA participated (Film 1). The students were divided into three two-person group, one from each faculty. In these groups, they discussed how the characters should act and who was going to play the roles in the scenario.

After a short briefing (opportunities and limitations in the physical learning environment), the scenario was implemented, streamed to a room where the rest of the students (respondents) watched and video-taped (Film 1).

The reflection and discussion was conducted immediately after, inspired by the Critical Response Process structure [8], which includes a four-step method as presented in Fig. 1.

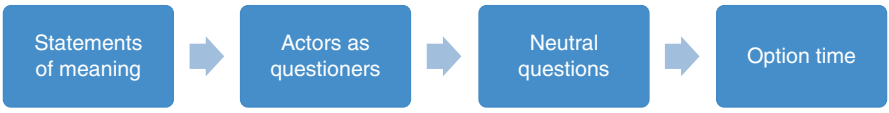

Fig. 1 Critical response process' four phases

The various actors' choice of solutions in the situation was freely and openly discussed. Each actor had acted in the role in accordance with what was decided in the small groups.

Various issues were identified:

The patient, acted by a RN student, struggled with the young nurse's eagerness to intervene.
The experienced NA had concerns for the patient's state of mind after the conversation.
The young inexperienced RN struggled with her feelings of insecurity.
Everybody was familiar with the feeling of being young and inexperienced in challenging situations.

As a result of the discussion and experiences from the scenario, further exploration of the situation was suggested by developing a new scenario, focusing on a conversation with the patient, listening to his story and his struggle and investigating what then happens.

The students followed the same procedure as described above, and a new scenario was implemented (Film 2). In the debriefing, the reflections were categorized into two themes:

How to prepare the upcoming family conversation.
How to handle the RN-NA conflict.

A new scenario was developed and implemented that focused on a situation where the two colleagues meet and had time and space for a discussion (Film 3). A debriefing followed.

Based on the comments and suggestions in the debriefing, a new version of the RN-NA conversation was implemented in a scenario (Film 4).

In the debriefing, there was a long discussion with many reflections on the difficulties of addressing conflicts and tensions in an interprofessional team. This roundtable discussion formed the basis of three new scenarios which were implemented:

Film 5: A pre-conference between the physician at the nursing home, the RN and the NA.
Film 6: A conversation with the patient and his wife, together with the RN, the NA and the physician.

In addition, follow-up conversations with the actors after the debriefing where they shared their thoughts and feelings about seeing this situation from their role's perspective were videotaped (Film 7).

Each simulation activity session lasted approximately 60 min: 20 min. Preparation, 10–15 min. Scenario and 15–20 min. Reflection and discussion. All the scenarios were videotaped and safely stored in NTNU's archives with the specific security procedure that is needed for privacy reasons (Table 2).

Table 2 The content of the films

Film 1	A conversation bedside with the patient where the registered nurse and the nurse associate participated
Film 2	A nurse associate–patient follow-up conversation
Film 3	A conversation where the two colleagues met and had time and space for a discussion
Film 4	An alternative version of the conversation between the two colleagues based on the discussion after Film 3
Film 5	A pre-conference between the physician at the nursing home, the registered nurse and the nurse associate before a family conversation with the patient and his wife
Film 6	The conversation with the patient and his wife, together with the registered nurse, the nurse associate and the physician
Film 7	A follow-up conversation with the actors after the debriefing where they shared their thoughts and feelings about seeing this situation from their role perspective

3.3 Phase 3: Simulation Activity Online

A total of 47 students participated in the online simulation activity day, 30 post-graduate students (RNs) from the NTNU programme and 17 vocational college students (NAs), together with 4 teachers and 1 researcher. All the students had participated in Phase 1 and had taken part in the choice of the narrative which should illustrate the theme interdisciplinary teamwork in palliative care/end-of-life care. The online simulation activity was meant to be a common learning process by using scenarios from the learning resource bank as a basis for interprofessional learning. As teachers, we were very excited about whether the recorded scenarios would cover the issues and reflections that the students would now identify. By having many recorded scenarios to choose from, this proved to be possible. In the following, we describe how the day was organized rather than placing emphasis on the content of reflections and discussions.

The students were divided in advance into eight monoprofessional groups. The RN students use group work throughout the educational process, and they attended their groups, while the NA students were divided into four groups for this occasion.

We started with a brief presentation and introduction and provided information on how this day would be conducted.

First, in plenary, we all watched the introduction scenario (Film 1): The RN and the NA bedside conversation with the patient. After that, the students participated in a three-step process:

First step: the students attended their monoprofessional group in breakout rooms to discuss what they had observed (about 15 min).

Second step: the students went directly into a new breakout room with a mixed group of RN and NA students (15 min) to exchange the results from the monoprofessional discussion and to decide what issues and reflections they wanted to bring up.

Third step: All met in the plenary room for a common summary and exchange of the main issues in the discussions. The identified issues provided the basis for a joint discussion and choice of issues that were relevant for further exploration in a new scenario.

The choice they made could be exemplified as the scenario in Film 3, which was shown in the plenary room after a short break. This time they went through a two-step process:

During the first step, the students attended breakout rooms for interprofessional reflections and discussions (15 min). We skipped the discussion in the monoprofessional groups because the students had already got to know each other in the previous session.

As in the previous session, the second step was attendance in the plenary summary. The relevant and current issues were discussed, and the students developed and chose a focus in a new scenario. The choice coincided with what could be exemplified and illustrated by scenario 6 (Film 6).

The same process for discussion and reflection as in the latter followed.

Three films with subsequent discussions and reflections were completed in 7 h, including breaks. The day was summed up, and the students gave their spontaneous feedback about how they had experienced the online simulation activity and organization of their learning.

4 Reflections on the Pros and Cons of Online Simulation Activities

It is a prerequisite for success that both teachers and students get used to online communication and interaction. In relation to the online simulation activity day, we as teachers were happy that we had pre-recorded videos and that we were not dependent on the scenario being played live online. Technology causes a lot of stress and great irritation if it does not work out/function.

Simulation activity also requires simulation competency. In several studies, simulation activity is reported to be a learning situation with "A rollercoaster of emotions" [9]. To achieve learning, it is of importance that the learner can handle the feelings that appear in the setting [10]. Being an actor in the scenario means being exposed and can easily lead to feeling overloaded and vulnerable [11, 12]. It can easily end up with the actor being pushed far out from their comfort zone and into what can be called the discomfort zone [13]. In this zone, no learning is achieved when overloaded by feelings and stress. Defensiveness and self-protection might occur, meaning poor learning conditions with feedback not being timely given to support learning [8, 10, 14]. Against this background, we have tried in this project to facilitate a learning climate that promotes experimental learning, guided by participants' needs, and downplays individual performance. We want to highlight some aspects and tools that have been used in this online simulation activity setting that are equally relevant and can be transferred to simulation activity in general.

To summarize, both groups were satisfied with the online simulation activity. They all valued having time and space and the opportunity to meet and reflect together in a setting like this. There was a common perception of the importance of carrying out RN-NA simulation training regularly. Online simulation activity might increase the possibility for more frequent meetings. The students stated that the

online simulation worked "surprisingly well" and claimed that an online simulation activity for an interdisciplinary group such as theirs can be an effective and resource-saving way of learning. However, they pointed out that it depends on detailed and specific planning and organization. The information provided to the participants beforehand must be clear and concrete so they know the schedule, everybody's role and what is expected from each and everyone. A timeline and organization of break-out rooms must be published. The students expressed a need for a designated leader who knows the intention of the reflection and discussion part of the debrief before going to the breakout rooms. It saves time and increases the efficiency of group work. If possible, they would prefer that a teacher could visit the breakout room and facilitate the conversation. These statements have support in the literature and research; in building a community for learning, the students need to know/develop/build understanding, rules and agreement on how to communicate, the value of discussion and diverse viewpoints [11, 15].

The students emphasized the importance of being involved in developing the scenarios and that it was fellow students who performed in the scenarios. It made the focused themes directly relevant to their clinical practice, and it increased their involvement and engagement—highlighted in the literature as important factors for simulation competency [15]. The students reported having achieved an increased awareness about similar situations which often occur in their clinical daily life. Later one student exemplified her increased awareness by describing a meeting with a young RN with little clinical experience. She (the NA) was more active in supporting the RN. She described how important this cooperation was for both.

However, several of the NA students in particular pointed to the lack of face-to-face connection when online simulation activity is implemented. On the other hand, several students described online meeting as a "mental space" leading to a situation that made it easier to take the floor and participate in the discussions than when they all are present in the same room. Group dynamics and hierarchy between professions seem to be an obstacle for some students. This may prevent them from taking the floor and speaking out. As one NA student expressed: "There would be too much tension in the room". Online simulation activity seemed to facilitate the reduction of this tension. One of the students expressed this as follows:

> Maybe it is easier to share the space – to bring more balance in the discussion online because we are more aware of bringing everybody's voice into the group. In a situation with physical presence, the challenge is often that the groups are unbalanced when it comes to who is verbally active or not.

In the online simulation activity setting, the video filming of the scenarios was carried out just by those involved and without an audience. A short debriefing was implemented focusing on how the students perceived the scenario and the setting, including a debriefing related to the performer's feelings. About a week passed between the recording of the film and the online presentation. One of the performers said that this break between implementing the scenario and the online simulation activity day was valuable for his learning. He said:

> I was one of the persons who took part in the taped scenario. Online simulation made it easier for me to achieve the necessary distance for being a part of the debriefing/reflection. In a live simulation situation, this would be more difficult.

The "break" between being an active actor in the scenario, which is a stressful exercise, and then after some days viewing oneself on screen is probably expedient. The performers had time to gather their thoughts and take control, which enabled them to learn and receive feedback [10, 14].

When a student was designated as an actor in the scenario, they acted on behalf of a group that had discussed and decided how this role should be played. This reduces the focus on individual performance, choice and behaviour and contributes to a learning community with more open discussions and less need for defensiveness and considerations about personal vulnerability.

Student involvement in the development of cases and scenarios made simulation activity learner centred. The facilitation of exploration of what they consider relevant issues in new scenarios was experimental and practice oriented. Being responsible for determining focus and exploring solutions reduced stress.

We had many scenario options that were developed together with the students, which led us to believe that they were relevant learning resources. This way of carrying out the simulation's activity can give the facilitator a feeling of lack of control, uncertainty about what is happening and challenges in maintaining focus and keeping to the time framework. However, we believe that facilitating such an experimental process of learning results in a greater degree of learning in this context than when everything is predetermined and teacher directed.

5 Conclusion

This pilot project involved transferring simulation activity from physical meetings of the participants in a simulation centre to simulation activity as online learning. The possibilities physical meetings (face to face) provide for spontaneity, nonverbal communication and eye contact are difficult to replace in an online setting. However, based on the students' and teachers' evaluations, it seems that such a learning approach can be an effective and rational way of learning. Nevertheless, this requires thorough preparation, well-thought-out organization and detailed information for everyone involved. When the students are videotaped in the scenarios, further use requires the student's consent and an awareness of the necessity to protect students' privacy. The dependence on the technology makes the setting vulnerable and requires for everybody involved habituation and cooping.

These preconditions are well known from recommendations about simulation activity in general and do not differ significantly when simulation activity is used in physical meetings. However, the online setting increases their significance when students cannot see each other's faces and/or who is joining "the room".

Based on our experiences, online simulation activity can be used as an effective and rational way of learning in addition to simulation activity in the form of physical meetings.

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The Use of Critical Response Process as a Debriefing Structure in Simulation Activity in Nursing Education

Jon Viktor Haugom and Randi Tosterud

1 Introduction

To be a facilitator in simulation requires specific skills and knowledge in simulation pedagogy [1]. Being a facilitator when using high-fidelity simulation as a learning approach might appear to be a challenging, complex, and exhausting role. A great deal of preparations must be made concerning the practical prepping of mannequins, available equipment, surroundings, technology, adequate advance information to the participants, and cooperation with the staff involved. Moreover, insight into the target group's starting point for learning is required, as well as awareness of the timeframe and learning outcomes. This also includes welcoming the group in a way that facilitates a safe and good learning climate and briefing the participants about equipment and technology. During the scenario, facilitating learning for both the group of actors and the group of responders must be kept in mind. In the debriefing, the facilitator must help the actors control and handle their feelings. Furthermore, the facilitator must act as a group leader, and is not only expected to be an expert in the current field but also to be learner-centered focused. All the participants must be engaged in active reflection and feedback. The learning outcome must be focused, but the facilitator also needs to improvise and prioritize depending on what appears as interesting and challenging for the participants to discuss. Realistic feedback must be given in a way that encourages the learners to listen, understand, and improve and progress in their learning. The facilitator is dependent on the current group size and dynamics—inspiring and stimulating when the dynamic appears as active, supportive, dialogical, and engaged, but exhausting and depressing when it is silent, monological, closed, and passive. Clearly, the facilitator needs tools to handle the simulation activity.

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In this chapter, we want to present a structure for feedback which can help the facilitator to achieve their main objective of enabling the participants to achieve learning. But first a short summary of what is known about simulation, debriefing, and feedback is presented.

1.1 Simulation Activity as a Learning Approach

Simulation activity is a resource-intensive learning approach due to the equipment required, the learning surroundings, and people involved in operating and facilitating. It offers the potential for learning beyond the learning outcome such as training in feedback literacy and professional argumentation, situational awareness, and teamwork training. These are all considered to be important factors in building a patient safety culture. A patient safety culture requires everyone to have the courage to raise their voice and involves an openness to failures and success, mutual support, receiving and giving feedback, and a shared responsibility. The students need training during their education to participate in such learning environments with the aim of developing such knowledge, skills, and attitudes.

Learner-centered and lifelong learning are emphasized in higher education and require the learner to be active in learning and not to be dependent on teachers or facilitators. It requires learners to be able to evaluate their own performance, to identify their lack of skills or knowledge, and to take responsibility for progress in their learning. The strength of simulation activity is that it facilitates experimenting, failure, and detection of deficiencies, all learning conditions which are not possible in the clinic. However, if these additional effects are to be exploited, this must be reflected in how the simulation is carried out and how the debriefing is structured. Simulation activity offers the potential to supply what is underscored in higher education today: active learning, interprofessional learning, collaborative learning, and learner-centered learning [2–5]. Simulation is widely applied and frequently used in healthcare education and is often also used to maintain or enhance competency in healthcare units. Simulation can be used to help transfer theory into practice, improve logistical flow, and facilitate training in technical and non-technical skills [6]. In a simulation scenario, the participants can experience challenges in both handling a situation, communication, relational conditions, and personal factors. Thoughts emerge from what we see, hear, or touch and must be further developed into learning through reflective thinking [7]. This is known in the simulation activity as the debriefing phase.

