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Jorunn Aas Handeland

# Manikins Mediate Lifelong Learning Skills in Nursing Education

A Qualitative Exploration of How  
Manikins Influence Nursing Students' Learning

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*People are human beings, produced by the society in which they live.*

*You encourage people by seeing the good in them.*

Nelson Mandela



## **Foreword and acknowledgements**

This thesis marks the ending point of a long journey. Throughout this journey, I have been fascinated by the profound and strong driving force that learning is. Learning changes us as individuals and makes us change our surroundings. We can learn without knowing it; sometimes circumstances force learning on us, and sometimes we even learn against our own will. My doctoral journey has taught me how little I know and how much remains to be learned. I am left with curiosity and eagerness to continue exploring and learning more.

Fortunately, I have not had to take this journey alone. Many people have supported and encouraged me, earning my gratitude. I want to thank the students and teachers who participated in the project. Without them, the project would not have become a reality. I also thank the University of Agder and the Faculty of Health and Sport Sciences for funding and giving me the trust to shape my project.

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Thanks to my parents for always supporting me and to the rest of my family and friends for cheering me on. I would especially like to mention Hanne Cecilie, Johanna, and Olav Helge, who have contributed with professional interest, discussions, and feedback.

Finally, and foremost, my deepest gratitude goes to Gase. Your love, understanding and patience have been a cornerstone of my work. Your belief in me and constant facilitation and support have been my primary sources of motivation. Thank you for being my most honest critic. Without you, this doctoral journey would never have commenced—much less completed.

I dedicate this work to our beloved, beautiful daughters, Siri Elise and Emilie. You have helped me focus on what is most important in life. Remember, you are good enough and capable of much more than you believe.

Jorunn Aas Handeland  
Grimstad, 2024



## Summary

**Background:** In today's healthcare system, nurses face considerable demands, necessitating adaptability, situational awareness, decision-making, and critical thinking. The transition from student to newly qualified nurse presents challenges, leading some nurses to leave the profession early and intensifying challenges in recruiting and retaining health personnel. Managing this transition requires continuous competence development and learning skills. There is a need to facilitate a learning process that prepares nursing students for professional practice by fostering lifelong learning skills. This thesis builds on a doctoral project exploring human-looking, full-bodied manikins as learning tools in nursing education. The literature indicates a gap in the knowledge of nursing students' experiences working with manikins and how manikins influence their learning. The rationale of this thesis is how nursing education can use manikins to support students' development of lifelong learning skills that can ease their transition into clinical practice and help them function as nurses.

**Aim:** The aim of this thesis is to develop new knowledge and understanding of how manikins influence nursing students' learning, which can guide nursing education in developing educational strategies that support practice-relevant learning.

**Design and methods:** A project with a qualitative and exploratory design consisting of three complementary studies was conducted from October 2018 to January 2022. Study 1, a systematic review and metasynthesis, aimed at summarising and synthesising findings from qualitative primary research studies of nursing students' experiences from educational activities using manikins to gain a deeper understanding of the role these manikins played in nursing students' learning. Study 2, a multi-site ethnographic field study, aimed at gaining new insight into the influence of human-looking manikins on nursing students' learning. Data were collected from observations and interviews of 204 first-year students' and 18 teachers' actions, interactions, and experiences in 15 educational sessions. Study 3, an educational action research study, aimed at gaining more extensive knowledge about nursing students' learning from participating in a developmental project that included manikins. Together with the researcher, 23 second-year students and one teacher planned and conducted an intervention in a theoretical course. Data were collected through written

responses, observations, and meeting recordings to identify changes in the participants' activities. Thematic analyses drew on sociocultural learning theory and cultural-historical activity theory to reinforce the results' meaning in all three studies.

**Results:** Three summarised results were extracted from the studies' results, reflecting how nursing students' use of manikins influenced their learning: *Manikins' duality* describes manikins' dual role as objects and patient representations. As objects, manikins were used to train psychomotor and technical skills, with their human-likeness having limited meaning. As patient representations, manikins reminded the students of a patient, facilitating the integration of technical, communication, and caring skills, with their human-likeness becoming significant. Manikins' duality allowed the students to experiment with the nursing role, but tensions arose if it was unclear how they should approach manikins. *Manikins' influence on collaboration* describes how manikins constituted a shared goal of ensuring patient care. They also promoted discussions, reflections, and collective problem-solving. Manikins encouraged students to simulate spontaneously, providing an understanding of collaboration and teamwork. Taking the patient role helped students understand the importance of individualising care. *Manikins' meaning for self-directed learning* describes how allowing nursing students freedom and autonomy in planning and working self-directedly with manikins provided experiences and training in planning, problem-solving, and decision-making.

**Conclusions:** Manikins are complex and dynamic learning tools with a dual meaning as objects and patient representations, thereby mediating an understanding of nursing that encompasses the technical and caring dimensions. Manikins' human-likeness gives a sense of patient presence and encourages spontaneous simulation among nursing students. This helps them behave as if they were nurses and take the patient role, giving insight into teamwork, communication, and individualised care. Working with manikins is a collective activity that stimulates discussions, reflection, and collaboration which are essential for nursing practice and continuous professional development. Manikins are a meeting point for creativity and experimentation that provide opportunities for experiential learning.

The thesis encourages introducing nursing students to various manikins early, promoting self-training with manikins, and using simple manikins in theoretical courses. It argues for more self-directed and student-active learning strategies, empowering nursing students for professional development and lifelong learning. Aware, targeted, and regular use of manikins can strengthen the awareness of patient care as the core of nursing, laying a foundation for lifelong learning.



## **Sammendrag**

**Bakgrunn:** I dagens helsetjeneste møter sykepleiere betydelige krav til tilpasningsevne, situasjonsforståelse, beslutningstaking og kritisk tenkning. Overgangen fra student til nyutdannet sykepleier byr på utfordringer, noe som fører til at noen slutter tidlig i yrket, som igjen forsterker utfordringene med å rekruttere og beholde helsepersonell. Å mestre denne overgangen krever kontinuerlig faglig utvikling og læringskompetanse. Det er behov for å tilrettelegge for læring som bedre forbereder sykepleierstudenter til yrkesutøvelse gjennom å fremme livslang læring. Avhandlingen bygger på et doktorgradsprosjekt som utforsker menneskelignende simuleringsdukker som læringsverktøy i sykepleierutdanningen. Litteraturen viser at det er manglende kunnskap om sykepleierstudenters erfaringer med å jobbe med simuleringsdukker og hvordan de påvirker studentenes læring. Grunnlaget for avhandlingen er hvordan sykepleierutdanningen kan bruke simuleringsdukker for å støtte studentenes utvikling av ferdigheter for livslang læring som også kan lette overgangen til klinisk praksis og hjelpe dem å fungere som sykepleiere.

**Målet** med avhandlingen er å utvikle ny kunnskap om og forståelse for hvordan simuleringsdukker påvirker sykepleierstudenters læring, noe som kan veilede sykepleierutdanninger i å utvikle strategier for undervisningen som fremmer praksisrelevant læring.

**Design og metode:** Et prosjekt med et kvalitativt og utforskende design bestående av tre komplementære studier ble gjennomført fra oktober 2018 til januar 2022. Studie 1, en systematisk litteraturstudie og metasyntese, hadde som mål å oppsummere og syntetisere funn fra kvalitative primærstudier av sykepleierstudenters erfaringer med å bruke simuleringsdukker i ulike læringsaktiviteter for å få dypere forståelse av hvilken rolle dukkene spiller for studentenes læring. Studie 2, en etnografisk feltstudie, hadde som mål å få ny innsikt i hvordan simuleringsdukker virker inn på sykepleierstudenters læring. Gjennom observasjoner og intervjuer ble det samlet data fra 204 førsteårsstudenters og 18 læreres handlinger, interaksjon og erfaringer i 15 undervisningssesjoner. Studie 3, en pedagogisk aksjonsforskningsstudie, hadde som mål å utvikle mer omfattende kunnskap om sykepleierstudenters læring ved å delta i et prosjekt med simuleringsdukker. Sammen med forskeren planla og gjennomførte 23 andreårsstudenter og én lærer en intervensjon i et teoretisk

emne. Data ble samlet gjennom deltakernes skriftlige svar, observasjoner og lydopptak for å identifisere endringer i deltakernes aktiviteter. I alle de tre studiene ble det gjort tematiske analyser støttet av sosiokulturell læringsteori og kulturhistorisk aktivitetsteori.