The debriefing is considered crucial to achieve learning. The purpose of the debriefing is that the participants reexamine what took place in the scenario. This is a reflective learning process to help promote the development of clinical reasoning and judgment skills in an active learning environment. Debriefing offers the possibility to give and receive feedback, to resolve feelings, as well as the opportunity to learn from either successes or failures [1].

Let us take a closer look at the important factors for achieving learning from feedback.

1.2 Feedback as Part of Debriefing

Feedback is considered important in learning in general and an important part of the debriefing. Teachers and fellow students are important givers of feedback, as are colleagues and managers in working life. However, even if we all understand and appreciate feedback, it is regarded as a complex and multilayered concept with no common and agreed understanding of how to offer and provide it to achieve learning [8]. Lefroy et al. [9] offer a definition of feedback supporting self-regulating learning as follows:

> *Helpful feedback is a supportive conversation that clarifies the trainee's awareness of their developing competencies, enhances their self-efficacy for making progress, challenges them to set objectives for improvement, and facilitates their development of strategies to enable that improvement to occur.*

For feedback to contribute to learning, the students need to handle their emotional and relational reactions, and they need to have the chance to express themselves. They must appreciate the feedback and understand how it can be used in further learning and individual growth. This shows that the prerequisite for feedback to have a learning effect is that it is carried out as a dialogue [8].

Transferring this knowledge into a simulation setting is highly relevant. Even though it is emphasized that simulation is for learning, students report simulation to be stressful in terms of being put in the spotlight and assessed, while in their performance they are exposed in relation to both body and mind [10]. In particular, those performing in the scenario report that they feel in a vulnerable position that is characterized by a high risk of disgracing themselves and ending up in a stressful and intrusive situation [11, 12]. The feeling of having to defend and protect themselves might arise, which reduces their ability to make use of the feedback they receive [9, 13].

Studies reveal disappointing results showing that debriefing seems to be more based on the facilitators' frames and dominance than the participants' frames [5]. The facilitator tends to assume a role of prominence as in teaching in general [14], which does not accord with recommendations for stimulating students as self-regulated learners [9]. The facilitator's feedback style and communicative abilities in facilitating are crucial and have a great impact on the learning climate [15, 16]. It is emphasized that the facilitators would benefit from practicing techniques for stimulating involvement and reflective practice in the participants [5, 15].

There is no clear evidence of when or how debriefing should be implemented to achieve learning and change [17, 18], but it seems that structuring the debriefing is of importance. Several frameworks are available to help structure debriefing in a purposeful manner [1]. However, the development of appropriate frameworks and ways of structuring debriefing adapted to the participants' needs and the learning outcomes represents an ongoing process. There is also a need for further in-depth research into how dialogic feedback can enhance student learning [8].

1.3 Critical Response Process as a Structure for Debriefing

In the following, we present a structure for feedback called critical response process (CRP), evolved by Liz Lerman [13]. CRP underscores the value of dialogue, inquiry, and peer feedback, and it offers the actors the opportunity to exercise a degree of control in the criticism directed at their work based on the perception that "When defensiveness starts, learning stops" [13]. CRP originally evolved as an approach to group critiques on artistic work in progress. However, Lerman claims that its flexibility makes it suitable for different types of learning situations that involve feedback. The roles involved are artist(s) (called the actors in medical simulation), respondent(s) (one, few, or many), and a facilitator. These are parallel roles used in medical simulation, though respondents are often called observers. Inspired by Lerman's work, we used this structure in debriefing as part of simulation activity, and in the following, we describe how we transferred and used CRP in medical simulation.

CRP includes a four-step method [13] summarized in Table 1.

1.3.1 Phase 1 Statements of Meaning

The respondents are requested to prepare one or two positive statements and formulate open questions about the actors' performance. When the debriefing starts, each respondent gives the actors one response at a time on something they found to be good practice, impressive, engaging, thought-provoking, and interesting. Only positive feedback should be given at this stage with no addition of "… but…." Several rounds may be necessary to obtain all the positive responses. The rationale for this is that everyone must make their voice heard and give positive feedback at this first stage, which will probably lower the threshold for taking the floor in the later stages. The respondents address their feedback directly to the actors. Thus, the responsibility for providing feedback is established as a common concern and contributes to a standard of shared responsibility. The respondents describe what they found engaging and what was impressive and good practice, resulting in less focus on the facilitator's feedback. Such reinforcement of what was done well promotes a climate of trust and learning. Consequently, this phase confirms good practice and what can be learned from it. Being the one to perform the scenario can be a stressful experience, and when entering the debriefing, studies have shown that the actors feel cognitive and emotional overloaded and vulnerable [11, 12]. At this stage of the feedback, the actors get a well-deserved break after the stress of performing the scenario, and they are filled in with positive descriptions of their work. This gives them time to gather

Table 1 Critical response process

Phase 1	Statements of meaning
Phase 2	Actors as questioners
Phase 3	Neutral questions
Phase 4	Option time

their thoughts and take control, enabling them to receive further feedback with reduced emotional distress and self-criticism. These are all factors which are underscored in providing useful feedback and thereby achieving learning [9, 13].

1.3.2 Phase 2 Actors as Questioner

In this phase, the actors raise all their questions about their own performance, and the respondents answer honestly, discuss, and reflect. This makes the feedback learner-centered in that it is controlled and based on the actors' need for learning and understanding of the situation. The respondents propose answers leading to reflection and dialogical feedback.

The actors keep control by raising questions about their own performance. This phase reduces the need for the respondents and facilitator to give negative feedback on mistakes, wrong priorities, or a lack of skills and knowledge. It is easy to give honest responses because the actors ask for it. The positive climate in this phase seems to enable the actors to dare to put their practice under debate, being open for responses which lead to further dialogues between the students about alternative solutions and priorities implemented in the scenario. By themselves being the ones who put their actions and priorities under debate, they keep control and are open to feedback on what they themselves perceive as relevant issues from the scenario. This provides the facilitator and the respondents with insight into the actors' needs for reflection and learning.

1.3.3 Phase 3 Neutral Questions

Each respondent asks the actors neutral, open-ended questions about their performance. Being an actor in the scenario means to be exposed. Defensiveness and self-protection may occur, leading to poor learning conditions and feedback not being given in timely manner to support learning [9, 13]. Neutral and open questioning gives the actors the opportunity to discover, explain, reflect on, and assess their own practice. Emphasizing open and neutral questions does not trigger the need for defense but facilitates for feedback as a supportive conversation. If necessary, the facilitator must help the respondents reformulate questions so that they are open and neutral, leading to a question-based dialogue. This phase can help increase participants' awareness and training in giving and receiving feedback in general and is an important additional effect of simulation activity. It is important that the facilitator creates a climate that involves an openness to failure and success, where all participants are aware of the importance of mutual support for good cooperation. Simulation activities can offer a learning environment aimed at enabling students to develop abilities which are considered important in building a patient safety culture.

To avoid taking focus away from valuable discussions and conversations between the actors and the respondents, it is an advantage if the facilitator waits until the students have given feedback and asked their questions. However, the facilitator must ensure the quality of comments from the respondents and the actors to ensure professional soundness.

1.3.4 Phase 4 Option Time

Each respondent offers the actors suggestions or advice for change, opinions, and strategies for further learning. The advice/suggestions must be honest, concrete, and understandable for the recipient. The advice and suggestions deal with progress in learning and strategies for further learning. This is done in a kind of ritual by the respondent telling the actors what the advice/suggestion is about and then asking if they want to receive it. An example could be "I have some thoughts about how you communicated with the patient. Would you like to hear these?" The actor(s) has the option to answer yes or no. This ritual seems to be perceived as rather weird by the students; often smiles and humor appear in this phase. The ritual of telling the content of the advice and asking if they want to receive it is based on the goal of giving explicit control to the recipient of feedback. There is no point in giving feedback if the recipient is not motivated or responsive.

The option/advice is often positively charged ("Keep on like you showed us today; it was impressive") but also includes areas for improvement and how to proceed in learning. The facilitator possesses many roles in CRP: to relieve the performers if they are highly emotionally affected and to prevent the focus on the negative aspects that accompany free discussion. However, sometimes, the facilitator should act as "the bad guy" if the respondents are too polite or reluctant to give honest advice about lack of skills, knowledge, and attitudes for good practice. In a patient safety perspective, simulation activity might be a dangerous way of learning if the actors leave the setting with a false self-esteem and belief that this went well without recognizing the need for more training and learning to improving practice.

1.4 Exploring Two Structures for Debriefing and How They Influence the Facilitator Role

There is a lack of knowledge about how to structure debriefing to achieve the purpose of the simulation activity, which is active and learner-centered learning, and less dominated by the facilitator's frames and control. Inspired by this, we decided to conduct a study using a quasi-experimental multi-method, comparative design. A full presentation of the study has been published [19].

Two structures for debriefing were included. The first was a well-known structure in medical simulation, the Steinwachs structure [20], originally developed to facilitate the debriefing phase in gaming education. It includes the recommended minimum phases of reaction, analysis, and summary [1]. In the first phase, the description phase, the facilitator challenges the actors to describe what occurred in the scenario, with the intention of airing their experiences and impressions and exchanging their perceptions with the respondents. In the second phase, called the analogy/analysis phase, the actors explore, analyze, and reflect on alternative solutions, relevance, success, and failure. In the third phase, called the application phase, the actors and respondents express what is particularly relevant and the consequences for further learning. The facilitator gives their attention to the learning/reflection process and strives to get everyone to participate in the debriefing and

contribute support in the discussion. This basic structure can be recognized in several of the available structures used in debriefing in medical simulation.

The second structure included was the critical response process (CRP). The rationale for the choice of including this structure was that it deviates from the recommended minimum phases of reaction, analysis, and summary [1]. To the best of our knowledge, CRP has not been previously used as a structure for debriefing in medical simulation.

The data was collected from the end of April to the end of May 2017, and all debriefing sessions were videotaped by using a Swivl iPad. Following the debriefing, the students completed the Norwegian translated version of the Debriefing Experience Scale [21], and the facilitator wrote notes after each debriefing.

The sample consisted of undergraduates in bachelor of science in nursing in the second year of their 3-year program. They were conducting their 9-week clinical practice, either in medical or surgical wards. Out of 168 students, 155 participated in the study. They were divided into 15 groups, with a group size between 6 and 13 students. To be well prepared, the students received the scenarios some days before the simulation activity. Two students performed each scenario, and the others were respondents. Immediately before starting the simulation activity, the facilitator randomly picked a note describing which structure (Steinwachs or CRP) to use in the current debriefing. The same facilitator facilitated all the simulation activity sessions.

Based on the results from the time registration of the facilitator's verbally prominent role and the students' response to the Debriefing Experience Scale, there was no difference between using Steinwachs and CRP structure. However, in analyzing the videos and facilitators' notes, the facilitator's role concerning control, dominance, and responsibility clearly differed, which in turn affected the actors' and the respondents' roles. Even though there was nearly no difference in how much of the time the facilitator talked, there was a clear difference in what they spent their time on.

When using Steinwachs structure, the facilitator appeared to have the dominant role. He was in control, being responsible for feedback, raising questions, verifying, and asking follow-up questions—a conversation that mainly included the actors in the scenario and the facilitator. The actors addressed questions and responses to him, and the whole group focused on the facilitator as illustrated in Fig. 1.

When using CRP, the facilitator's role seemed to be as a leader of the group discussion, introducing new phases and helping reformulate questions if necessary. Each phase of the CRP structure forced a transmission of the responsibility and control from the facilitator to the respondents and the actors, as illustrated in Fig. 2.

After using CRP, the facilitator noted their concern about losing control, a fear of not achieving the learning outcomes. Since the students were the ones giving feedback and asking questions, CRP seemed to safeguard a more comprehensive focus on the "nursing performance." In contrast, in the Steinwachs structure, the facilitator's feedback and questions seemed to break up the performance into details connected to the learning outcomes (ABCDE, communication, leadership). However,

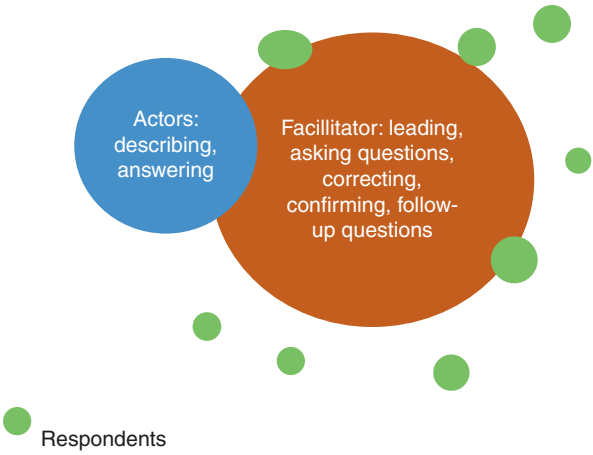

Fig. 1 Prominent roles using Steinwachs' structure based on observation

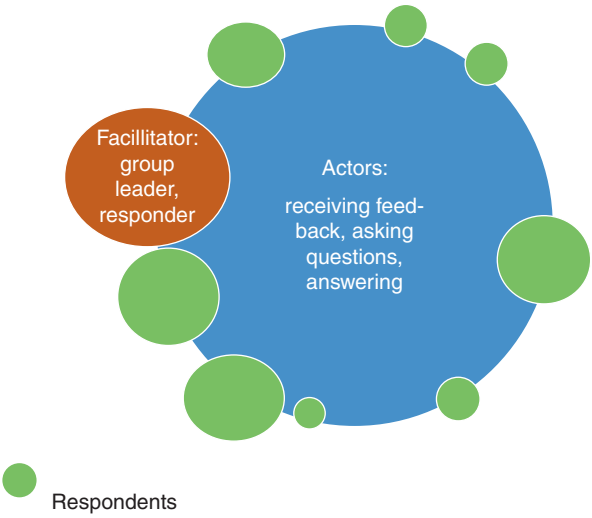

Fig. 2 Prominent roles using the CRP structure based on observation

when analyzing the videos and the students' responses to the questionnaire, learning outcomes appeared to be the dominant focus in both structures.

The two structures differ from each other from the start. The first phase in Steinwachs structure involves the actors as actively being challenged to describe what they observed and which actions they took. However, the facilitator did not report to miss the description phase when using CRP. Often in the description phase, it was necessary to interrupt because the actors started to analyze immediately, sometimes leading to frustration and confusion because the actors could not see the difference between describing and analyzing.