**Resultater:** Tre temaer oppsummerer de tre studienes resultater. Temaene reflekterer hvordan sykepleierstudenters bruk av dukker påvirker deres læring. *Simuleringsdukkenes tosidighet* beskriver dukkenes doble rolle som gjenstander og pasientrepresentasjoner. Som gjenstander ble de brukt til å trene psykomotoriske og tekniske ferdigheter. Da hadde deres menneskelige utseende begrenset betydning. Som pasientrepresentasjoner påminnet simuleringsdukkene studentene om en pasient, noe som gjorde det lettere å integrere tekniske ferdigheter og kommunikasjons- og omsorgsevner. Da hadde deres menneskelige utseende en sentral betydning. Dualiteten tillot studentene å eksperimentere med sykepleierrollen, men det oppsto spenninger dersom det var uklart hvordan de skulle nærme seg dukkene. *Simuleringsdukkenes innvirkning på samarbeid* handler om at dukkene dannet et felles mål om å sikre pasientbehandling, fremmet diskusjon, refleksjoner og kollektiv problemløsning. De oppmuntret studentene til å simulere spontant, noe som gav forståelse av samarbeid og teamarbeid. Å gå inn i pasientrollen bidro til en forståelse av viktigheten av individualisert pleie. *Simuleringsdukkenes betydning for selvstyrt læring* handler om at det å gi sykepleierstudenter frihet og selvstendighet i planlegging av læringsaktiviteter med dukkene ga erfaring og trening i planlegging, problemløsning og beslutningstaking.

**Konklusjon:** Simuleringsdukker er komplekse og dynamiske læringsredskaper. Deres tosidighet som gjenstander og pasientrepresentasjoner kan formidle en forståelse av sykepleie som omfatter både de tekniske og omsorgsfulle dimensjonene. Simuleringsdukkenes menneskelige utseende gir en følelse av pasientnærvar som inviterer til spontan simulering der sykepleierstudenter kan oppføre seg som om de er sykepleiere og gå inn i pasientrollen. Dette gir erfaring med og innsikt i teamarbeid, kommunikasjon og individualisert omsorg. Å jobbe med simuleringsdukker er en kollektiv aktivitet som stimulerer til diskusjoner, refleksjon og samarbeid, som er avgjørende for en sykepleiers kontinuerlige faglige utvikling. Simuleringsdukker danner et møtepunkt for kreativitet og eksperimentering med muligheter for erfaringsbasert læring.

Avhandlingen oppfordrer sykepleierutdannelsen til å introdusere sykepleierstudenter for ulike simuleringsdukker tidlig i studiet, tilrettelegge for egentrening med dem og å bruke enkle dukker som støtte i teoretisk undervisning. Avhandlingen argumenterer også for mer selvstyrte og studentaktive læringsaktiviteter. Bevisst, målrettet og regelmessig bruk av simuleringsdukker kan styrke en forståelse av at pasientbehandling er kjernen i sykepleie og bidra til å legge et grunnlag for livslang læring.





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## List of papers

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Handeland, J., Prinz, A., Ekra, E. M., & Fossum, M. (2021).  
The role of manikins in nursing students' learning: A systematic review  
and thematic metasynthesis. *Nurse Education Today*, 98.  
[doi.org/10.1016/j.nedt.2020.104661](https://doi.org/10.1016/j.nedt.2020.104661)

### Paper 2

Handeland, J., Prinz, A., Ekra, E. M., & Fossum, M. (2022).  
The sense of a patient: An ethnographic multi-site field study exploring  
the influence of manikins on nursing students' learning. *International  
Journal of Educational Research Open*, 3.  
[doi.org/10.1016/j.ijedro.2021.100110](https://doi.org/10.1016/j.ijedro.2021.100110)

### Paper 3

Handeland, J., Prinz, A., Ekra, E. M., & Fossum, M. (2023).  
'I realised it when we played with the doll!': Nursing students' learning  
from participation in an Action Research project that included manikins.  
*Educational Action Research*.  
[doi.org/10.1080/09650792.2023.2242425](https://doi.org/10.1080/09650792.2023.2242425)



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## **Abbreviations**

AR – Action Research

CAE – Canadian Aviation Electronics

CHAT – Cultural-Historical Activity Theory

EAR – Educational Action Research

ENTREQ – Enhancing Transparency in Reporting the Synthesis of Qualitative  
Research Statement

INACSL – International Nursing Association for Clinical Simulation and  
Learning

METI – Medical Education Technologies, Inc.

NLN – National League for Nursing

PROSPERO – International Prospective Register of Systematic Reviews

RETHOS – Nasjonale Retningslinjer for Helse- og Sosialfagutdanningene  
[National Curriculum Regulations for Norwegian Health and Welfare  
Education]

SDL – Self-Directed Learning

SRQR – Standards for Reporting Qualitative Research

ZPD – Zone of Proximal Development



# Part I



# 1 Introduction

In today's healthcare services, nurses face rapidly changing and complex situations. These situations rarely have definite solutions. To fulfil the expectations they meet, nurses need many competencies; they must exhibit situational awareness, critical thinking, decision-making, and the ability to act promptly and appropriately (Bjerkvik & Valeberg, 2021).

Entering this professional clinical practice is demanding. Newly graduated nurses do not always feel sufficiently prepared for everyday work, fearing taking responsibility and having little experience and limited competence (Bjerkvik et al., 2022; Jarden et al., 2021). Some are overwhelmed by the expectations and responsibilities they encounter, which may lead them to leave the nursing profession early (Keith et al., 2021; Ulupinar & Aydogan, 2021), escalating the existing problems of recruiting and retaining qualified health personnel. The need to train and retain nurses is significant (Ministry of Health and Care Services, 2023; WHO, 2022).

These problems associated with the transition to clinical practice challenge nursing education's responsibility for preparing students for a nursing practice. One way that education seeks to meet this challenge is through student-active learning strategies, in which the students can experience and practice a nurse's responsibility. For example, self-directed learning can help them to better function in practice (Levett-Jones, 2005; Wong et al., 2021), and through problem-based learning and simulations, students can understand how theory is relevant to patient treatment and care (Dix et al., 2021; Ehrenberg & Häggblom, 2007).

Nevertheless, a distance exists between education and clinical practice which makes it challenging for nursing students to manage their transition to practice. According to Benner et al. (2010), newly graduated nurses are not prepared for clinical work, nor are they adequately prepared for continuous lifelong learning. Berragan (2013) explained that nursing education and practice represent different arenas that shape different goals and in which knowledge is acquired differently. While education aims to give students the basic competence to meet practice and is organised to facilitate their learning, clinical practice is rooted in the answerability to patients (Berragan, 2013). Learning in nursing practice is mainly based on performance in specific situations, managing new challenges and problems, and learning from colleagues (Alvsvåg, 2022; Ministry

of Education and Research, 2019b). In other words, there is a distance between how students learn in education and how they will continue to learn in practice. Therefore, students must adjust how they learn when they enter practice (Benner et al., 2010; Bjerkvik & Valeberg, 2021).

The rationale for this thesis is to explore how nursing education can contribute to learning that is relevant to nursing students' future work. In the words of Benner et al. (2010, p. 13), nursing students need to learn *in the way they will need to continue to learn as practitioners*. Education can contribute to bringing the educational arena closer to practice and help the students manage the transition from being a student to a nurse and navigating in practice. To do this, research must also investigate how the learning strategies and tools nursing education uses influence students' learning.

This thesis is based on a doctoral project surrounding human-looking, full-bodied manikins in bachelor's degree nursing education. Manikins have been used as learning tools in nursing education since the early 1900s. Finding similarities between the first manikins and today's high-technological patient simulators can be challenging. However, the rationale has remained the same: to provide the students with a patient representation, or reconstitution, to support their learning and competence development to become qualified nurses (Johnson, 2009). With manikins, students can safely practice repeatedly and make mistakes without harming patients (Gaba, 2004; Lavoie & Clarke, 2017; Olson et al., 2018).

Extensive knowledge exists regarding what nursing students learn from working with manikins in simulations. This benefits the learning of theoretical knowledge, psychomotor skills, critical thinking, problem-solving, and communication competence (Lapkin et al., 2010; Lee & Oh, 2015; Blake & Blake, 2019). However, knowledge of *how* human-looking, full-bodied manikins influence nursing students' professional learning is limited. Therefore, there is a need for insight and understanding into the use of these manikins as learning tools in nursing education.

## **1.1 Context and delimitations**

This doctoral project in professional learning, technology, and nursing was affiliated with the Department of Health and Nursing Science and the Centre for e-health at the Faculty of Health and Sport Sciences, University of Agder in Norway. I refer to the doctoral project in this thesis as a 'project'. From October

2018 to January 2022, I conducted three sub-studies. Each of these sub-studies will be referred to as a ‘study’. While Study 1 was built on research reports from an international context, Studies 2 and 3 were conducted within the context of the Norwegian bachelor’s nursing education.

Human-looking, full-bodied manikins are commonly described as simulators, indicating that they replace a patient in a simulated scenario. However, they are also used in other learning activities, such as skills training. In this thesis, they are referred to as ‘manikins’ to underline their use in varied activities. This thesis directs simulation within nursing education, not simulation within a clinical health work context to train qualified nurses and other health personnel.

The thesis focuses on manikins independently of technological level and features to explore manikins as learning tools. The concept of standardised patients, which indicates that a living person plays the role of a patient, body parts, patient suits, virtual reality patient simulators, and various human-appearing devices, are not on this thesis’ agenda. Manikins are also explored independently of specific learning activities.

## **1.2 The structure of the thesis**

Following this introductory section, Section 2 presents an overview of the empirical knowledge status that scaffolds the thesis rationale and aim. Section 3 describes the theoretical and conceptual frameworks constituting the thesis’ epistemological basis. Next, the thesis’ overarching aim and the three studies’ specific aims are presented in Section 4. Section 5 first describes the project’s design and methodology and details the three studies’ design, data collection and analysis process before accounting for potential consequences and challenges arising from the researcher’s position and participation in the project. Finally, the ethical aspects related to the project are considered. Section 6 presents the results of the three studies and provides a summary of the results relevant to the thesis’ aim. Section 7 discusses the results of the doctoral project by engaging in theoretical concepts. Section 8 critically discusses the project’s methodological limitations and overall trustworthiness. Finally, the thesis’ conclusions and implications for nursing education and future research are drawn in Section 9.





## **2 Background**

This section frames the research field by presenting the empirical knowledge status and literature underpinning the rationale and aim of the thesis. This presentation lays the foundation for identifying and formulating the knowledge gap that exists regarding the use of manikins in nursing education.

First, Norwegian nursing education is introduced. Then, perspectives on a nurse's professional learning process and the relevance of self-directed learning to this process are presented.

The origin and development of manikins are outlined together with the central aspects of manikins' nature and some implications of using them. Working with manikins is closely related to simulation learning. When investigating the literature, it appears challenging to elucidate manikins' role in nursing education without considering them in the context of simulation. Therefore, I account for the relevant aspects of simulation in today's nursing education, with an emphasis on the manikins' position.

### **2.1 Norwegian nursing education**

The first Norwegian nursing school was established in 1868. In 1946, nursing education was formalised as a three-year education with requirements for nursing authorisation. Then, in 1986, nursing education became the responsibility of state colleges, and in 2002, it developed into a three-year bachelor's degree. During the same period, nursing gradually became academicised (Christiansen et al., 2004; Mathisen, 2006).

Nursing education is multifaceted, builds on many varying subject areas, and combines theoretical and practical courses. The proportion of theory and practice has changed since 1868. Originally, practical training was central, and the theoretical content was secondary. Gradually, theoretical subjects, such as medicine and pharmacology, gained prominence, and the share of clinical practice was reduced (Christiansen et al., 2004; Mathisen, 2006). From 1987 onwards, half of the education involved clinical practice with direct patient contact, as later mandated by the European Union (EU) Directive in 2013 (The European Parliament, 2013).

Today's Norwegian nursing education is governed by the National Curriculum Regulations for Norwegian Health and Welfare Education (RETHOS) (Ministry of Education and Research, 2017) and the National

Regulations on Nursing Education (Ministry of Education and Research, 2019a). These regulations define the national educational content guidelines intended to secure a final competence standard. Norwegian nursing education programs intend to ensure the graduation of qualified and authorised nurses with the essential competence to ensure patients' needs, promote health, treat illness, relieve suffering, and ensure a dignified death (Ministry of Education and Research, 2019a). The regulations also specify the healthcare settings in which practical training should take place, ensuring that students gain experiences in various settings.

Nursing education works to adapt to the changing needs of society and the rapidly changing healthcare landscape. In Norway and internationally, nursing education struggles to fulfil these requirements within the existing framework due to limited resources, large student cohorts, a shortage of clinical placement sites, and the increased complexity of patient care (Jeffries et al., 2019). For example, nursing education faces significant problems providing students with statutory practice. Some see the EU directive as a bottleneck for graduating enough nurses. Therefore, it is currently debated in the media and professional environments whether the hours in clinical practice should be reduced. Hayden et al. (2014) argued that up to 50% of clinical practice hours in nursing education can be replaced by simulation. This study is put forward as an argument for redefining what counts as practice, for example, by replacing some clinical placement with simulation (Kirkevold, 2022; Oftedal, 2022).

## **2.2 Nursing students' learning process**

Originally, nursing was learned in practice under experienced nurses, who were responsible for mentoring future nurses, based on a master–apprentice model. The apprentice was introduced to the nurse's tasks and responsibilities in a community of knowledge. However, gradually the role shifted from being a workforce member to being a student (Christiansen et al., 2004; Mathisen, 2006).

Nurses must continuously learn and develop to meet patients' health needs, indicating that nursing is a lifelong learning and development process that begins as a student (Alvsvåg, 2022; Kaulback, 2020). Supportive environments and organisational culture influence nurses' continuing professional development (Mlambo et al., 2021). Benner (1984) described this developmental process from a newly qualified novice to an experienced expert. Gradually, a nurse becomes less bound by principles and rules and builds a practice of learning from

experience. A nurse develops a readiness for action and problem-solving using what Benner (1984) calls intuition. According to Benner (1984), intuitive knowledge cannot be taught, defined, or formulated in rules because it is an unconscious insight from accumulated experiences. This view of intuition is a paradox since the experience-based aspect of practice is expected to be formulated and justified in academia (Gardner, 2012). Here lies a tension between scientific, academic knowledge and practice-based, experiential knowledge. Benner et al. (2010) problematised that nursing education tends to separate the practical and theoretical aspects of nursing. Instead, the students need help understanding how their learning relates to future patient care to better prepare them for clinical work.

### **2.3 Self-directed learning in nursing education**

Self-directed learning (SDL) denotes learning strategies in which the learner is responsible for organising and performing activities to ensure learning. Knowles (1975) argued that people grow in capacity and better retain and use knowledge if provided with the responsibility for their learning. He also described SDL as a trigger for inner motivation. Other terms, such as self-planned learning, self-learning, and self-education, are used synonymously. However, they all refer to the learner's responsibility for their learning.