In the beginning of the study, Steinwachs structure gave the facilitator the best feeling of control over the debriefing to ensure focus on the learning outcomes. As the study progressed, CRP became the preferred structure for the facilitator. Although the fear of losing control was still present, the facilitator felt it was a relief to transfer and share the responsibility for the debriefing with the respondents, and not have to make a big effort to stimulate student activity. Perhaps the facilitator's eagerness to keep control can hamper the students' learning. CRP gives the facilitator a better opportunity to focus on group dynamics, formulation of questions, and learning outcomes.

2 Conclusion

In this chapter, we have presented critical response process as a structure for debriefing based on a study focusing on how two different structures affected the facilitator role. In our experience, CRP offers a structure for debriefing that well facilitates active, learner-centered, and collaborative learning. It emphasizes feedback as maintenance of dialogue, mutual support, and open and non-judgmental responses, all of which safeguard essential factors for feedback leading to learning. CRP offers a great opportunity to put the ability to give and receive feedback on the agenda. This is an important part of learning and essential in building a patient safety culture. The responsibility for conducting a debriefing is transferred to the learners as intended, and the facilitator gets the chance to truly be a facilitator. An alternative when using CRP with many respondents is to divide them into groups so they can discuss and give their positive comments, questions, and action options as a group to the actors in the debriefing. This pre-debriefing will lead to a lot of extra learning, with discussions on how to formulate questions to achieve constructive conversations.

Debriefing is an important part of simulation activity to achieve learning. Feedback is a part of debriefing and is described as a complex and multilayered concept. There is no common and agreed understanding of how to offer and give feedback to achieve learning, besides the importance of stimulating self-reflection. However, essential factors must be safeguarded to make feedback useful for learning. Simulation activity offers the participants a learning environment for training and developing feedback literacy. CRP seems to be a structure for debriefing that facilitates such training. How debriefing is structured and how the facilitator fosters such training are of great importance. Simulation is a resource-intensive learning approach, and in addition to achieving the given learning outcomes, emphasizing and utilizing such additional effects can make simulation activity an effective learning approach.

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Learning Without a Teacher: Perceptions of Peer-to-Peer Learning Activities in Simulation Training

Lise Degn, Hanne Selberg, and Anne-Lene Rye Markussen

1 Introduction

Over the past decades, higher education has been high on the political agenda. Almost all nations have seen an intense massification of higher education institutions and have focused on how best—and most efficiently—to organize education. Peer-to-peer teaching, or more broadly peer learning, is one educational format that has been widely experimented with, i.e., students training each other and, in turn, themselves. One of its advantages is that it utilizes the students' own time and resources in the learning setting, thereby releasing the teacher's [1, 2].

Peer learning covers varying forms of interaction between students with learning in mind [1, 3], and pedagogical and didactic research and development highlight other benefits in addition to resource efficiency and quality of education. Nursing education increasingly uses peer-to-peer-based simulation skills training in simulation labs [4, 5]. Both internationally and nationally, this development has been pushed by discussions about novice nurses lacking technical skills, partly due to decreased possibilities to practice skills during clinical placements [6]. Peer learning has been found applicable in development of technical skills and in preparing students for future practice in the clinical setting [4]. Health education research indicates that peer learning improves students' technical skills, enhances their confidence in skills performance, decreases anxiety [5, 7, 8], and enhances cooperative

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learning, collaboration skills, knowledge sharing, and giving and seeking support [4, 9, 10].

The theoretical underpinning of peer-learning is sociocultural learning theory [11]. The assumption is that the learner never, or rarely, learns in a vacuum but is embedded in a social space and in interaction with others (teachers, peers, etc.). This social interaction can have both positive and negative implications, which the designer of a learning activity must take into account. Learning is also assumed to take place in both formal learning settings and informal contexts where individuals interact. A number of studies of nursing students conclude that peer learning may have a positive effect on learning outcome, for instance, because it helps prepare students become professional nurses through personal development and professional development [12].

Inspired by this research and based on our experience that students lack basic technical skills such as handling intravenous medication and oxygen therapy, the project, from which we are reporting in the present chapter, designed and set up "peer-to-peer self-learning stations" in order to give all students the opportunity to get hands-on skills training and to repeat the training for mastery learning. These self-learning stations were designed to train the basic skills that the students need to participate in complex full-scale scenarios and thus be able to concentrate on the overall learning goals.

In this chapter, we explore the strengths and weaknesses that nursing students highlight about peer-to-peer learning in simulation and discuss how these experiences and perceptions align with the theoretical expectations and assumptions. To explore this question, we report from an experimental study carried out at University College Copenhagen in Denmark. In the experiment, fifth-semester nursing students were subjected to an intensified simulation intervention, combined with other supporting elements designed to increase collaborative and peer learning. One supporting element was a series of peer-to-peer sessions, in which small groups of students trained technical skills for mastery learning before engaging in full-scale scenarios. Traditionally, peer-to-peer activities are conducted with an experienced student tutoring less experienced peers. The intention in this experiment, however, was to enhance students' skills acquisition in a safe learning space by letting them practice at their own pace. The novelty of the approach was that it was designed to be "teacher-free," i.e., without a teacher present, thus allowing the students to take charge of their own learning, enhance engagement, and increase student confidence. This chapter therefore focuses on "teacher-free" learning, the students' expectations to this way of learning, and possible implications for the effect of peer learning activities.

In relation to the traditional teacher role, the role in simulation-based teaching changes markedly as the balance of power shifts from teacher to student. The student is expected to be responsible for own learning, and the teacher becomes the facilitator of learning rather than the transmitter of knowledge. Inspired by Hattie's [13] claim that the biggest effects on learning occur when students become their own teachers, the theory of self-conducted learning and flipped learning, we set up a peer-to-peer self-training concept with an instructional scaffolding.

The central research question we address in this chapter is: *How is peer-to-peer learning in simulation perceived by students, and what are the implications for the role of the teacher?*

2 The Case

To illuminate how students perceive peer-to-peer learning activities in simulation, we explore an experimental study of simulation-based training for nursing students in their fifth semester at University College Copenhagen in Denmark as part of the research project PIQUED (Pathways to Improve Quality in Higher Education). The control group of 155 students received "standard" simulation-based training in the fifth semester, which consists of three lessons of full-scale scenarios, whereas the intervention group (164 students) received a specially designed course, which ran over 3 full days in the fifth semester and 2 days in the sixth semester (Fig. 1).

In addition to receiving more simulation-based training, the intervention group had the opportunity to train specific technical and non-technical skills repetitively with increasing complexity in specially designed simulation-based self-learning sessions, an element called peer-to-peer self-learning stations, which is the focus of this chapter. These sessions were intended to prepare the students to handle the interventions built into the complex full-scale scenarios at the end of the program. The assumption was that the intervention would increase the learning outcome, the technical competences, the feeling of self-efficacy, and the potential for transfer to clinical practice.

The peer-to-peer self-learning stations were designed to give the students the opportunity—in a simulation-based setup—to train technical skills in small groups to achieve mastery learning in the following skills: duodenal tube placement, peripheral intravenous cannulation, oxygen therapy, urinary catheterization, the

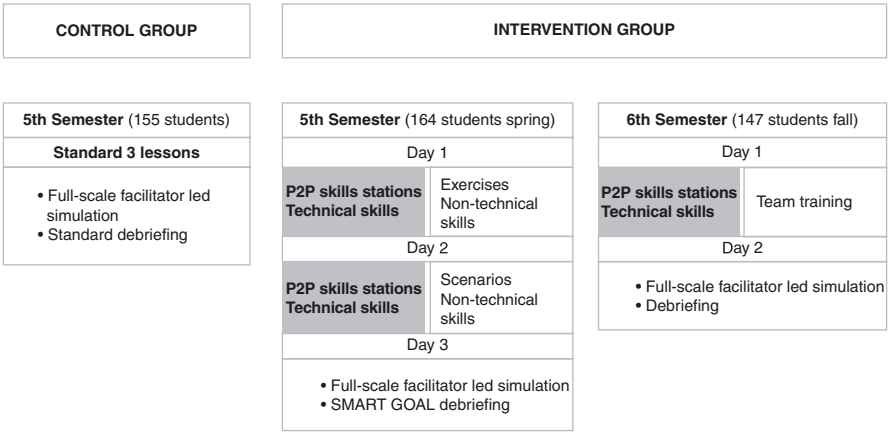

Fig. 1 Project interventions

Trendelenburg position, intravenous medication administration, intravenous fluid therapy, and blood pressure measurement. The actions the students were expected to carry out follow the professional guidelines from VAR Healthcare [14]. The Model of Practical Skill Performance [15] forms the basis for the procedures in VAR Healthcare, and we have attached it to our didactical setup as it contains the categories that must be realized in a good performance of a practical nursing skills: substance, sequence, accuracy, fluency, integration, and caring comportment.

We focus on this particular element of the experiment (highlighted with the grey background in Fig. 1) and investigate how peer-to-peer learning can be integrated in simulation training of nursing students and what the potentials and pitfall may be. Since the focus of this chapter is solely on the potentials and pitfalls of peer-to-peer learning, and not in the effects of the experiment as such, the control group is not included in this particular study. For more information on the overall effects of the overall study, see Fuglsang et al. [17].

2.1 Peer-to-Peer Self-Learning Stations

The peer-to-peer self-learning stations used in the experiment consisted of a technology-assisted setup, which introduces and guides a group of 4–5 students through a learning exercise to train technical skills in a simulation environment (see Fig. 2). The learning exercise may involve mannequins, task trainers, and various remedies from clinical practice.

The underlying concept in the exercise is that the students are supposed to "act as if" they are treating a real patient which implies, for example, that in addition to the technical skills, they must guide the "patient."

Fig. 2 Set up P2P skills station

While two students perform a procedure, observing students monitor scenarios and check off interventions using a tablet with a pre-determined set of biomarkers. The biomarkers are categorized in interventions before, during, and after execution of the procedure, e.g., "apply and tighten the tourniquet." The biomarkers are designed to track the participating students' concrete interventions while performing the procedures.

The training concept also allows for reflection during training through reflexive pop-up issues built into the program, e.g., "Where are you supposed to place the tourniquet in relation to the chosen insertion site?" The correct answer can be accessed after the reflection. The rationale is that active evaluation, reflection, and dialogue enhance learning for both evaluating and participating students. The session ends with student-led debriefing, where the participants receive automatic feedback on their execution of an action through the system, debrief with each other in the groups, and thereafter repeat the training and improve their performance. The learning exercise is thus highly scaffolded in order to avoid "erroneous learning" and thematic errors.

Training of technical skills at the peer-to-peer self-learning stations was conducted concurrently with training in non-technical skills, such as communication, teamwork, and algorithms. In the peer-to-peer self-learning sessions, the students worked independently, but teachers and teaching assistants involved in the project were present, primarily to observe collaboration in the groups and help with technical issues, e.g., equipment.

In the first intervention round, the students worked in shifts at the stations over the 2 days to give everyone a turn as hands-on participant or observer. The second intervention round focused on repetition of selected technical and non-technical skills.

3 Methods and Ethical Considerations

The results presented in this chapter are derived from a survey study conducted at the end of each intervention round. The ethical considerations in relation to the overall project were assessed by the study board at the nursing education programme at University College Copenhagen, including considerations in relation to the balance between study benefits and human resources used, potential risks and inconveniences, methods, and participation. Even though participation in the simulation training was mandatory, the students were informed about the study and their right to refrain from participation by not filling in the surveys or actively participate in the simulation scenarios.

In a questionnaire with open-ended questions, the students were asked to describe their initial reflections regarding four themes: (1) *peer-to-peer as a learning method*, (2) *collaboration with fellow students*, (3) *reflection*, and (4) *learning outcome*. In the second round, a question about the use of a virtual task trainer for peripheral intravenous cannulation was added. The response rates were 93% in the first round and 89% in the second.

Using a hermeneutic analysis [16], all answers were collated and sorted by the themes from both intervention rounds. At the first stage of the analysis, the authors worked separately to identify statements and overall themes in the responses. At the second stage of the analysis, the authors worked together to develop the final categorizations. Finally, the statements and categories that related specifically to the strengths and weaknesses of the learning method were identified and condensed. The observation notes, produced by teachers and medical students, were used to validate the analytical observations and interpretations.

4 Results

In this section, we present the results of the analysis regarding the strengths and weaknesses of the peer-to-peer method as perceived by the students.

4.1 Strengths of the Peer-to-Peer Method

The analysis points to two central categories: *learning environment* and *collaboration and team dynamics.*

4.1.1 The Learning Environment

The learning environment was almost unanimously perceived as positive. As mentioned, the peer-to-peer self-learning stations were highly scaffolding to frame the learning experience as a safe learning space, where the students can make mistakes without consequences and learn through mistakes, correction, and reflection. Exactly the opportunity to reflect together is perceived as a strength by the students, as expressed here:

> The reflections we had after the sessions worked really well and resulted in the execution afterwards being more correct.[1]

The students perceive the interaction between the technical and the didactical setup positively, e.g., when they receive feedback directly through the Simpad as they are working. The students express that this gives them an insight into the status of their own competences, which are then strengthened through the ensuing dialogue with the other students. This forces them to express and argue for their actions, which is seen as a positive element in the learning experience.

Another element that is perceived as a strength of the peer-to-peer method is the opportunity to learn through mistakes and corrections. The students link this with their subsequent entry into "the real world" and describe that the peer-to-peer learning stations allow them to try out their skills "in reality, rather than just reading

[1] All quotes from students have been translated by the authors.

about it," while still being in an environment where mistakes are allowed and a part of the learning setup.

These descriptions indicate that the students have a clear sense of the progression in their educational program and that they link this progression to the individual elements in the program. They seem to understand the intention behind establishing a solid theoretical base before applying the theory in a controlled environment in the simulation and then finally entering "the real world." The students describe this "real world" as their clinical training and as their future work as nurses. Learning outcome is thus coupled directly to practice, expressed as increased knowledge, experience, self-confidence, and motivation.

The students' responses after their clinical practice, i.e., when they return to the second round of peer-to-peer learning stations, show that this sense of progression is enduring. They note an increased sense of confidence and routine in relation to round one, and they note that fellow students may contribute with new reflections.

4.1.2 Collaboration and Team Dynamics

The second positive category of the peer-to-peer learning format relates to the students' perceptions of *collaboration and team dynamics*. The collaborative self-learning stations very much rely on students learning from each other to support their motivation and learning outcome. The students seem to understand this design to some extent and perceive team collaboration as mainly positive. They describe a well-functioning group dynamic as a positive element of the learning situation and as something that increases their outcome, particularly as it helps create a conducive and safe learning atmosphere, where, e.g., mistakes are allowed. They especially highlight the collective reflection that arises through the activities:

> Good way to learn and get the procedures under your skin, with the opportunity to discuss doubts with peers = no stupid questions + fellow students can teach each other things that you might not know yourself, because everyone has different experiences.

The "lack" of a visible teacher is addressed, when a student describes how they "rather than asking the teacher, when we have doubts, we reflect with each other." This is seen as a strength, as it provides the individual student with new perspectives and opportunities to discuss doubts with peers. The students are seen to contribute with various levels of knowledge and competences, and this creates a sense of security in the performance because they are able to collaborate on a common goal.

4.2 Summary of Strengths

In the analysis of the students' perceptions of strengths in the peer-to-peer learning format, the main element perceived as positive and conducive to learning is a safe learning environment, where the interplay between the technical and didactical setup helps the students reflect on their own learning outcome and competences. Mistakes are allowed, the students help each other reflect, and they seem to

understand the didactical setup of the activities and can connect them to their own progression and learning "path."

Interestingly, they do not mention the lack or absence of teachers as a strength, which indicates that even though they understand the didactical setup, the peer learning element is somewhat invisible to them. However, before elaborating on the absent teachers, let us first look at the students' perceptions of weaknesses of peer-to-peer learning.

4.3 Weaknesses of the Peer-to-Peer Method

The analysis points to two categories as central in the perception of weaknesses: *group dynamics* and *the understanding of learning*.

4.3.1 Group Dynamics

In the analysis of the strengths of peer-to-peer learning, it appears that the well-functioning team dynamic is perceived to be conducive to learning, but a malfunctioning group dynamic creates frustration, lack of motivation, and commitment, e.g., to complete the scenario. The students' descriptions of their experiences with teamwork in the peer-to-peer session center around "the other students" to a high degree. The commitment of the others may be seen as a precondition for the collaboration to be perceived as productive, and when this commitment is not present (or expressed), it is perceived as a problem. Several students highlight having been in a situation where the others "were not serious" about the learning exercise and describe this as detrimental to their own motivation.

A central point here is that the students' varying knowledge and competences may contribute to a productive common reflection, but some students may perceive this as a weakness if individual contributions are not equal. Similarly, data demonstrates that students see it as a challenge to embrace "role play," which is so central to simulation, potentially because it is a collective exercise. The students describe it as difficult to be serious about the role play and to "act as if," which is the central tenet of this type of learning activity.

One student says that role play is "difficult to take seriously when we are just students," and another notes: "Fun to collaborate with fellow students, but difficult to be serious about it and get into the roles."

4.3.2 Students' Perception of Learning

The second category, the students' understanding of learning, comprises statements about (not) understanding or recognizing certain activities as learning. This point is reinforced by responses from the second round, i.e., after clinical practice. The analysis demonstrates that the students' perception of peer-to-peer learning, and simulation generally, as a realistic space is challenged. Several students find it difficult to embrace the situation when "it is not a real emergency" or find it "too artificial to practice on a doll." This is seen in relation to the practice they have now encountered and been part of, and the discrepancy they experience between these two settings

somehow disturbs their perception of the learning potential. Likewise, we see a number of statements about the perceived lack of relevance, again related to the "real world."

> It becomes a bit frivolous with the doll, now that we are in clinical practice where we use it all day in the real world.
>
> Yet, it is too unrealistic. It would be better earlier in the program. I get more out of experiencing it in clinical practice. First time was enough. This was repetition.

The relevance of simulation as a learning space also seems to diminish after the clinical practice, and the students have a clear picture of practice as "genuine" and simulation as a "copy," which is seen as less relevant after having met the real world. This is seen in statements about the students feeling "secure enough," i.e., having achieved the learning they need and that additional training is superfluous:

> (it is) something one does every day for someone in clinical practice. Therefore not relevant or learning potential for me.

The analysis demonstrates that the students' approach to and understanding of learning are often not aligned with the elements characterizing peer-to-peer learning in simulation, e.g., learning through repetition, as shown above, or the prerequisite of bringing their own knowledge and competences to the table rather than being offered knowledge from a teacher.

Learning through repetition is sometimes seen as a strength and an element in creating a safe space, sometimes as unnecessary and meaningless. For example, the students grew tired of "doing the same role play four times. It is fine to train the procedure itself, but the role play was too much." In other words, repetition was not experienced as necessary to achieve security and confidence in a procedure but as demotivating and unnecessary. The same duality appears when looking at the responses from the second round, where repetition is both seen as an opportunity to train, e.g., sequences and strengthen security in the execution of procedures, and *also* as an unnecessary overflow of learning.

The lack of a teacher is another element of the learning setting where the analysis demonstrates a discrepancy between the students' perception of learning and the didactical setup. As mentioned, the didactical setup of the peer-to-peer self-learning station is based on the students learning together and from each other. However, they do not necessarily recognize this as a part of the didactics but as a flaw in the setup. One student says:

> It is a fine initiative, but very vague. We need more teachers to stand at each station, so we can talk and reflect out loud and learn properly from it.

In general, the analysis suggests that they have a hard time accepting that there is no "right answer" but that the key learning outcome is in the process rather than the result. The responses tend to circle around the need to know whether what they are doing is "correct," and they seem to feel that they cannot find out without a teacher.

Some articulate a risk of "erroneous learning" or speak of uncertainty when there is no correct answer to the exercise.

Observation notes from the sessions support this by highlighting that the students mainly "request a teacher, when one is available—kind of just to be sure. If there isn't a teacher present, they use each other more" and that they "seek approval every time they answer."

4.4 Summary of Weaknesses

In the analysis of the weaknesses, the students' expectations play a significant role in their perceptions of weaknesses. First, we have demonstrated that the students expect a great deal from their peers, and when these expectations are not met (lack of commitment etc.), the learning outcome suffers.

Likewise, the students progressively expect more from themselves and consequently from their education, and they are disappointed when they encounter "the same" exercises they now see as irrelevant.

This could all be understood in relation to the final category, namely, how the students understand learning, what learning is, and how it arises. To a large extent, the students expect learning to emanate from a teacher rather than in the process of peer interaction. They see the absence of a teacher, and consequently of a "right answer," as a weakness of the learning setup and fail to recognize the learning potential.

5 Discussion

In this chapter, we have explored the strengths and weaknesses of peer-to-peer learning identified by students and discuss how their experiences and perceptions align with the theoretical expectations and assumptions. The quantitative effect measures of the overall study, i.e., the reported learning outcome of the whole experiment (peer-to-peer, full-scale simulation, and post-clinical practice follow-up; cf. Fig. 1), demonstrate that the students in the intervention group report markedly higher levels of professional self-confidence, particularly in their technical skills compared to non-technical skills [17], which is to a large extent attributable to the peer-to-peer learning sessions. However, the analysis of the students' descriptions of their experiences revealed additional interesting insights, particularly regarding their perceptions of learning and how they influence their experiences of a "teacher-free" learning space.

Interestingly, it appears that the strengths of the peer-to-peer concept—strengths that the students to some extent recognize—are based on the premise *no teacher*, i.e., establishing a room for reflection rather than testing, focus on strengthening teamwork, etc. One of the key weaknesses identified by the students is the absence of a teacher. Observation notes suggest that when a teacher is present, the format is

compromised, as the students tend to seek confirmation that what they are doing is correct rather than reflect with each other on what they are doing, which is a key learning goal of the exercise.

In other words, they seem to have an expectation that there is a "right answer" or a "right way of doing things" and that only the teacher has the answer. However, the idea behind this learning method is that the students hold the answer and that it emerges in their interactions. The analysis thereby reveals a mismatch between the students' expectations of *how to learn* and the learning concept of the exercise.

One possible explanation why the students experience this mismatch lies in the design of the learning exercise. As mentioned several times, the exercise is highly scaffolded, e.g., by technically assisted checklists, feedback, etc. The intention is to avoid erroneous learning and thematic errors, but it seems to reinforce the students' expectations of "a right answer" that lies with the teacher.

Additionally and related to the former point, the didactical idea behind the exercise seems to be somewhat invisible to the students, which may partially explain the mismatch between expectations and intentions. The students do recognize some benefits, i.e., the safe learning space with room to make mistakes, but fail to see others, i.e., the value of repetition and the learning potential in reflecting with peers, indicating that they cannot see the connection between them. This is intertwined with the social interaction, which we see reinforcing these elements, both positively and negatively.

So where does this leave the teacher in the "teacher-free" learning space? Well, it seems that the teacher is still very much present through the design of the activity, and when the design is unclear or does not take social interaction sufficiently into account, the teacher's absence becomes visible. This implies that the teacher's role in this kind of learning setting is much more important in the preparation phase and that explicitation of the didactical principles should play a greater role. In other words, the role of the teacher is perhaps to explain why they are not there rather than to attempt to be there "by proxy" through (excessive) scaffolding.

6 Conclusion

The central research question in this chapter was: *How is peer-to-peer learning in simulation perceived by students, and what are the implications for the role of the teacher?* The analysis indicates that peer-to-peer learning in simulation-based teaching has great potential. As mentioned in the discussion, the reported learning outcome of the whole experiment demonstrates markedly higher professional self-confidence among students in the intervention group. However, the analysis and discussion also demonstrate that there is room for improvement, and the important lessons may be of great value to future peer-learning activities in simulation. The conclusion is that the peer-to-peer learning format entails a very different role for the teacher and that the explicitation of the didactical principles behind such exercises may enhance students' positive outcome.

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Train the Trainer Course: How Can the Skills of a Facilitator Benefit Academic Staff in Nursing and Other Health Education Programs?

Ulrika Eriksson and Astrid Kilvik

1 Introduction

In connection with the training of nurses and other health professionals, one has traditionally relied on active learning methods, such as simulation and skills training [1–3]. The purpose of such learning methods is to create arenas that resemble contexts and situations involving patients that the student will encounter in his/her professional life [4]. Particularly important for this learning method is the lecturer as facilitator with pedagogical responsibility [2]. The academic staff of nursing and other health professions have normally completed professional educations. The next educational stage consists of different types of formal higher education programs (master's degree and PhD programs), with or without a pedagogical foundation. Universities may also require documented and relevant practical and pedagogical skills (university pedagogy) in addition to the formal degree. With its emphasis on pedagogical content, a train the trainer course could subsequently represent a module that is part of a course in university pedagogy.

For lecturers who are responsible for the pedagogical and practical implementation of simulation exercises, it is important to have completed a facilitator course [7, 9]. According to Gardner, there are descriptions dating back to the 1980s of LOFT (Loft Oriented Flight Training) instructors, who relied on debriefing as a learning method [5]. The facilitator's skills in among other things debriefing significantly impact the student's possibilities for learning. In the words of Flatgård and Berg: "There are high demands on the competence and suitability of the facilitator, and it

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is crucial that there is a clear focus on systematic training, education and follow-up in this role" [6, p. 227].

Also important is the stress on standards of best practice in nursing. The skills of the facilitator are deemed to have a great impact on the learning of those taking part in a simulation exercise [7]. Further, it is crucial that organizations introduce systems that offer the facilitators the possibility of mentorship involving a senior facilitator [8, 9].

The thematic content of facilitator courses is normally not formalized in national or international steering documents [8]. However, this could vary between countries. Still, the exchange of knowledge and networking between various countries leaves an impression that there are similarities in the principles of implementation, with certain thematic and local adaptations. Usually, the courses do not yield credits from institutions of higher education. The courses tend to have a duration of 2–4 days. Among other things, they are based on pedagogical principles of adult learning, the different stages of simulation exercises, models of debriefing, the development of operationalized learning outcomes, and the role and function of the facilitator. Patient safety is a key factor. A common characteristic of such courses is the use of learning methods that require active participants [8]. This means that the participants carry out different forms of group work and take part in workshops while being able to acquire competence and skills in the role of facilitator in real simulation exercises. The competence is developed through the use of *feedback* and *feed forward* between participants and between participants and course facilitators. According to Hattie and Timperly [10], the concepts of *feedback* and *feed forward* can be described as follows:

- Feedback → Where am I now?
- Feed forward → Where do I go from here?

Guided by this methodology, train the trainer courses rely on the same pedagogical principles as simulation exercises. The courses are organized by different institutions and organizations, such as Stavanger Acute Medicine Foundation for Education and Research (SAFER), network-based organizations like EuSim, The Medical Training and Simulation (METS) Center, or institutions linked to the health sector like Copenhagen Academy for Medical Education and Simulation (CAMES).

2 Adult Learning and Train the Trainer Courses

Train the trainer courses are based on a variety of learning theories and theoretical perspectives on how adults learn. Adult learning is a collective category denoting an academic field that has evolved through decades and which draws inspiration from various disciplines and theoretical models. It is typically characterized by the use of the concept *adult learning* rather than the term *adult education* [11].

Generally, facilitator courses tend to emphasize perspectives on experience-based learning, reflection-on-action and reflection-in-action, the use of *feed back*

and *feed forward*, as well as the significance of the socio-cultural context [3, 12–15]. By relying on learning tools that are typically used in relation to students in real simulation exercises, the facilitator will be able to become a professional facilitator of learning.

Through this approach to learning, the lecturer participating in a facilitator course will be joined by a student completing simulation exercises in a study programme [16]. The involvement of both parties will be based on the same understanding of adult learning.

Courses devoted to academic staff who wish to assume the function of facilitator are important when promoting learning among students of nursing and other health educations in general [8]. Still, only a limited number of institutions of higher education has formalized such courses for lecturers of nursing and other health sciences [11]. It has been argued that targeted courses in research method and pedagogy, like facilitator courses, are a condition for adult learning where simulation is part of the learning method [1, 6].

3 Facilitator Versus Lecturer

In higher education, the role of lecturers has over the decades developed from ensuring the transfer of information and knowledge toward a stronger emphasis on the role of a facilitator responsible for the students' learning processes. This is evident in the more frequent use of active learning methods, like simulation, skills training, team-based learning, problem-based learning, etc. This could be considered a paradigm shift where the lecturer more than ever before assumes the role of facilitator instead of a disseminator of facts, concepts, and information [17]. The latter understanding of the lecturer's role seems to emphasize a re-presentation of the curriculum in a study program, which is also possible for the students to access through self-studies. Even if the lecturer has articulated and disseminated the information, there is no guarantee that the student subsequently will be able to apply this information in his/her professional practice. This will obviously affect the ability to acquire action competence and preparedness in professional studies like nursing and other health sciences. A lecturer tends to have a more traditional approach to the profession, with the focus being more on the lecturer than on the learning student. The traditional lecturer has a clear-cut role or function, with a responsibility to present or share information about a given subject area or topic, as opposed to the facilitator [18].