There are valuable learning opportunities in providing nursing students with the freedom and responsibility to influence their learning activities and work more independently. For example, in SDL combined with manikin simulations, allowing nursing students to decide on simulation activities can improve their inner motivation and critical thinking (Díaz-Agea et al., 2021; Fenzi et al., 2022). Furthermore, giving students the responsibility for planning and facilitating scenarios can promote their professional growth, communication and teamwork skills, responsibility, and creativity (Edwards et al., 2018; Lawrence et al., 2018; Oldenburg et al., 2012).

Moreover, to function in the healthcare system, nurses must be self-directed. The body of knowledge evolves and changes in professional practice. The same applies to technology, regulations, and best practices. Therefore, learning and acquiring knowledge are preconditions for nursing. In this context, SDL is considered one approach that can contribute to continuous and lifelong learning (Levett-Jones, 2005; Nazarianpirdosti et al., 2021; Wong et al., 2021), which is essential for being updated and advancing as a professional (Kaulback,

2020). In a study exploring nursing students' perceptions of the self-directed use of a clinical learning laboratory, Kerr et al. (2020) found that the students experienced enhanced confidence and competence in clinical placement. Therefore, the experience of working independently and self-directed is relevant to nursing students' future nursing careers.

However, there are challenges associated with SDL. Some students find this learning style challenging, preferring more structured and organised activities (O'Shea, 2003). It is problematic if students lack the knowledge to make informed choices and set learning goals. This implies that some students need guidance to become self-directed (Nazarianpirdosti et al., 2021; Wong et al., 2021). Therefore, nursing education and teachers are responsible for facilitating SDL activities, engaging in discussions, and supporting critical thinking and reflections during SDL activities (Brookfield, 2009; Hiemstra, 1994; Knowles, 1975).

## **2.4 Manikins' origin and development**

In 1911, nursing students at Hartford Hospital Training School in the USA were allowed to train basic skills with 'Mrs Chase', the first human-looking full-bodied model specifically designed for nursing education. In the following years, 'Mrs Chase' was improved, and even in the 1970s, nursing students could meet newer versions of 'Mrs Chase' (Aebersold, 2018; Nickerson & Pollard, 2010; Sanko, 2017).

Along with technological development, more advanced manikins were developed. For example, beginning in 1960 ResusciAnne facilitated training in cardiopulmonary resuscitation skills (Roberts & Greene, 2011). The first computer-controlled manikin, SimOne, introduced in 1966, had a heartbeat, blood pressure, detectable pulse, moving chest, and reacting pupils. However, it was expensive, and only one was produced before it was phased out (Cooper & Taqueti, 2004). When a computerised full-body manikin was placed in an actual operation theatre in 1987, it introduced the high-authenticity simulation in healthcare. At the same time, the GAS manikin facilitated training in basic anaesthesia skills and could respond to the learner's interventions with changes in physical parameters (Cooper & Taqueti, 2004).

Today, companies like Medical Education Technologies Inc. (METI), Canadian Aviation Electronics (CAE™), Gaumard™ and Laerdal® produce an extensive range of manikins, providing nursing students with different learning

experiences than those who worked with ‘Mrs Chase’. Adult, geriatric, and children manikins, manikins with various skin tones, and female manikins designed to simulate birth situations offer countless learning opportunities. Some are simple without specific technological features, while others possess advanced adjustable features, such as a voice, detectable pulse, blood pressure, and audible breath (Hopwood et al., 2016).

## **2.5 Manikins' nature**

Manikins are intended to remind us of patients. Therefore, it is important that they look like humans (De Weerd et al., 2009). Lavoie et al. (2020) found that the presence of a patient substitute, such as manikins, can promote realism and allow students to interact with and train psychomotor skills more realistically.

In parallel and dynamically, a manikin constitutes a technical, a medical, and a human body (Hopwood et al., 2016). In line with this, Ireland (2017) described manikins as hybrid humans; they are a mix of human nature and human-created technology. Ireland (2017) even compared manikins with zombies; they are both dead and alive. This hybrid nature can evoke unpleasant feelings because it reminds us of what we fear most: death. Even if some claim that students must disregard that the manikin is a doll and force themselves to engage with it as a patient to obtain learning, it is impossible to deny that it is a doll (Parker & Myrick, 2010; Roberts & Greene, 2011). These descriptions suggest that the nature of manikins is complex. Manikins possess a two-sidedness in which one side represents their technical, lifeless, and human-like body, while the other is the symbolic side where the manikin represents a patient.

A manikin’s physiological responses can be manipulated, and situations can be standardised, controlled, and reproduced. Therefore, many students can be exposed to similar situations (Hopwood et al., 2016). However, a manikin’s nature differs fundamentally from human nature. Unlike humans, a manikin’s physiological responses can be preset and made predictable, simplified, and amplified (Dunnington, 2014). In manikin simulations, the uniqueness of human behaviour is removed, which may also reduce the contextual, unpredictable, and variable aspects that are also in play and influence learning. Dunnington (2014) argued that students must learn to recognise the differences and paradoxes between the educational situation and the clinical situation it mirrors to understand how the knowledge is relevant. However, to my knowledge,

considering the existing research, limited studies have specifically investigated the learning implications related to manikins' appearance and nature.

## **2.6 Simulation in nursing education**

The term simulation originates from the Latin 'simulare', meaning 'making similar or equal'. This thesis follows the International Nursing Association for Clinical Simulation and Learning's (INACSL) definition of simulation as *an educational strategy in which a particular set of conditions are created or replicated to resemble authentic situations that are possible in real life* (INACSL, 2016b, p. S44).

The aim of simulation is to provide experiences that students can transfer and recall in situations that remind them of the simulated event (Hopwood et al., 2016; Lavoie & Clarke, 2017). In simulated learning environments, nursing students can train skills in an authentic context, experience the workdays of registered nurses, and thus prepare for clinical practice (Davies et al., 2020; Leighton et al., 2021). Manikins constitute a substantial part of simulation in nursing education, and much of the student-reported satisfaction with simulations can be directly connected to their experiences with manikins (Carrero-Planells et al., 2021).

### **2.6.1 Scenario-simulation**

A scenario indicates a planned and constructed clinical situation that allows students to simulate. In a scenario, the patient is often represented by a manikin. Scenario simulations are commonly organised into three phases: a pre-briefing, where the students are introduced to the upcoming situation; the simulation phase, in which the students play out the scenario facilitated by a teacher while another teacher operates the manikin; and a debriefing phase (Morse et al., 2019). Much of the learning seems to happen in the debriefing phase (Díaz-Agea et al., 2022; Morse et al., 2019) when the students systematically reflect on their actions and experiences and are supported to integrate theory (Kim & Yoo, 2020; Lee et al., 2019).

Simulation is often described and understood synonymously as scenario simulations with advanced computer-controlled manikins (Lee et al., 2019; Roberts et al., 2019). This is a paradox because authentic simulations can be conducted with and without a manikin (Hanshaw & Dickerson, 2020).

Frameworks and standards offer guidelines for planning and designing simulations (Salifu et al., 2022). For example, the INACSL standards (2016a) and the NLN (National League for Nursing)/Jeffries Simulation Theory (Cowperthwait, 2020; Jeffries et al., 2015) describe elements to consider when planning simulations. In line with these, scenario simulations are often strictly organised. Therefore, scenario simulations are sometimes criticised for being too instructional, emphasising a linear learning process and attempting to reduce disturbing elements (Lavoie et al., 2020). Even though the students actively engage, they have limited opportunities to influence the planning and organisation of the activities.