The role of a facilitator stresses the conditions of adult learning through initiating and enabling discussion, reflection, and in-depth learning in topics or subject areas that are defined in the steering documents of the study program [17, 19]. Fundamentally, the facilitator's role aims at promoting a methodological understanding where the student should *learn to learn.* It is crucial to lay the foundation for reflection, independence, and the development of skills in cooperation, communication, and responsible action [20]. These focus areas are based on theoretical perspectives on learning, such as Kolb's learning cycle, Schøn's concepts of

reflection-on-action and reflection-in-action, Lave and Wenger's emphasis on sociocultural context in communities of practice, as well as Dewey's theory of experience-based learning and *learning by doing* [20, 21]. These perspectives are described in more detail in the introductory chapter of this book.

A facilitator could also help raise the awareness about learning as a collective process that evolves and accumulates in interaction between people [20]. According to Tøsse [21, p. 91]: "The lecturer is a facilitator who in Maslow's words should help a person to be the best that he/she is able to become." A facilitating professional views learning rather as dialogue than pure dissemination of knowledge [21].

This is evident in the reflection (debriefing) phase of simulation exercises, where the facilitator enters a dialogue with the students to reflect on a concrete scenario related to the learning outcomes of the relevant activity [22]. Further, it is also important that the facilitator applies his/her skills to initiate transformative learning. Transformative learning is a type of learning where the students are made aware of their own opinions and mental habits. This typically takes place when the students discover that their opinions are not necessarily consistent with what has been implemented. Generally, transformative learning happens through reflection that includes the emotional aspect of the learning process [20]. This form of learning is also described in social cognitive theory [20, 23].

A lecturer operating in the role of facilitator assists the students in their learning processes and thus helps cultivate new skills instead of assessing qualifications. Skills development in relation to adult learning appears to be something different from what is traditionally associated with development of qualifications. The term qualifications is often seen in relation to a specific position or function [24]. In higher education, the commonly applied concepts are knowledge, skills, and general competence [25]. This means that the lecturer in the role of a facilitator should pave the way for the learning of the individual student [19]. The facilitation skills of a lecturer may also help reduce the gap between theoretical and practical activities [26]. Healthcare Simulation Dictionary defines the role and function of a facilitator like this:

> *An individual who is involved in the implementation and/or delivery of simulation activities. For example, faculty, educators,* etc. *An individual that helps to bring about an outcome (such as learning, productivity, or communication) by providing indirect or unobtrusive assistance, guidance, or supervision. For example: The debriefing facilitator kept the discussion flowing smoothly*. [27, p. 18].

4 The Significance of Common Language and Framework

In connection with simulation exercises, there is usually a framework underpinning the administrative and practical implementation, as well as the planning process. Administrative and practical considerations could, for instance, include selecting dates, room booking, access to adequate learning resources, etc. With regard to the planning of educational activities, important factors are scenario planning, choice of equipment, various learning tools and forms of simulation based on the learning outcomes, etc. [22].

As described earlier in this chapter, it is crucial that lecturers operating as facilitators have completed facilitation training courses [6]. It is also important that the content of the facilitator course corresponds to the standard of best practice, reflected in the International Nursing Association of Clinical Simulation and Learning's (INACSL) Standards of Best Practice (Simulation Standard V: Facilitator):

> *A proficient facilitator is required to manage the complexity of all aspects of simulation. The facilitator has specific simulation education provided by forma coursework, continuing education offerings, and targeted work with an experienced mentor.* [9, p. S23].

The content of the facilitation training courses determines the administrative, practical, and academic decisions on which the simulation exercises in nursing and other health education programs are based. Lecturers who assume the role of facilitator at the end of the course would have different professional backgrounds and be at different stages in their careers. A train the trainer course that is specifically designed for the facilitator role should be a comprehensive research-based and knowledge-oriented course based on the standard of best practice for professionals of nursing and other health educations. Just as the students enrolled in formal study programs, lecturers who strive to develop their skills through courses, such as the facilitator course, would require a so-called community of practice. The communities of practice could be described as follows: groups in which the participants share interests, problems, or ideas within an area and where they develop their competence through regular interaction and dialogue with each other. Communities of practice tend to be informally organized cooperative groups of learning. This does not mean that they are disorganized but rather that they are informal settings without reliance on traditional organizational control. The bond between the participants is based on their joint commitment, which in turn relies on the responsibility and effort to develop a common project. This commitment does not necessarily demand homogeneity and agreement. On the contrary, diversity is crucial in driving the cooperation forward [28]. Such a community of practice would promote learning from the course itself and the learning outcomes of the lecturers. In addition, the community will represent a counterbalance against the trend of individualization [19, 20].

Based on the different experiences among the lecturers involved in the course regarding active forms of learning, it is important to develop a learning process that takes these differences into consideration. This will affect the individual lecturer's ability to operate as an independent facilitator after completing the train the trainer course. It could be advisable to apply a structured framework, like Dreyfus and Dreyfus' competence steps, which take you from novice to advanced beginner, competent, proficient, and finally expert. Through these steps, the lecturer in the new role as facilitator will be able to acquire competence [21]. This model represents a learning process which offers an opportunity: "...which takes you from a rule-based and context-dependent beginner's behaviour to an experience-based and context-independent expert behaviour" [21, p. 128].

The learning outcomes and content of the train the trainer course make it possible to develop a common language and comprehensive perspective on adult learning, which is useful for other roles and functions as well. Development and the focus on a joint language could prevent the facilitation of simulation exercises from becoming arbitrary and individualized [19]. In this way, the students will encounter facilitators who, regardless of personal characteristics, has a focus on adult learning and active learning methods like skills training and simulation.

When developing simulation exercises, it is common to apply a structured, practical form of implementation, which normally and traditionally consists of a familiarization phase (briefing), an implementation phase, and a reflection phase (debriefing) [29]. The facilitator course provides the lecturer with knowledge, skills, and general competence that should also benefit the student's learning. The mentioned framework enables an opportunity for learning.

5 The Facilitator's Competence: Side Effects and Synergies

The facilitation competence among lecturers of professional education could also involve some additional effects and synergies that ought to be highlighted. This could include educational leadership skills for those responsible for study programs or courses, development of new learning methods and forms of examination, support for colleagues through mentorship, and implementation of teamwork. Lecturers who have completed the train the trainer course should be in a good position to successfully implement simulation as a learning method in nursing and other health disciplines. Accordingly, the knowledge, skills, and competence of facilitation represent crucial components of educational leadership as a discipline [2]. This is relevant for lecturers with course responsibility or heads of studies, as well as advisors working with people in leadership positions. Obviously, it also applies to lecturers-turned-facilitators who use student-focused approaches and learning tools that promote learning based on a useful design reflecting the learning outcomes of the study program. One could be guided toward the learning tools required to achieve the learning outcomes of the course [18]. Lecturers with facilitation competence will be in a particularly good position to work on learning design in professional education.

The facilitation skills could also be useful when selecting forms of examination in nursing and other health disciplines. Toward the end of the study program, the student normally needs to go through a summative assessment, which is based on the requirements of society. The society needs to ensure that the individual student has acquired the necessary competence and obtain documentation in connection with admission to further studies. A lecturer with facilitator competence could in this context contribute to the development and implementation of examination forms that promote adult learning.

Examples of this are case-based written examinations or simulation-based forms of assessment. A facilitator has a stronger focus on student-centered learning than a social control system, representing a counterweight against traditional examination forms (school examinations) and a new approach toward adult learning [19].

In nursing and other health disciplines, there has been a tendency to put more emphasis on the phenomenon of teamwork, which is in line with the focus on general quality and patient safety in the health services [30]. Simulation as a learning method is well suited to develop competence and skills in teamwork [3]. As mentioned earlier, lecturers with facilitator competence could give valuable contributions to the implementation of team-based learning in different study programs. These contributions may be reflected in the steering documents of a specific course, or more generally in the study program through implementation and development of simulation exercises [31].

In higher education, there is a growing need to establish a system that enables facilitators to receive mentorship from, for instance, senior facilitators [8, 9]. By systematically applying a system of mentorship, as a form of inter-colleague support, lecturers will be able to receive *feedback* and *feed forward*, in the same way as the students. According to de Lange and Lauvås [32], colleague support is a form of supervision that involves professionals at the same educational level. In this context, a mentorship system where the facilitation skills are applied in relation to colleagues can be defined as a form of colleague support. As mentioned above, the concepts of *feedback* and *feed forward* are useful [10]. An example of this could be a situation where de-briefing takes place following a simulation exercise, where a senior facilitator has participated as an observer. The following questions and statements could be natural in a conversation between a mentor and his/her colleague:

- What are you satisfied with?
- This is what I think you should be satisfied with.
- What do you think you could do differently next time?
- This is what I think you should do differently next time.

This is a systematic, simple, and concrete structure that could enable adult learning [33]. The contribution of the senior facilitator is to combine experiences with the possibilities for transformation. This makes it possible to use facilitation skills to create positive side effects for the learning party and also discover useful synergies in the lecturer's daily work. *Feedback* and *feed forward* ought to be seen as beneficial for all learning [33], and the significance of colleague support has already been thoroughly described in the literature [32].

The abovementioned colleague support, through a system of mentorship where facilitation skills are used, should be viewed in relation to the concept of lifelong learning. Lifelong learning may happen through both formal and informal learning and represents a form of strategy for all types of education, as well as learning in professional life and life in general. Lifelong learning is thus a natural component in the concept of adult learning [34].

The competence acquired through facilitation, among other things, is also transferable to other contexts of learning in higher education. Examples of this can be supervision of theoretical student work, conversations with students who experience challenges in their studies (advisory conversations), or formative assessment in connection with clinical practice. According to Wahlgren [35], a lecturer working in

higher education should be able to assume different roles and develop skills in various contexts. A lecturer with facilitation competence ought to be able to perform such a role and use the skills that Wahlgren considers necessary for a supervisor and coach. The mentioned roles are particularly important when promoting adult learning [35]. How facilitation skills could benefit lecturers with years of professional experience has not been clearly highlighted in the literature. But one could well assume that facilitation competence represents a contribution to a more student-centered understanding of learning.

6 Conclusion

The facilitator has a key function in simulation exercises for students in nursing and other health disciplines, given his/her responsibility for enabling successful learning processes. The skills of the facilitator are therefore critically important in enabling the learning of the students. This competence is available through train the trainer courses, which are based on the principles of simulation as a learning method and rely on theoretical perspectives on adult learning.

A systematic train the trainer course could help the facilitator achieve professional confidence and a solid foundation for implementing his/her particular role. The framework, content, and learning outcomes of the facilitator course have helped create a common language and a comprehensive perspective on adult learning. This will ensure that students encounter a facilitator who relies on *context-independent expert behavior* instead of an arbitrary and individualized role.

Generally, the facilitator tends to rather emphasize his/her role as an active *enabler* of student learning than an instrumental function of *conveyor* of facts, concepts, and pure information. This separates a facilitator from a lecturer. Moreover, the facilitation skills among lecturers of nursing and other health disciplines could yield additional effects and synergies that are useful in their general professional lives. Facilitation skills could be applied in all types of educational leadership, in the development of learning design, and when selecting between different forms of examination. With facilitation skills, lecturers could also help cultivate competence related to teamwork. Another additional effect is the possibility of using the mentorship system of the train the trainer course, with senior facilitators providing support for colleagues at the same professional level. The roles of coach and supervisor, which are developed through the train the trainer course, may also be applied vis-à-vis students, for instance, in connection with advisory conversations or formative assessments in clinical practice.

The ability to alternate between roles in different situations and contexts is significant when promoting adult learning. The focus of the train the trainer course with regard to student activity and lifelong learning can be transferred to other learning situations. Even if the importance of facilitation skills is not strongly emphasized in the literature, it is fair to assume that this competence will help promote a more student-centered learning perspective among lecturers of nursing and other health professions.

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Playful Learning with VR-SIMI Model: The Use of 360-Video as a Learning Tool for Nursing Students in a Psychiatric Simulation Setting

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1 Introduction

The development of new technologies has become more apparent over the last decade, especially with the development of mobile platforms (laptops, tablets, mobile phones), all of which connect to the Internet. How and whether technology improves learning are two big questions and the source of much debate. In this chapter, the authors will look at how the use of 360-degree videos, viewed through head-mounted displays (virtual reality headsets or HMDs), can become supplements to high-fidelity simulations using similar pedagogy. The role of 360-degree video in education is not yet clearly identified and understood, as little research has been done on this topic [1].

Since the introduction of the blackboard within education in the early eighteenth century, the development of technologies used in education has been many: overhead projectors, whiteboards, computers, and tablets, to mention a few. People more generally are faced with new opportunities that enable us to interact with anyone anywhere in the world, at any time; we can access any information through the touch of a button. These changes have occurred rapidly and affect how teaching and learning is viewed. How has this affected learning? The students themselves are

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now able to access information traditionally provided by the instructor and textbooks [2].

A bachelor's degree in nursing must change in-step with new knowledge and new methods of learning. Students in the future may not have the same relationship to books as the previous generation but will perhaps have acquired other methods of gaining knowledge. Students now have a world of knowledge literally at the tip of their fingers and face the challenge of filtering the information to determine what is accurate. Teachers today aim to develop new didactical methods where students can focus on interpersonal interactions, especially in meetings with patients where they can practice professional relationship skills [3]. It is in encounters with patients that relational skills become evident. The authors believe that videos showing relevant scenarios in a 360-degree video format will be beneficial for students preparing for the clinical setting. Practice in mental health work can challenge students, as the practice brings with it new situations and unknown human encounters, which are often in combination with misguided assumptions about mental health issues [4].

Using VR technology in healthcare training is an important supplement when creating training and simulation programs [5]. It has become common in recent years to use 360-degree videos when creating relevant clinical settings and training. Themes with challenging topics such as suicide assessment, managing violence and threats, and the opportunities to train in demanding interpersonal situations are limited in healthcare simulation training [6]. Research in the field suggests that if we are affected emotionally, we learn better. With VR glasses, senses and emotions are activated, enabling students to learn in a completely different way than by reading or listening to a lecture [7]. Nursing requires creativity and a good ability for clinical decision-making processes. To practice this, playfulness can give students motivation and the opportunity to promote learning. 360-Degree video can be seen as a playful way to learn from new situations. "Play" in particular has the ability to unite imagination and intellect in that it acts as a tool for students to discover things at their own pace and in their own way [8]. Playful learning increases the levels of oxytocin, engages the students emotionally, and gives them a creative experience [9].

2 Technical Aspects of 360-Degree Video in Education

Virtual reality as a concept has acquired distinct meanings. The history began long before computers and modern technologies were invented. In the 1930s, the term "virtual reality" was first used by the French writer and philosopher Antonin Artaud in his book *The Theatre and Its Double* [10] when he tried to construct the illusion of being in other spaces [11]. The American inventor and film enthusiast Morton Heilig is perhaps the best known of these VR experimenters. He experimented with a project called multisensory theatre. In this performance, he used three-dimensional images imposed on physical facilities such as smell, wind, and movement. In 1962, he built a prototype of his vision called Sensorama Simulator [12]. In modern times, Heilig has been called the father of virtual reality (VR) technology. A few

years later, in 1965, Ivan Sutherland and his students Danny Cohen, among others, constructed the first device that could be placed on the head, the head-mounted display (HMD), with head-tracking and stereoscopic glasses. The surroundings were updated in the glasses that also took into account the head position and direction [1].

Up until the 2000s, new phones and boards with higher resolution and motion detection were produced, as well as new types of headsets that made it possible to participate in simulations through VR headsets. This complete presence is often described as an immersive state [13]. Over the past 20 years, VR technology has been further developed in computer games, cars, and flight simulator training programs. In the mid-2010s and beyond, VR became more recognized as technology in educational research environments as well as in industry, military, and architecture. The concept of immersive learning was introduced and became more accessible with a new stand-alone headset in 2013. Within VR simulation, as in regular healthcare simulation with technical skills training on procedures, it is of great importance that the training takes place in a physical safe environment to prevent injury [14]. Over time, programmes have been developed to train technical skills (TS) on procedures in healthcare and in industrial enterprises. Immersive VR simulation with HMDs has been used since the early 2000s [13]. Today, VR technology has reached a point of technological maturity that makes it more accessible for both the consumer market and educational institutions [15].

Videos tell their stories through an established language of cinema, using certain cues that the audience interprets [16]. However, 360-degree video is a relatively new experience to most people; only about 19% of US adults had tried VR in 2020 [15]. This means that the language of storytelling is not as established in this medium, and this must be considered when designing the 360-degree video. In a non-360-degree video, the director has full control of the audience's attention: where they should focus and how they should experience the story being told. This is not the case with 360-degree videos as the user is in control of what they view in every moment. Creators need to design an engaging clinical situation where the student is guided, through visual and auditorial cues, to focus on the most relevant elements in order to learn [17].

Another aspect of student lack of experience with VR is the technical threshold that the HMDs present. The student will have a reduced experience if they do not know how to adjust them to their needs, for example, by adjusting the straps, volume, and focus. The technical frustration will be lessened with time as more students test them out and learn how to get the most out of them [18], but for now, ample time to introduce and explain the equipment to new users is recommended.

A great benefit to 360-degree video is the possibility of centralized distribution of produced content. Each produced simulation can be digitally distributed to any HMD. The more students that can use the same 360-degree video, the less the median cost of each produced experience. This allows institutions to work together on development and production and then share the final product. Maintenance on VR labs with self-contained HMDs involves keeping the HMD operational and replacing erroneous units.

3 Research on Virtual Reality and 360-Degree Video

VR for educational purposes has been researched for decades [12], with many compelling findings. The research on 360-degree video in education, however, seems to still be in an early exploratory phase [1], perhaps owing to only-recently dropping costs for the necessary technology. In this section, we will briefly discuss some findings of research on both topics to explore how the use of 360-degree video might benefit nursing simulation.

First, a note on the technical differences between 360-degree video and VR. Whereas VR puts the viewer in a virtual 3D-modeled environment, the environment of a 360-degree video is pre-recorded using a special camera that films in every direction. This means that the viewer can look around freely as in other VR experiences, but movement is limited because the camera only records from one position at a time, and interaction is limited because the environment is pre-recorded. Even so, 360-degree video is often referred to as VR [12], and some of the possible experiences of VR can be achieved using 360-degree video.

When researchers discuss the benefits of VR, they often highlight its ability to make the participant feel as if she is really present in a situation, the illusion of "presence," rather than viewing the situation as a distanced observer [12]. This effect is apparent in many different VR experiments. For example, participants have been shown to feel pain and discomfort when their virtual body is subjected to certain stimuli [19], participants react to virtual characters with the same social instincts for personal distance as if they were real people [13] and, perhaps most importantly, participants themselves often report an experience of virtual presence [12].

This effect has been utilized in different ways that might prove useful for nursing simulation. Pan and Slater (2011) used VR to simulate ethical dilemmas and found that participants would sometimes respond differently to the dilemma after having experienced it virtually, rather than just as a theoretical problem [20]. Kleinsmith et al. found that VR could be used as empathy training with virtual patients [21], and Cook et al. concludes that VR can "provide training and many different scenarios that will help [doctors] toward gaining experience" [14]. Virtual experiences have also been shown to reduce anxiety from real experiences, for example, in VR-based exposure therapy for people suffering from arachnophobia [22].

The experience of "presence" can also involve being in a different body, which opens up whole new avenues of possibilities. Peck et al. found that virtually inhabiting a black person's body for only 12 min made white participants less racist [23]. Ahn et al. let participants with normal vision virtually experience different forms of colour blindness, leading to more helpful behaviour toward people with colour blindness as compared to a control group [24]. VR is a promising tool for learning goals that are concerned with empathy, experience, and ethics.

Some Korean universities tested VR specifically in nursing education as a safe alternative to clinical practice during the COVID-19 pandemic. They found that VR, in combination with traditional simulation, gave the best learning results and highlighted the importance of a framework of learning activities before and after the VR session [25].

But do these findings translate to the use of 360-degree video? As mentioned, these technologies have fundamental differences, as well as similarities. In a scoping review of the research on 360-degree video, Snelson and Hsu found that an experience of "presence" was common among participants in experiments involving 360-degree video [1]. Virtual exposure therapy has also proven successful using 360-degree video [26], hinting that exposure to stressful nursing-related situations in 360-degree video might lead to reduced stress in real clinical situations. Overall, Snelson and Hsu found mixed results for the learning benefits of 360-degree video but noted that "there is some indication that learning with 360-degree VR video might be more appropriate for certain types of learning such as promoting empathy, reflection, or skill-based knowledge as opposed to factual or conceptual knowledge" [1]. These types of learning are a good fit with the goals of nursing simulation.

4 Preparing for Psychiatric Nursing

Students who are preparing for practice within psychiatric nursing must be able to meet patients who are struggling with depression, extensive anxiety problems, psychoses, substance abuse disorders, and, potentially, an inability to self-care [27]. Nursing students must learn to deal with a field that is at times complex, which requires a dynamic approach. In the face of mental health work, one can see how health professionals become emotionally involved in patient's difficulties. Interaction with the patients may trigger adverse interactions such as rejection, quarrelling, neglect, and opposition. In order to maintain a professional relationship, nursing students are required to accept, validate, and use communication skills to promote health [27]. Nursing students are taught various techniques for communication, such as active listening, and affirmative and exploratory skills. Practicing mentalization, seeing others from the inside and yourself from the outside, is one such method. Mentalization as a perspective is universal and can be used in many types of consultations with patients [5]. It is, however, difficult to prepare for the complex, unique, and delicate nature of each meeting, as each interaction involves complex, subtle verbal and nonverbal cues [28, 29]. Simulation is a pedagogical method that has been used to prepare students for patient interactions, which enables students to put already-acquired skills and knowledge to use in a setting that is as close to reality as possible. This provides students with valuable experience and knowledge into how their own reactions may influence their situational awareness [3, 4].

Students in nursing are trained in knowledge-based practice. This requires making assessments based on both research, experience, and promoting shared decisions, which requires unbiased assessment [30]. Students must be able to meet demanding clinical situations in a tactful way. It is an advantage if students have emotionally trained for this, which 360-degree video offers. Being able to identify where there is a lack of knowledge by mapping current knowledge is important. How these challenges are met and how capability and flexibility are shown to integrate new with existing knowledge are key prerequisites for knowledge advancement [31].

5 Why Is 360-Degree Video Suitable for Promoting Nursing Students' Competence in Psychiatric Nursing?

The pedagogy of simulation aims to create a safe environment for reflection and learning, enabling the students to apply already acquired skills, knowledge, and values in a clinical setting. Simulation has traditionally been an arena where the student is able to combine technical skills and non-technical skills (communication, teamwork, decision-making, and critical thinking) [32–34]. Simulation utilizes a combination of pedagogy and technology to achieve the desired learning outcome, which is covered in other sections.

Skills training has been a part of nursing education since 1910 [34], when the first lifelike mannequin was developed for nurses to practice their clinical skills. It was a doll with no other functions, which can be defined as a low-fidelity simulator. Since then, the technology has made leaps. Today's modern mannequins can give clinical signs and symptoms as well as talk. These mannequins are expensive and are regarded as high-fidelity simulators [32, 34].

Clinical simulation in a somatic setting has the unique ability to imitate real-life scenarios, as mannequins can give clinical signs and symptoms. Students act on the clinical signs and symptoms and get real-time feedback from their interventions. However, the nature of the psychiatric setting, where one or two nurses are faced with conversations of a delicate or volatile nature, makes it exceedingly difficult to use mannequins [3, 28]. Mannequins lack the ability to provide the complex nonverbal cues, such as facial expression, eye movement, and body posture, which are all important aspects in communication. The learning outcomes in simulations within the psychiatric setting might address how the nursing student or nurse applies specific mental health tools to assess for suicide risk, depression, or symptoms of other illnesses.

Nursing is a profession where skills, knowledge, and experience, combined with professional attitudes and values, play crucial parts. Nursing students need to make the journey form novice to clinician over a period of 3 years. Students must develop skills within the psychomotor, cognitive, and affective domain. The psychomotor and cognitive domains may be covered through several didactive methods such as PBL (problem-based learning) and TBL (team-based learning) [35, 36]. Although student active methods, like those mentioned above, address the psychomotor and cognitive domains, the affective domain "remains undiscovered country" [37]. The affective domain addresses the students' perspectives, emotions, feelings, and attitudes that the student needs to be able to understand the motivation for action and inaction [38].

In the reality of clinical life, students are faced with the complexity of applying already-acquired clinical skills and knowledge in real-life situations. Although there is a growing body of research addressing student awareness of their own feelings, the challenge is how this is transferred to students [3]. Students who are preparing for clinical placements in the psychiatric setting need to be aware of the sensitive, unpredictable, and sometime volatile nature of this part of nursing. By experiencing

certain scenarios, students may start to develop new awareness and a deeper understanding of how they may interact with the patients [33].

For simulations in the psychiatric setting, actors may be used to imitate a patient, which provides students with valuable interaction and experience. It does, however, require the actor to be provided with sufficient direction. The task of the actor is not to act for the students but with the students to such an extent that they are able to address the learning outcome. Some simulation centres employ trained actors, while others use other unskilled actors. If the actor overplays or is unable to understand the desired learning outcome, the whole simulation experience might be affected. Although the use of 360-degree video lacks the interaction that high-fidelity simulations have, it has the advantage that by using 360-degree video, the quality of the recording and the actor can be controlled giving a consistency to the learning outcomes. Few studies [3, 29] have been done on the use of 360-degree video in this type of setting, but this method has the possibility of creating a private room environment free from distractions. This method provides an opportunity to reflect openly and equally without concern for other participants, as the students have one common experience, though different perceptions. Furthermore, this differs from an experience on a flat screen, as the participant is immersed, but not by environmental distractions like other electronic devices, noise, light, and/or other factors [39].

The types of skills nurses need in the psychiatric clinic is complex and should not be reduced to communication skills. Anderson and colleagues have operationalized a set of facilitative interpersonal skills that are meaningful and useful [40]. These skills are used by helpers in various professions and are believed to motivate a person with emotional or mental difficulties to initiate change toward better emotional and mental health. The core of facilitating interpersonal skills can be defined by the fact that the helper, i.e. nurse, is able to capture, understand, and communicate a wide range of interpersonal messages to a person seeking help. The nurse can then convince the person seeking help to adopt proposed solutions to the problem and let go of more inappropriate coping strategies [40]. How one learns these skills is often based on both practical and theoretical knowledge. Mass training becomes possible with the use of 360-degree video, which constructs a form of experiential knowledge.

6 VR-360-Degree Model: "VR-SIMI Model"

VR-SIMI is a model used to describe a specific VR-training method for health professionals developed at the Centre for Simulation and Innovation at SIMInnlandet, Innlandet Hospital Trust in Norway [41]. The terms used at SIMInnlandet, to describe the specific stages of the method, are *Briefing, E-Motion*, and *Debriefing* as shown in Fig. 1.

The VR-SIMI model combines pedagogical principles from medical simulation with the 360-degree VR scenarios, exposing and preparing health professionals for clinical situations in the psychiatric nursing setting, by training their ability to reflect on and learn from relevant situations. Figure 2 shows examples of situations that students can practice increasing their competence in psychiatric

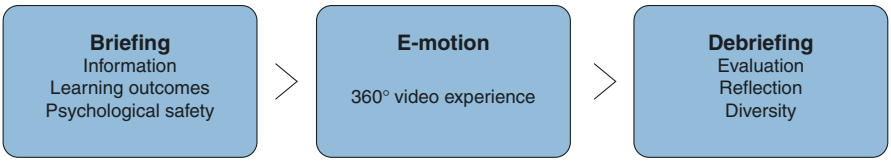

Fig. 1 Three terms involved in the VR-SIMI model

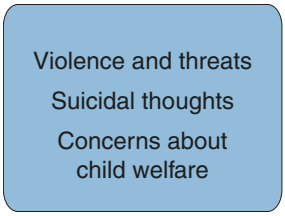

Fig. 2 Examples of situations students can practice in preparation for practice in mental health work

nursing. VR-SIMI involves embodied multimodal learning by offering theoretical knowledge, immersive 360-degree video experience, and reflection in the same exercise.

Psychological safety is based on trust and will help students reduce their interpersonal risk. This will promote certainty and a will to change in the next phase [42]. Psychological safety can be seen as a strategy which helps people overcome their defensiveness or learning anxiety. Schein argues that psychological safety allows people to focus on collective goals and problem prevention, rather than on self-protection. We can see this in the light of the use of 360-degree video as a tool that allows the students to be free without defence and self-focus [43].

E-motion describes the student viewing experience and refers to the feeling of "presence," as discussed in the previous section [7].