### **2.6.2 Learning from manikin simulation**

When used in simulations, manikins are a tool that benefits nursing students' theoretical knowledge acquisition (Lapkin et al., 2010) and their mastering of psychomotor and clinical skills (Kim et al., 2016; Lee & Oh, 2015; Rajaguru & Park, 2021; Shin et al., 2015). Additionally, manikin-simulated scenarios can improve students' perceptions of their professional knowledge and clinical performance (Lee et al., 2019). Manikin simulations positively impact nursing students' development of critical and clinical thinking, clinical reasoning-related and problem-solving skills, and their ability to make clinical judgements that are essential for care provision (Alshehri et al., 2023; Lapkin et al., 2010; Lee & Oh, 2015). Nevertheless, Theobald et al. (2021) question the basis for asserting that simulations with advanced manikins improve nursing students' clinical reasoning skills.

Simulated learning methods can raise nursing students' communication competence, ethical awareness, and caring behaviour (Blake & Blake, 2019; Sedgwick et al., 2021). Manikin simulations are found to be superior to other methods of enhancing empathy for vulnerable patients (Levett-Jones et al., 2019). Additionally, using advanced manikins can support learning and understanding teamwork skills (Foster et al., 2019).

Self-efficacy refers to an individual's belief in one's competence, coping skills, and abilities to master unknown situations. Self-efficacy is substantial for motivation and may facilitate further learning (Bandura, 1997). The literature strongly indicates that simulated activities, which often include manikins, can strengthen students' self-efficacy and self-confidence (Karabacak et al., 2019;

Oliveira Silva et al., 2022). Additionally, the active and participating components in simulations are associated with self-confidence (Olaussen et al., 2020).

The reviewed literature indicates extensive research on specific manikin-simulated learning interventions' learning effects and outcomes. However, to my knowledge, limited research has explored nursing students' experiences of working with manikins regardless of learning activity or type of manikins. Lapkin et al. (2010) called for an aggregated exploration of manikin simulations from a qualitative perspective, but I found no such research while working on this doctoral project. In addition, the literature exploring learning outcomes related to manikins' presence and appearance is scarce.

### **2.7 Manikin simulation: a social practice**

Simulated learning activities are described as social practices (De Weerd et al., 2009; Dieckmann et al., 2007; Schoenherr & Hamstra, 2017). In the context of this thesis, this indicates that learning by simulation happens in the interaction between nursing students and teachers. Students who use manikins in simulations share learning experiences, and collective meaning-making can arise (McNiesh, 2015; Parker, 2011). Shoenherr and Hamstra (2017) called for investigations into the social aspects of simulated learning activities. Paradoxically, these aspects are sometimes perceived as disturbing elements that should be reduced (Dunnington, 2014).

One aspect that seems prominently related to manikins is how their presence seems to support, or almost push, the nursing students to behave as-if they were nurses. According to Dieckmann et al. (2007), this as-if concept implies that the students treat the manikin as they would have treated a patient if they were nurses, allowing them to act, reflect and interact as-if they were nurses. When the students try out the nursing role when making decisions, taking the lead, planning, and working in a team, they get access to knowledge embedded in the nursing role (Ashley & Stamp, 2014; McNiesh, 2015). In Hopwood et al.'s (2016) words, nursing students get to 'try the body of a nurse'.

### **2.8 The quest for fidelity**

The concept of 'fidelity' refers *to the degree of realism of a simulation and includes physical, conceptual, and psychological dimensions* (INACSL, 2016b). In other words, fidelity indicates how realistically a simulation session is presented and perceived. Fidelity commonly ranges in three levels: low-fidelity,



mid-fidelity and high-fidelity. Manikins often range according to these levels, from high-fidelity manikins to medium-fidelity manikins to low-fidelity manikins. The so-called low-fidelity manikins appear less realistic and are often limited to training procedural and psychomotor skills (Aebersold, 2018; Nehring & Lashley, 2009). In addition, high-fidelity simulations implicitly indicate the use of advanced, computerised manikins (Bailey & Emory, 2022; Hanshaw & Dickerson, 2020; Li et al., 2022). Often, the literature only reports that a high-fidelity manikin was used but provides limited information on how the participants used and perceived it.

Moreover, fidelity depends on what we want to achieve with the simulation. The choice of type of manikin must match the learning activity's purpose. Regarding the effect of manikins' fidelity on learning, Norman et al. (2012) found no clear benefits of high-fidelity manikins over low-fidelity manikins. Research has shown that high-fidelity manikins may be more effective than low-fidelity manikins for nursing students learning to hear heart and lung sounds (Mutlu et al., 2019). Kim and Yoo (2022) found that high-fidelity manikins positively impacted skill performance and clinical competence more than lower-fidelity manikins. However, a manikin's fidelity did not affect learning outcomes regarding knowledge, satisfaction, and self-confidence (Kim & Yoo, 2022). Therefore, there is a limited significant relationship between high fidelity and learning. There is no automaticity that advanced manikins provide high fidelity. Moreover, there are reasons to argue for using simple manikins in scenario simulations (Sanko, 2017).

However, there are other ways to approach fidelity. Maran and Glavin (2003) distinguished between physical and psychological fidelity. Physical, or engineering, fidelity refers to how well the material context, equipment, and technology resemble the context it seeks to replicate. Psychological, or functional, fidelity refers to how well the participants believe in the simulated situation or experience it as realistic. Often, physical fidelity is emphasised at the cost of the psychological (Lavoie et al. 2020). Schoenherr and Hamstra (2017) warn of a fidelity definition that emphasises physical and technological features, because this cannot guarantee experienced realism (Dieckman et al. 2007). Moreover, psychological fidelity is sometimes of greater importance for learning than physical fidelity, according to Norman (2012).

Furthermore, fidelity can be understood as an interactional phenomenon depending on how realistically the students enact and perform in the situation.

Here, the manikin's fidelity depends on how well the participants approach the manikin as a patient (Ahn & Rimpiläinen, 2018; Lavoie et al., 2020). This understanding is central to this thesis.

## **2.9 Summary and knowledge gap**

The knowledge status and literature presented in this section demonstrate that working with manikins in nursing education benefits nursing students' learning. The manikins' presence and appearance are essential, as they can support nursing students in advancing toward what it is to be a nurse (Ashley & Stamp, 2014; Dieckmann et al., 2007; Hopwood et al., 2016). There are multiple and rich benefits to using manikins as learning tools.

Furthermore, the literature describes SDL as a learning approach with the potential to contribute to continuous and lifelong learning. Based on this thesis' rationale, this forms a basis for further exploring how nursing education can facilitate SDL learning activities relevant to nursing students' future work.

However, I have identified two areas with limited knowledge. First, the existing knowledge of what the presence and use of manikins mean for nursing students' learning is insufficient. Because the reviewed literature focuses on technologically advanced manikins used in scenario simulations, we have a limited understanding of what it means to use manikins in general. Second, we know little about how nursing students communicate and interact in the manikins' presence. Thus, there is insufficient knowledge of manikins' role in social interactions and how this influences nursing students' learning.

Together, these two areas constitute the knowledge gap explored in this thesis. In other words, there is a gap in the in-depth knowledge of how the use of manikins influences nursing students' learning. I denote this knowledge gap as a combined knowledge and empirical gap, corresponding to the taxonomy suggested by Miles (2017), underlining a need for knowledge that can help to understand the manikins' meaning for nursing students' learning and how nursing education can better make use of these learning tools.

### **3 Epistemological, theoretical, and conceptual frameworks**

This section describes the theoretical frameworks and conceptual constructs that supported the writing of the thesis. In line with Madden (2017), the addressed theories laid a foundation for the project and were used as analytical tools to guide my thinking to develop knowledge and understanding of how the use of manikins influences nursing students' learning.

#### **3.1 Pragmatism and social constructionism**

Epistemologically, the thesis is written from a pragmatic and social constructionism perspective. The core of pragmatic epistemology is that knowledge from the human and social sciences is not derived solely from facts but a product of interpretations and understandings in a specific time and context (Campbell, 2015; Sami, 2015). This informs this thesis, as it offers one perspective on how manikins used in nursing education influence nursing students' learning.