6.1 Briefing

In VR-SIMI, psychological safety is of great importance for the training experience. The building blocks for a "safe room" are laid in the pre-simulation phase. In addition to establishing a flat group structure through the "sharing is caring" attitude, factors such as clarifying expectations, closeness to the collaborative exploration of the theoretical input and learning outcomes. The friendly fostering of diversity is important in VR-SIMI to ensure the psychological safety for the participants. Maintaining a psychologically and physically safe learning environment is crucial for the student experience. It is therefore important that the number of participants experiencing the scenario does not exceed ten students. This enables all students to actively participate in the debriefing and may reduce a fear of feeling exposed. In

the pilot stages of the VR-SIMI experience, some students experience dizziness and nausea, which can result in students falling over. Students expressed feeling safer when sitting down in an office chair with arm rests equipped with a swiveling option (e.g. gaming chairs). The briefing phase ensures the theoretical and emotional warm-up through the presentation of the model, the technology, learning goals, and theory relevant to the learning goals. Furthermore, the participants are invited to share and contribute with their own knowledge and experience from their education and work as healthcare professionals.

6.2 E-Motion Phase: 360-Degree VR Experience

During this phase, students put on the HMDs, as can be seen in Picture 1. The facilitator conducts a "start-up ritual," making sure equipment is ready. The facilitator then starts the scenario simultaneously on all HMDs. Though all students watch the same recording, the experience will depend on each participant's personal and professional values, as well as lived experience. The subjective experience of each individual participant may therefore vary considerably, which creates the foundation for reflection and learning. The group takes this diversity of embodied experiences into the reflection phase. Ideally, the facilitator participates in the VR experience.

Picture 1 A VR simulation group carrying out the 360-degree VR experience viewed through head-mounted displays, in the E-Motion phase. (*Photo: Marius Huse*)

6.3 Debriefing–Reflection Phase

In addition to opening to the participants' bodily experiences, thoughts, and feelings related to the virtual scenario, the consideration of diversity among the participants is of importance. A variety of experiences and perspectives within the group after the same VR-scenario is of special interest. The facilitator encourages the students to be active participants throughout this phase, emphasizing the process of reflection, rather than right or wrong answers. The importance of the reflection process has been covered earlier in this book.

6.4 Exercises

The VR-SIMI model was used in a project called "VR-SIMI Acute" that included four exercises with playful learning in mind. The group members viewed the same VR-experience with the following frames:

Exercise 1: How does working with mental illness affect us? How do we embody other people's suffering?
Exercise 2: Mentalization: How can we see ourselves from the outside?
Exercise 3: Mentalization: How can we see the patient from the inside? Which model of understanding do we use?
Exercise 4: "Change glasses": Experience the virtual situation as a unit leader, a therapist, a chief physician, or a new employee, and use your new experience in the reflection.

In exercise 1, the staff work on the understanding of mental illness and how it affects them. This exercise challenges perceptions and aims to increase knowledge of student's own understanding and awareness. In exercises 2 and 3, participants work on the theoretical perspective mentalization and how this can function as a good scenario for improving relations skills.

> Mentalizing is the capacity to understand ourselves and others in terms of intentional mental states, such as feelings, desires, wishes, attitudes, and goals. It is a fundamental capacity in our social environment: Without this capacity, we would be completely lost in a world that is determined by complex and ever-changing interpersonal relationships that require a high degree of collaboration and mutual understanding [44, p. 366].

When students work to see themselves from the outside and others from the inside, relational competence will increase, especially through an increased awareness of how complicated but also important relational compassion is. Exercise 4 titled "Change Glasses" challenges perspectives on student's own and others' roles and aims to increase understanding for others in order to prevent misunderstandings.

6.5 Potential Clinical Situations: Suitable as Preparation for Clinical Practice

A nurse is committed to promoting hope and change in the case of creating health-promoting behaviours [45], among many relational skills, some of which are mentioned here in the chapter. How nursing students can pass on and create empathy in interactions with the patient is dependent on the nurses' professional attitudes and clinical experience. A nursing student naturally lacks clinical experience and certain types of training that a nurse needs to and wants to practice. It is not unknown for nursing students to meet patients who have complex health challenges [30]. VR simulations are reflective of clinical situations in psychiatric nursing and give possibilities for practice.

7 Conclusions

By looking for new methods that can be used in educational institutions, we can elevate students' perspective and activation so that learning is formed, especially learning that is needed for the specific fields in the clinic. The potential of 360-degree VR video gives flexibility to create systematic experiential learning as well as playful emotional learning in collaboration with students. This chapter has provided knowledge about the practical use of 360-degree VR video, technical potential, and challenges. We have also discussed why this method is suitable for improving nursing students' competence in the psychiatric clinic. The chapter is an introduction to inspire use of 360-degree VR video in professional education, with a focus on nursing education. 360-Degree video simulations will not replace real-life situations but can act as a complement. What 360-degree video simulation offers is a tool that allows nursing students to have increased time in relevant situations that can contribute to quicker and better decision-making in real, clinical situations. This chapter argues that using 360-degree video creates a playful and safe learning environment, promoting reflection and learning. The VR- SIMI model shows more explicitly how 360-degree VR video can be used as a tool for nursing students in a psychiatric simulation. The 360-degree VR simulation of a clinical situation is a highly immersive experience and gives the participants a feeling of "being there," a feeling of presence.

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Virtual Reality (VR) in Anatomy Teaching and Learning in Higher Healthcare Education

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1 Introduction

The implementation and use of technology is not a new phenomenon in higher education, as the use of technology creates new possibilities and challenges involving pedagogical thinking and planning [1]. Since learning using digital technology can provide a wider variation within education, as well as training for a professional career, society in general increasingly implements and adopts new technology [1, 2]. The use of technology can enhance interest among students and provide them with better conditions to understand complex information and phenomena [1].

The quality of healthcare and patient safety is prioritized within the healthcare system, and evidence-based health education is important when it comes to ensuring quality of care and patient safety [3]. Clinical practice is in a state of continuous change and has led to increasing demands in terms of student competencies and clinical skills. Higher education plays an important role in knowledge translation and in strengthening the competencies and clinical skills of students [4]. In higher education, the implementation of technology has enhanced the possibilities to teach students more complex concepts in a more efficient manner and with greater variation and visualization [5]. An example of a complex subject is the teaching and learning of anatomy. Anatomy is considered an essential science within medicine

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and healthcare education, and anatomical knowledge is important for developing skills and becoming a competent practitioner [5–8].

Anatomy is a visual and three-dimensional (3D) science, traditionally taught in higher education through two-dimensional presentations (pictures) in books and classroom teaching. A recognized visualization technology for exploring and experiencing 3D is virtual reality (VR). Numerous systematic reviews state that technology such as VR can enhance motivation for learning and preserve knowledge and in-depth learning [9–13]. This chapter provides a general introduction to different aspects of VR and its potential relevance for increasing the quality of anatomy teaching and learning in higher education. We also provide practical insights into the development and implementation of VR-based teaching and learning of anatomy on the bachelor and master's levels in a Norwegian setting.

2 Virtual Reality: The "Whats" and "Whys"

VR is defined as "a technology which allows a user to interact with a computer-simulated environment, be it a real or imagined one" [14] and is increasingly presented as a feasible interface to promote salient, motivational, and safe environments for virtual learning [15, 16]. However, the definition of VR varies significantly in scientific literature and covers a wide range of technologies. In short, it varies from the classic, non-immersive desktop system (PC, Mac®, PlayStation®) with or without added motion tracking (Nintendo Wii® and Microsoft Kinect®) to immersive CAVE systems (multiple large projected surfaces) and head-mounted display (HMD) systems (HTC Vive® and Oculus Rift®) [17] (Fig. 1). CAVE systems have become more common due to technological advances and a desire to prioritize such systems [17]. However, our focus in this chapter is on the use of head-mounted display (HMD) systems. With HMDs, the user is immersed in the virtual environment by wearing goggles with screens for both eyes. The goggles utilize sensors that give the software exact information on the user's position and movement. Head-mounted display (HMD) systems have an additional advantage over less immersive

Fig. 1 Examples of three different types of virtual reality systems: desktop, CAVE, and head-mounted display. (Illustration: Lauritz Valved)

VR technologies in that they give students the possibility to physically move around in the environment and interact with, explore, and move objects from different angles.

Immersion relates to how effectively the computer-simulated environment replaces the perception of the real world, making the student perceive the environment through sensorimotor contingencies [18], meaning that the student's learning is shaped by stimuli and actions within the virtual environment. In this setting, it is of relevance to note the difference between 360-photo and video-based virtual experiences and computer-generated VR environments (virtual environments, VE). A photo or video captured by a 360-degree camera can be viewed in a head-mounted display (HMD) system and enables the student to visually explore the surroundings. However, this exploration is limited to the point in space in which the camera is positioned at the time of capture and the timeline of events and interactions is predefined. A virtual environment is based on 3D models, and the head-mounted display (HMD) system's position and movements are translated into the virtual environment, thus enabling the student to move around in this environment, viewing the surroundings from all positions and angles. In a VE, the timeline of events and interactions is not necessarily predefined, as the 3D models can be generated for continuous interaction.

In the Faculty of Health and Social Science at the Western University of Applied Science (HVL), we have implemented head-mounted display (HMD)-based VR in the teaching and learning of anatomy, making it possible for our students to enter a synthetic anatomical environment. We use commercially available VR software, including over 4500 anatomical structures, where the students can interact with (dissect) all of them, starting from a full-body structure or predefined substructures [19].

3 Anatomy Teaching and Learning in Higher Education

To construct knowledge about anatomical structures and how different bones, muscles, nerves, etc. are located and relate to one another is something students of both medicine and nursing have claimed to be difficult or challenging [1]. Traditionally, the teaching of anatomical knowledge within our health science programs has been introduced to students through lectures and two-dimensional pictures from books. Both primary studies and systematic reviews report that students experience learning anatomy as difficult and challenging [5–8]. The most prominent challenge to learning anatomy among students is to identify anatomical structures and understand the spatial relations between the different structures [6]. The ability to understand and perceive spatial dimensions and understand how human structures relate to one another is difficult to learn using two-dimensional resources, while anatomical structures are three-dimensional [13]. Actual anatomical knowledge and spatial anatomy knowledge has been shown to increase using three-dimensional methods instead of two-dimensional [13].

Learning concepts argue that learners must play a significant role in the educational process, presented as *collaborative learning*, meaning that students become more active and responsible for their own learning and achieving their learning goals when collaborating with peers [1, 20]. An important prerequisite in small-group collaboration is the sharing of knowledge and expertise and student ability to explain their reasoning to one another and to themselves. Promoting such cognitive restructuring of knowledge, interaction, and positive relationship within the group is essential [21–23]. Working together also contributes to developing social competencies through problem-solving and instant feedback, in addition to preparing students for a professional career, as collaboration is an essential core competency for achieving quality of healthcare [24, 25].

4 VR as Part of Anatomy Learning in Higher Education: A Practical Insight

Systematic reviews report that the use of VR has a positive impact on student ability to understand spatial and structural anatomy [3] and may be an effective resource to enhance the student's level of anatomy knowledge [5]. Another important advantage of using VR in anatomy teaching is the possibility to create a realistic learning environment that enhances student motivation and situated learning [4]. An additional reason to implement VR into the teaching of anatomy is to potentially achieve a transition from teacher-centered and passive learning (lectures) to an interactive, student-centered and exploratory learning, i.e., collaborative learning.

Since 2018, the Faculty of Health and Social Sciences at the Western Norway University of Applied Sciences (HVL) has been developing and implementing VR in anatomy teaching and learning within the bachelor's program in radiography and the master's program in midwifery. The strategic goals of the faculty are to implement and enhance the use of different learning activities, combined with technological tools, in order to enhance the ability to provide tailored and flexible education [26]. By using digital tools and a more collaborative approach within teaching, our primary goals are to enhance the learning outcomes among students, increase student motivation for learning, and, consequently, enhance the quality of the teaching.

The implementation of VR within anatomy learning and teaching was a progressive process that started with a pilot using the commercially available software 3D Organon VR [19] among first-year radiography students. The students tested the equipment in small groups of three to four students, by which one student used the head-mounted display (HMD) systems to enter the virtual environment and the other students participated by observing the VE on the desktop display. Each piloting session lasted for 60 min and concluded with a questionnaire evaluating the experience of learning anatomy in VR, the use of the software equipment, and their opinions on VR as a possible learning resource in learning anatomy as part of radiography studies. We also collected data through participant observations and dialogue.

The data indicated that the students found the VR session to be stimulating and motivational for learning. We also experienced that the discussions and collaboration within the small groups increased during the session, and the students reported a discovery of anatomical structures and coherence that they had not achieved with the two-dimensional learning resources. Data from the pilot project provided valuable knowledge about how the students experienced the VR environment. The students reported that they preferred specific tasks and guidelines to achieve learning in the virtual environment. They reported that they felt uncertain and less independent if they were left in the VE without any instructions or goals for the session. We used this feedback to develop a thematic exercise booklet that guides the students through relevant structures, including group discussion exercises, facilitating the students in using anatomical terminology orally and with positive responses from the pilot students. We experienced that both the students and teachers need to be familiar with the technology in order to enhance the potential of the technology and, consequently, the learning of anatomy.

As a result of the positive feedback and experiences from the pilot project, the faculty established the SimArena VR Lab in our simulation and training center on campus, including a total of seven HMD setups. Since then, we have established two approaches to using VR in anatomy learning and teaching in higher education: *VR-based anatomy as an integrated learning resource* and *VR-based medical simulation.*

4.1 VR-Based Anatomy as an Integrated Learning Resource

Within the bachelor's program in radiography, VR-based anatomy teaching is used as one of several digital learning resources parallel to mobile apps that utilize artificial reality (AR) models, video-based lectures, and the video recordings of fellow students. VR serves as a supplement to classroom teaching and books but has not replaced these learning resources. This pedagogical strategy is based on the theory that learning is constructed when students work with peers to generate their own knowledge and are motivated by various learning strategies [27].

Implementing VR into the bachelor's program requires both didactical and pedagogical thinking and planning, and we used the didactical relation model that emphasizes the relationship between content, learning objectives, settings, learning activity, learning conditions, and assessment [28]. In a well-planned and developed course, there is good coherence and consistency between the six different factors in this model.

The curriculum plan focuses on the essential knowledge, skills, and general competencies students are expected to achieve by the end of the program [29], while the learning objectives (LO) in higher education are based on a predefined structure of knowledge, skills, and general competence. In implementing VR, we had to consider the students' learning outcomes both during and at the end of the anatomical course. To achieve this, we have differentiated the teaching of anatomy into various topics, such as the skeletal system, nervous system, and gastrointestinal system, and

organized the anatomy learning in the virtual environment into different topics. The students are taught anatomy following the structure of the anatomical syllabus reading list, creating a familiar environment for the students.