In line with pragmatism, the concepts of experiential and explorative learning are central to this thesis. In Dewey's (1859–1952) pragmatic tradition, experiential learning implies that knowledge develops through experience and experimentation in a specific social context (Dewey, 1997). When a person encounters a situation in which previously acquired knowledge and competence are insufficient, the person must explore new solutions based on previous experience and knowledge. By experimenting with new solutions, the person gains new knowledge and experiences (Frandsen, 2018; Miettinen, 2000). For example, manikin simulation is described as a source of experiential learning since learning runs primarily from the student's actions, not cognitive reasoning or instruction (Amod & Brysiewicz, 2019; De Weerd et al., 2009). In line with this, this thesis views problem solving as a fundamental and inherent human trait that nursing education must help students use and develop.

Social constructionism implies that the knowledge this thesis offers is created or constructed in the interaction between the researcher and the study participants. Constructionism and constructivism are related concepts, as both appreciate the researcher's active role in knowledge development. However, constructionism relates more to sociology and social meaning-making, while constructivism relates to psychology and individual constructs (Braun & Clarke,

2022). In line with the thesis' approach and supported by Alvesson and Sköldberg (2018), constructionism was chosen as the proper concept.

### **3.2 Sociocultural learning theory**

This thesis approaches learning as a fundamentally social activity, meaning that learning takes place in the interplay between individuals (Ludvigsen et al., 2011). Learning arises and is bound to a social context. Therefore, understanding learning with manikins as a social activity was a pivotal starting point for the project. In line with this, the sociocultural understanding of learning was suitable for supporting this thesis.

Sociocultural learning theory understands learning as a process influenced by physical, social, and historical conditions (Säljö, 2000; Vygotskij et al., 1978; Vygotsky, 1965). Vygotsky (1896–1934) investigated how the human mind develops and transforms through social experiences. Sociocultural learning theory views learning as a social process that connects the mind and society (Ludvigsen et al., 2011; Vygotskij et al., 1978; Säljö, 2000). According to Vygotsky, social structures are intertwined with, and recognisable in, an individual's mind (Vygotskij et al., 1978; Vygotsky, 1965). When people are engaged in an activity, they learn together, and new knowledge arises from their interplay (Säljö, 2000; Säljö, 2010). Therefore, exploring what is happening in interactions between people to understand learning is significant. Here, sociocultural learning theory provides a fruitful perspective to explore what it means to learn nursing and develop as a professional nurse with manikins.

Vygotsky introduced the concept of the 'zone of proximal development' (ZPD) (Säljö, 2000; Vygotskij et al., 1978). ZPD represents the space between a person's actual developmental level and abilities to solve problems and their potential developmental level, where the person must act under the guidance and surveillance of a more experienced person. Gradually, the learner becomes more capable of independently performing actions and solving new problems. This description underlines the teachers' responsibility for guiding students into and in situations with possibilities for relevant learning and supporting them in their learning process.

The sociocultural understanding of mediation is pivotal in this thesis, as it explores the meaning of manikins as mediating tools. The use of tools to support cognitive processes, thinking and memory is what Vygotsky called mediation (Säljö, 2005; Vygotskij et al., 1978). Mediation extends humans' biological

capacities and limitations (Säljö, 2005). According to Cole and Derry (2005) and McLuhan (1964), humans' interactions with technology and human-made artefacts have historically and fundamentally influenced the development of our cognition and intelligence. Mediating tools can be mental constructs, such as language and symbols, or physical tools, such as manikins. Mediation bridges the individual's mind to the social world and is fundamental to higher-order psychological processes, such as learning and speech (Säljö, 2005).

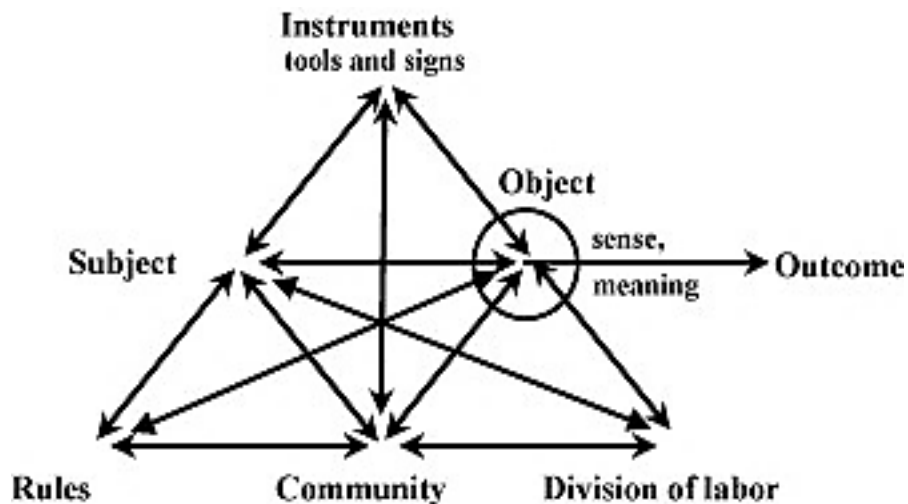
### **3.3 Cultural-historical activity theory**

A line extends from the Vygotskian sociocultural learning tradition to cultural-historical activity theory (CHAT). Vygotsky's student Leontyev (1903–1979), developed sociocultural learning into cultural-historical psychology (Sannino & Engeström, 2018). However, while sociocultural interest lies in individual learning, CHAT focuses on collective learning and how knowledge is created and transformed through human activity (Engeström, 2011; Engeström & Toiviainen, 2011; Sannino & Engeström, 2018). I found CHAT suitable for exploring the use of manikins in nursing education as a social activity and what is happening between the manikin, the nursing students, and the teachers in the educational context.

CHAT defines human activity as a chain of deliberate actions directed toward a specific objective. Together, this constitutes an activity system, the unit of analysis in CHAT. An activity system consists of six interrelated elements. If one element is changed or manipulated, the entire system will be transformed (Engeström, 2001; Roth & Lee, 2007; Sannino & Engeström, 2018). Figure 1 illustrates the activity system and its elements, as first outlined by Engeström in *Learning by Expanding* in 1987 (Engeström, 1987, 2015). The activity system's six elements are as follows:

1. *Mediating tools* are symbolic or physical instruments the subjects use to obtain their objective.
2. *The object* is the purpose the subjects direct their actions toward and give substance and meaning to their actions.
3. *The subjects* are the people engaged in the specific activity.
4. *The division of labour* indicates how roles, functions, power, and responsibility are shared and distributed in the activity system.

5. *The community* is the others involved in or affected by the system's activity who also have interests in the object of activity.
6. *The rules* are the laws, regulations and norms that regulate the system's activity and shape its room for action. (Engeström 1987/2015)



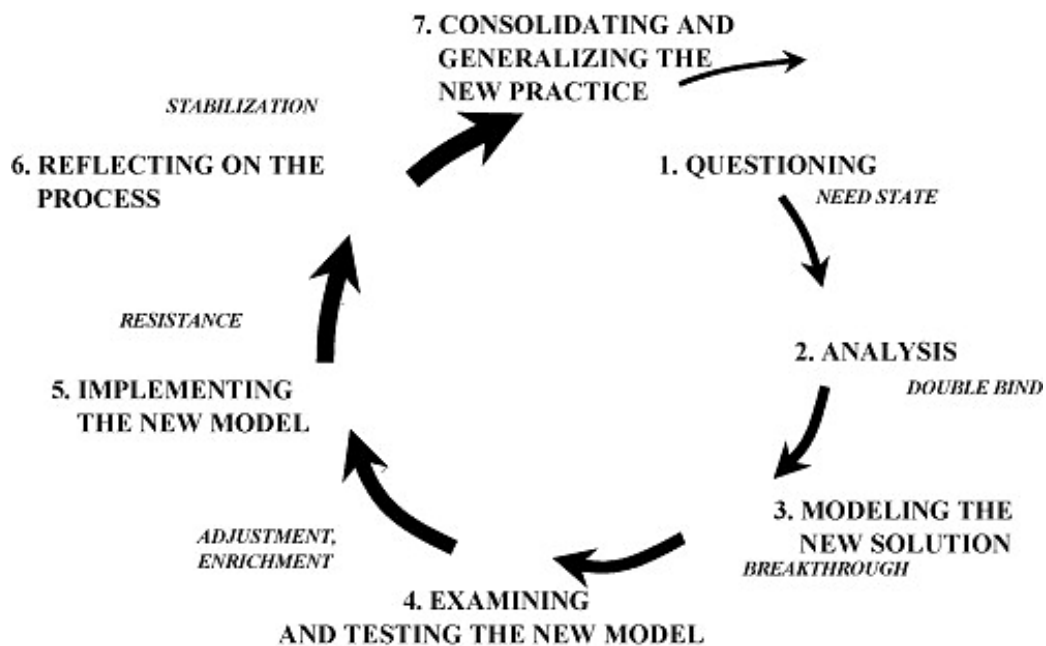
**Figure 1** The general model of an activity system (Engeström, 1987, p.78)  
 (Printed with the author's permission, Appendix 19)

Engeström and Sannino (2021) described four generations of activity systems. The first generation relates to the sociocultural tradition surrounding the mediation of individual activity. The second generation runs from Leontyev's tradition and shifts its perspective to collective activity. The third generation, represented by, for example Engeström and CHAT, focuses on the interplay between two or more interacting activity systems. Finally, the fourth generation addresses modern, fluctuating, heterogeneous, and dynamic activity systems in a global, political, and environmental context (Engeström & Sannino, 2021). The second and third generations are relevant to this thesis.

Every activity system consists of participants with different interests, motives, and values. Such differences can lead to contradictions or conflicts within or between systems. Nevertheless, contradictions or conflicts are also sources of development because they can foster new actions or make the participants redefine the object of activity. A redefined object of activity requires new skills and knowledge, new ways of doing things, and new mediation. Over

time, even minor changes in actions transform an activity system. Expansive learning denotes this development of new knowledge and enlarged room for action that arises with a redefined object of activity (Engeström, 2001, 2015; Engeström & Sannino, 2010).

Engeström (1999, 2015) developed the expansive learning cycle to illustrate the dynamics of expansive learning, as illustrated in Figure 2. An expansive process starts when a problem, in the sense of a contradiction or conflict, arises by questioning the existing situation. Then, alternative solutions are modelled by analysing and defining the problem before a new model, solution, or alternative activity is examined and implemented. Through this process, new knowledge develops from abstract to concrete and definable. In this thesis, the concept of expansive learning allows for an understanding of how different activity systems, such as nursing education and clinical nursing practice, can be bridged.



**Figure 2** The expansive learning cycle (Engeström, 1999, p. 384)  
(Printed with the author’s permission, Appendix 19)





## **4 The aim of the thesis**

This thesis' overarching aim is to develop new knowledge and understanding of how manikins influence nursing students' learning, which can guide nursing education in developing educational strategies that support practice-relevant learning.

### **4.1 The studies' aims**

This thesis consists of three studies, each of which was formulated in accordance with the thesis' overarching aim. The first two studies addressed the knowledge gap presented in Section 2.8, as follows:

Study 1 aimed to summarise and synthesise findings from qualitative primary research studies of nursing students' experiences from educational activities using manikins to gain a deeper understanding of the role these manikins play in nursing students' learning.

Study 2 aimed to gain new insight into the influence of human-like manikins on nursing students' learning.

Based on the findings from these two studies, Study 3 aimed to gain more extensive knowledge about nursing students' learning from participating in a developmental project that included manikins.



## **5 Methods**

This section covers the doctoral project's overall design and methodological underpinnings before describing in detail how the three studies were conducted. Next, I account for the consequences and challenges related to my role and position as a researcher in the project. The ethical considerations related to the project are clarified at the end of the chapter.

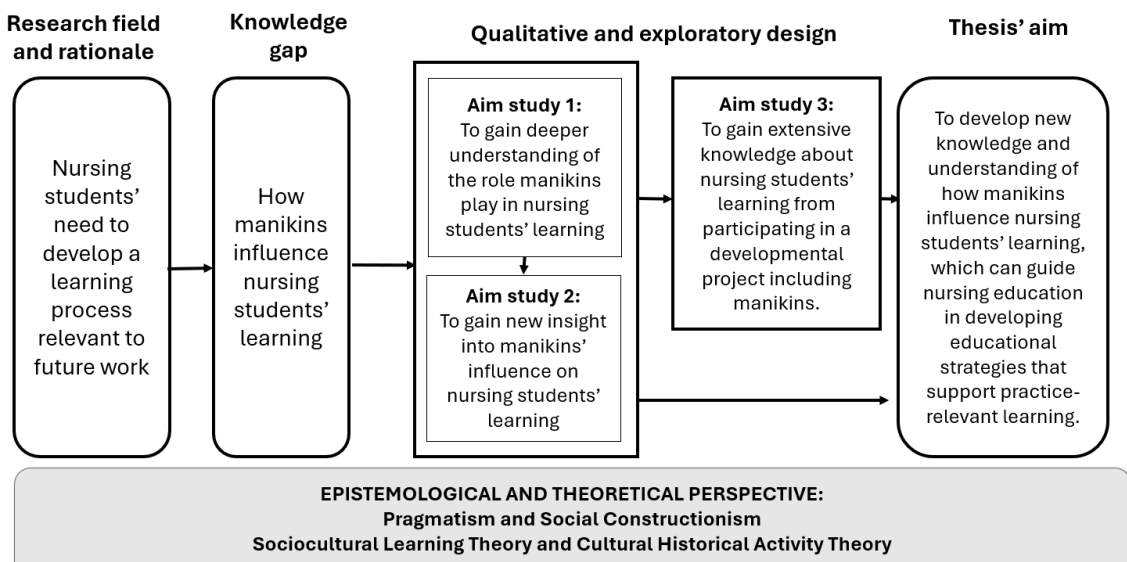
### **5.1 Overall methodology and design**

Given the thesis' aim, I considered a qualitative methodology most appropriate as it allows for coming close to people and generating data on their experiences, behaviours, and reflections (Patton, 2002). Qualitative data are non-numerical and can be collected from, for example open-ended interviews and observations and contribute to developing in-depth insight and understanding (Alvesson & Sköldbberg, 2018; Patton, 2002). According to pragmatic epistemology, insight and understanding presuppose an interpretation. The key is guiding the interpretation in a direction that gives meaning to the project's aim. In alignment with this, the thesis is placed in a hermeneutic interpretative tradition, based on Gadamer (2004), which describes the dialectic and reflective process between exploring the parts of the phenomenon under study and the overall phenomenon. The researcher's pre-understanding is the perspective from which the phenomenon is viewed. As new understanding is gradually gained, pre-understanding changes and deeper insight and understanding can be attained (Alvesson & Sköldbberg, 2018).

I designed a qualitative and exploratory project comprising three complementary studies. First, a systematic review and thematic metasynthesis study was designed to explore the primary research findings of nursing students' experiences of working with manikins. This study formed the basis and starting point for the two subsequent studies, as it provided an understanding of the student's experiences and descriptions explicitly related to manikins. Second, a multi-site ethnographic field study was designed to observe nursing student's actions and interactions when they used varied manikins in various learning activities. Together, these two studies provided theoretically inspired knowledge and understanding corresponding to the knowledge gap and pointed out the direction for Study 3. Study 3 was an educational action research (EAR) study planned and conducted in collaboration with a group of nursing students. Based

on this study, I could explore and develop knowledge about how a learning intervention with manikins can support practice-relevant learning. Figure 3 presents the project's upbuilding, and Table 1 presents an overview of the three studies.

The thesis' results were developed from writings, discussions, and iterative reflections on data inspired by theories, based on abductive principles. Abduction derives from pragmatic philosophy and implies a movement back and forth between theoretical ideas and empirical data patterns to develop new and expanded meanings and understandings. Abduction combines aspects from both deduction and induction (Alvesson & Sköldbberg, 2018; Tavory & Timmermans, 2014; Timmermans & Tavory, 2022).