Each topic is presented in a similar way and includes a classroom lecture, independent working, and assignments. The topic lecture is given at the beginning of a new topic and is used to outline the most relevant learning outcomes for the upcoming topic, followed by a walk-through of available and relevant tools for independent working. Assignment hours are scheduled 1 week after the topic lecture. The assignments focus primarily on "general competences," entailing group assignments of practical relevance in which the students must express professional anatomical knowledge of the subject, both in writing and orally. These assignments are carried out within the virtual environment in order to enhance student knowledge and understanding of spatial anatomical structures.

By differentiating the anatomy into different topics, we can enhance student understanding of spatial anatomy by tailoring the different teaching technologies to the content. In the past, we had experienced that students struggled with the content and understanding of the relationship between the different anatomical structures, but during the assignment sessions in VR, the students are more active, collaborate more, and use more precise anatomical language in their discussions. We have also experienced that the role of the teacher has transitioned from lecturer to facilitator.

We decided to implement the VR in the radiography course in relation to each student's different assignments on each topic, and the students' tasks and guidelines were entered into the virtual environment based on the pilot findings. Each radiography class has around 30 students, and all students are given 60–120 min to complete their assignments and tasks in VR. Considerable time is spent in VR, but the student evaluations and positive experiences in relation to knowledge and skills are the main reason to continue using VR in this setting. Alternatively, VR could be made available as a separate teaching tool for students, but our experience shows that students are not very familiar with the VR environment, and it is essential to be present, facilitate the discussions, and support the practical tasks in order for the VR-based approach to be of value in the learning of anatomy.

A typical assignment for our radiography students is to be handed a 2D image and to familiarize themselves and discuss topographic anatomy in order to understand how the structures are projected on the body. During these group discussions, students are required to engage orally. In the beginning of the semester, before students and facilitators have become better acquainted, we have noticed that the students who use the HMDs initiate discussions, while their fellow students often remain silent. The students report that they are unsure about their medical nomenclature pronunciation and are afraid to reveal their limitations to other students. The awareness of being observed may potentially limit them, as many of our students are straight out of secondary school, where they are used to being evaluated during oral discussions. Because of this, we must establish a safe and positive learning environment at the beginning of each semester to help the students view the teachers as facilitators, not evaluators.

To establish a safe learning environment, the students must work under the same learning conditions. We therefore invest considerable time and resources into familiarizing the students with the technology used in the virtual environment. When there are substantial discrepancies in the mastery levels of the technology in a group of students, we have experienced that students with fewer technical skills withdraw from the learning activities and tasks and become passive and highly dependent on the presence of a teacher. It is therefore important to set aside enough time for relatively basic tasks at the start of each course, making sure that all students master the learning conditions before progressing to more advanced topics.

Students generally demonstrate their knowledge and general competencies in anatomy by means of a written exam. After implementing VR into the anatomy lectures, we have altered the exam so that the students can also demonstrate their skills. The exam now consists of a written part and a video submission in which the students present their knowledge and skills in an oral presentation. By combining different assessment methods, the students can demonstrate in-depth knowledge rather than only memorizing structures and anatomical definitions.

The implementation of VR into the bachelor's program in radiography has provided valuable knowledge and experiences for the further development and implementation of VR in other programs within our faculty. The midwifery program has worked together closely with the radiography program, learning from their experiences and having the opportunity to further develop the use of VR in higher education. The exchange of knowledge between the different educational programs has led to a different use of VR in education.

4.2 VR-Based Medical Simulation in Midwifery

Within the master's program in midwifery, we have established a VR-based medical simulation session focusing on the relationship between the female pelvis, fetus, and uterine muscle. As with other medical and healthcare programs, midwives and midwifery students require in-depth knowledge of anatomy, especially the female pelvic anatomy and fetus. A midwife must have the right competencies to facilitate normal processes in pregnancy, birth, and postnatal care, with anatomical knowledge being one of many cornerstones for developing these clinical skills and competencies [30]. Encouraging the physiological processes of intrapartum care requires a significant understanding of the interaction between the female pelvis, uterine contractions, and the fetus. To learn these skills, midwifery students need opportunities for concrete, contextually meaningful learning situations where they could improve their clinical reasoning, critical thinking, and problem-solving skills and, through these learning strategies, increase their knowledge [31].

To stimulate knowledge and understanding of the female pelvis in accordance with fetal rotation through the birth canal, we have found VR to be an appropriate learning method. By using this tool, we can demonstrate the relationship between the female pelvis, fetus, and uterine muscle in a combination that is not possible in the traditional classroom sessions. The use of HDMs enables students to follow the

rotation of the fetus through the birth canal simply by adopting the fetal perspective looking down from the pelvic brim and into the pelvic cavity. The 3D effect has become essential to the teaching by replacing as many sense impressions as possible with virtual impressions and creating the illusion of being actual present in the female pelvis as a fetus. The task given to students is a laboring woman, and during the VR session, the midwifery students follow the woman and fetus through the different stages of labor. Working together in pairs, the students discuss and explore anatomical structures, use correct anatomical terms, and reflect on which procedures to initiate to promote a physiological birth. The teaching is implemented as a discussion and critical thinking among peers, demonstrating which bones, muscles, nerves, blood vessels, and structures are included in the female pelvis. Once these elements are identified, the students demonstrate how the leading part of the fetus positions itself in relation to the actual female anatomical structure or bone. During the entire session, the teacher serves as a facilitator of knowledge by participating and engaging in the discussions.

4.3 Pedagogical Strategy During the Simulation

Experience with digital resources and learning within a virtual environment varies among students of higher education, and they need to learn how to use the VR equipment at the same time as they are learning with it. It is therefore important to provide a model of learning in which students can explore the head-mounted display (HMD) systems and learn anatomy at the same time. Taking this into account, we created the sessions in the virtual reality room as a step-by-step learning experience for the midwifery students. Before entering the VR laboratory the first time, they are shown videos with the same anatomical structures as they will encounter in the virtual environment, so they can prepare and test their knowledge through multiple-choice and drag-and-drop assignments. In addition, we give them written instructions on how to use the digital tools, so they are familiar with the rules of VR before entering the learning environment. By using a scaffolding model constructing the teaching in VR, we gradually build on the student's previous experience. A structured learning scaffold offers essential support and development to participants at each stage as they acquire expertise in digital learning. Scaffolding often refers to the temporary support provided for the completion of a task that learners otherwise might not be able to complete [32].

During the first session in the VR room, the students are given a set of tasks aimed at familiarizing them with the VR environment and navigating the HDMs: how to put the goggles on properly, adjust the vision, and navigate the virtual environment using self-movement and the controller. These are the basic skills and knowledge required to participate in the future learning of anatomy. During this session, the students are assigned tasks related to the use of the HDMs that entail solving simple tasks linked to topographic anatomy. The tasks are also connected to the learning materials (videos and quizzes) given before entering the VR room. In introducing them to the virtual world by gradually building their skills and

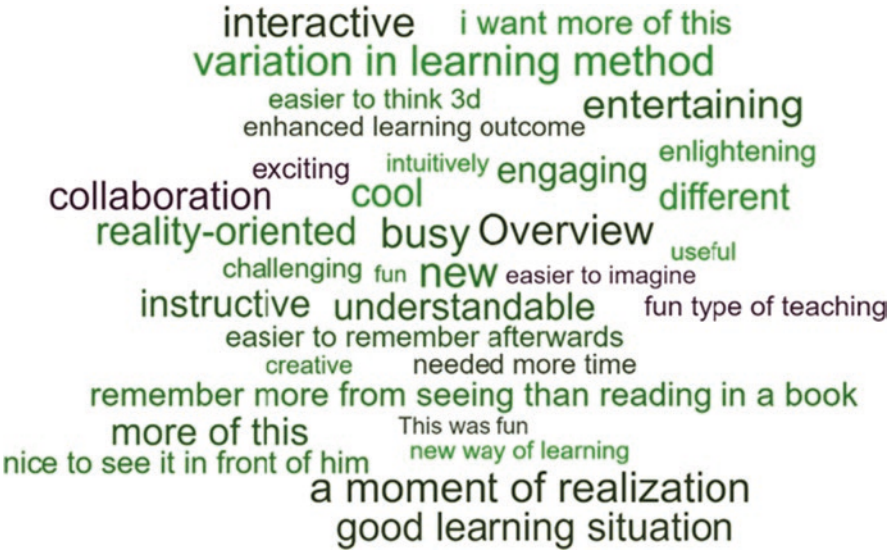

Fig. 2 Student experiences from attending VR session (translated from Norwegian to English)

competencies, we have experienced that student quickly manage to construct knowledge and understanding in anatomy using VR. The students' immediate feedback after their first session is illustrated in a word cloud (Fig. 2).

Following the initial introduction to the VR room, the next time the students attend the anatomy lecture and enter the VR room, they are familiar with the equipment and can focus on a more advanced anatomy assignment, thereby enhancing their knowledge and skills. The students are assigned a task involving a laboring woman at the start of labor. During this stage of the task, the students must find the pelvic structures and name the bones of the female pelvis, defining the pelvic inlet and border of the true and false pelvis. To understand the relationship between the female pelvic and fetus, the students must define the position that the head of the fetus would normally take in the female pelvis. This discussion provides valuable knowledge and understanding of the transverse, oblique, and anteroposterior position. The students also discover the meaning of the pelvic brim or inlet and that the pelvis is a cavity with an outlet because they can look down into the pelvis. The possibility to examine the anatomical structures from different angles gives the students the opportunity to take both the fetal perspective and midwife's perspective in relation to the pelvic inlet and outlet, gaining increased anatomical understanding. In addition to discussing and reflecting over the positioning of the fetal head, they also reflect on the flexion of the head to achieve the smallest possible diameter to pass the pelvic inlet and enter the pelvic cavity. This discussion provides the students with an in-depth understanding of how the fetus rotates and negotiates itself down the birth canal.

After accomplishing the task about the female pelvis and fetal position, the students are given further information on the progression of labor based on the

woman's contractions. The students then discuss the uterine muscle and physiology of how this muscle influences the rotation of the fetus and which observations and actions support progression in normal labor. In the VR software, the students add the muscle layer to the pelvic bones, with special focus on the levator ani muscles, urogenital and anal triangle regions, and the internal and external sphincter muscles. In collaboration with fellow students, they identify the muscles included in the levator ani and discuss the rotation of the fetal head entering the levator ani muscles. This discussion enables the students to understand the rotation of the fetal head from a transverse to an oblique position and ending with an anteroposterior position in the pelvic outlet with the help of the uterus muscle and levator ani. Through the visualization of the rotation, the students become more familiar with the topographic anatomy and how to navigate using the correct anatomical terms of anterior, posterior, deep, superficial, inferior, and superior, medial, and lateral. In addition to an understanding of the fetal rotation, the students rotate the pelvis and lift the pelvis, so that the anatomical structures can be studied from different angles. This possibility in the VR software gives the students a better understanding of the different layers of the muscles and increases their understanding of the concept of deep and superficial muscle layers. The students also discover how levator ani relates to the urogenital and anal triangle and the closeness of levator ani to the internal and external sphincter muscle. Using virtual reality and the possibility to observe the pelvic muscles from different angles helps the students understand the three-dimensional structures of the pelvic muscles. The ability to take both the fetal and midwife's perspective during the laboring process increases the students understanding of interventions to promote physiological labor and interventions to reduce perineal trauma. By incorporating different subjects related to the promotion of physiological labor and clinical examples into the discussion of anatomy, we have experienced increased understanding among the students. The clinical examples, combined with other anatomy-related topics from the midwifery program, seem to increase the understanding of why knowledge about anatomy is important to becoming a competent practitioner. Studies have shown that combining relevant clinical examples with complex subjects increases knowledge and understanding, in addition to enhancing student awareness of why the subject is relevant to learn [33].

Having understood the bones and muscles of the female pelvis, the students are then asked to add the nerves involved in the birth canal. The students can then visualize how the nerve branches are linked to the pelvic muscles. The students discuss the level on which an epidural would be placed and identify the nerves that could be affected by an epidural anesthesia. The picture of the nerve branches across the levator ani helps the students understand the value of an upright position of the laboring woman. In addition, they discuss the significance of nutrition and fluid during labor, as the muscles play an important role in promoting physiological labor. During this part of the task, the students are asked to find an important anatomical landmark—spina ischia and the related nervus pudendus. The students discuss how to perform a vaginal examination and give pudendal anesthetics to block the pudendal nerve. Thanks to the spatial abilities of VR, they identify the spina ischia on both sides of the pelvic cavity and understand how to navigate in an

actual situation to find both spina and the nerve connected to spina. Examining spina from both a superior and inferior position, the students discover that during a vaginal examination, they must enter the vagina posteriorly and laterally to identify spina ischia. This is something that is difficult to spot in 2D pictures from books or during a classroom lecture. After identifying spina ischia, the fetal position and station in the pelvic cavity are discussed and the rotation from a transverse to oblique position exposed to the students. Again, combining both the female pelvic and fetal position in the cavity enhances student understanding of the cardinal movements of labor.

The final step of the collaborative task in the VR room is the actual delivery of the fetal head and body. The students visualize the rotation from a transverse to anteroposterior position of the fetal head. During the task, the student with the VR goggles focuses on the fetal perspective down the birth canal, enabling the student to understand that the pelvis is spatial, with an inlet, cavity, and outlet. By navigating this cavity, the student can see how the different bones, muscles, and nerves relate to one another and how these different anatomical structures work as a whole. They discuss and reflect on different interventions to promote normal labor and, through the learning of anatomy, discover how different interventions are significant in relation to an understanding of the anatomy and physiology of the fetus and female pelvis. During the teaching session, the students work together in small groups. This is an intentional pedagogical approach. We have also recognized that anatomy is complex learning, demanding reflection through discussion and explanation. To secure the quality of the interaction and in-depth learning within the small groups, the students pair up with fellow students they already know. The teacher acts as a facilitator in the VR room, participating in the discussions and communication of knowledge. The students have reported that small-group activities create a safe environment for knowledge sharing and working with peers is more helpful than working alone due to the complexity of the subject matter. The students experience an increased understanding when interacting simultaneously in the VR room, creating a sense of togetherness. The students have also reported that the presence and availability of the teacher as a discussion partner rather than knowledge transmitter facilitates knowledge exchange within the group.

5 Summary

This chapter provide two examples of the integration of virtual reality into the teaching and learning of anatomy among students. Both approaches require a systematic utilization of student learning outcomes in the planning of anatomy lectures. The technology is tailored to the learning outcomes so that the students will gain knowledge and skills that prepare them for their future profession and clinical practice. By focusing on student learning in combination with learning activities and collaboration, the technology helps students gain understanding and knowledge.

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