**Figure 3** The project's upbuilding

**Table 1** Overview of the three studies

	<b>Study 1</b>	<b>Study 2</b>	<b>Study 3</b>
<b>Methodology</b>	Metasynthesis	Multi-site Ethnography	Educational Action Research
<b>Theoretical concepts applied</b>	Sociocultural Learning Theory	Cultural Historical Activity Theory	Kemmis' (2009) concepts of 'sayings, doings, and relatings' Motivation Theory
<b>Recruitment and participants</b>	28 reports of 27 studies	Purposive sampling: 204 first-year nursing students and 18 teachers	Purposive sampling: 23 second-year nursing students, one teacher, and one researcher
<b>Research field/ Context</b>	Undergraduate-level nursing education	Four campuses at three universities 15 educational sessions	One university campus. Intervention in a 9-week course
<b>Data collection</b>	Systematic literature review	Fieldwork: observations and interviews	Written responses, observations, and meeting recordings
<b>Analysis</b>	Thematic Meta-synthesis	Ethnographic thematic writing	Thematic analysis
<b>Manikin</b>	All from nontechnological to technologically advanced	Non-technological manikins for skill training (Laerdal), Nursing Anne, medium advanced with and without SimPad (Laerdal), SimMan 3G with LEAP (Laerdal)	Nursing Anne, medium advanced, with or without SimPad (Laerdal)
<b>Quality Reporting</b>	ENTREQ (Enhancing Transparency in Reporting the Synthesis of Qualitative Research Statement) (Tong et al., 2012)	SRQR (Standards for Reporting Qualitative Research) (O'Brien et al., 2014)	Seven choice points for quality in action research (Bradbury et al., 2019)

### **5.1.1 Metasynthesis**

Study 1 followed Sandelowski and Barosso's metasynthesis methodology (2003, 2007). This method was selected to provide an interpretation of synthesised qualitative findings to contribute to a deeper understanding of the role manikins play in nursing students' learning. Sandelowski and Barroso's (2007) steps for performing a metasynthesis guided the study. These steps include formulating a study purpose, planning a search strategy, searching and retrieving qualitative research reports, and appraising and evaluating the reports before classifying and synthesising the qualitative findings.

Sandelowski and Barroso's method also suggests a quantitatively oriented metasummary, which I did not conduct because this study focused on performing a thematic analysis, not a quantitative aggregation (Ludvigsen et al., 2016; Sandelowski & Barroso, 2007). Due to the narrative and varied nature of the data in the included studies, it would also be challenging to quantify the data. In addition, it was unclear how such an orientation could benefit the project.

### **5.1.2 Ethnography**

Study 2 was an ethnographic multi-site field study that, supported by Hammersley and Atkinson's (2019) and Madden's (2017) methods, aimed to gain new insight into the influence of human-looking manikins on nursing students' learning. Ethnography was selected because of its suitability for capturing data on what happens in people's interactions and how people organise their social activities. Through fieldwork, I systematically explored how different manikins were used in varied educational activities at different places in everyday situations, not in situations designed for research (Coffey, 2018; Madden, 2017). 'Multi-site' implies that the study was conducted at more than one location, assuming that interactional patterns could be found across these sites (Madden, 2017).

The word 'ethnography' can be interpreted as the 'writing of people' (Madden, 2017), implying that the writing process is a cornerstone in ethnographic research. This understanding guided the study's data interpretation. Through writing, I worked to make sense of the data to derive a meaningful description and new understanding (Hammersley & Atkinson, 2019).

### **5.1.3 Educational action research**

Study 3 was an EAR study inspired by Carr and Kemmis' (1986) method. EAR arose from English teacher education around 1970, when traditional education was criticised for being too theoretical and of too little practical relevance for students' future education and work (Elliott, 1991). Carr and Kemmis (1986) suggest a systematic cyclic process of investigations and experimentations consisting of four phases: plan, act, observe and reflect to perform EAR (Carr & Kemmis, 1986; Kemmis & McTaggart, 2008). The idea is to explore and develop solutions that do not yet exist.

EAR was selected because of its potential to contribute to more extensive knowledge about nursing students' learning from participating in a developmental project with manikins. Eikeland (2012) argued that action research (AR) is a source of knowledge about praxis, referring to knowledge and action as a unit. The core of AR lies in its interweaving of research and developmental work and presupposes initiating a change to improve conditions for human life and practice (Adelman, 1993; Reason & Bradbury, 2008). This way of introducing a change implies that an experimental aspect has been brought into the study. Kurt Lewin (1890–1947), the originator of AR, claimed that problem-solving through social experimentation is a natural and continuous aspect of human life, development, and learning. Here, Lewin shared Dewey's (1997) understanding of social experimentation and learning (Adelman, 1993; Frandsen, 2018; Kemmis & McTaggart, 2008). This study was further inspired by Engeström's description of expansive learning, suggesting that a change initiated from AR can start an expansive learning process (Engeström, 2011; Engeström & Sannino, 2010).

## **5.2 Study 1: A systematic review and metasynthesis**

Guided by the study aim, I planned and performed a systematic and comprehensive search to identify qualitative research reports presenting findings of bachelor's degree nursing students' experiences from educational activities with manikins. The included reports were appraised and classified before extracting and analysing the relevant findings. These findings were synthesised and formulated concerning the study's aim. A study protocol was registered in the International Prospective Register of Systematic Reviews (PROSPERO) in January 2019 (Appendix 4).

### **5.2.1 Search strategy and search outcome**

I followed Sandelowski and Barosso's (2007) suggestion to structuralise search parameters from the following kinds of questions: 'What' (use of manikins), 'Who' (undergraduate-level nursing education), 'When' (reports published from 2008) and 'How' (qualitative studies of students' experiences). Then, supported by a librarian with expertise in systematic searching, a search strategy of keywords and text words was developed (Appendix 5). Systematic searches were performed in CINAHL+, ERIC, Medline, and Embase in January 2019 and updated in April 2020 (Bramer & Bain, 2017). After merging the recordings from each database and removing duplicates using EndNote database X9 (Clarivate), 3,538 titles qualified for screening. Additionally, I conducted an exhaustive search by performing manual searches of the reference lists in the final included reports. However, this gave no results, as all reports in the literature lists that met the inclusion criteria were already identified and screened.

### **5.2.2 Screening**

The six inclusion criteria – primary studies, qualitative research, published from 2008, in English or Scandinavian languages, human-bodied manikins at all fidelity levels, and findings of nursing students' experiences – were formulated into six screening questions that guided the selection of reports. The last criterion was narrowed to involve only studies that had gathered data directly from students through individual or focus group interviews or written reflections, since this most precisely reflected the students' experiences. Studies merging findings from teachers and students were excluded because the teachers' experiences interfered with the students' voices.



All qualified titles were transferred to the Rayyan software tool (Ouzzani et al., 2016). The screening was carried out in collaboration with my main supervisor. We screened all the titles individually. In cases where we disagreed or were uncertain about inclusion, we discussed until we reached an agreement. The screening questions and the study aim guided us in these discussions. The search and screening resulted in the inclusion of 29 full-text reports from 27 studies.

### **5.2.3 Quality appraisal**

Assessing and reporting the reports' quality was essential because the quality of each included report influences the trustworthiness and validity of the metasynthesis (Majid & Vanstone, 2018). I sought to follow Sandelowski and Barroso's reading guide when planning and performing the appraisal to stay consistently within their framework (2002, 2007). I structured this guide into 10 categories that my main supervisor and I used to assess how the findings were presented and reported in each report. This appraisal is presented in Paper 1 in Part 2 of this thesis.

Sandelowski and Barosso (2007) range qualitative studies from how close or far the analysis is abstracted from the original data and argue that only qualitative studies presenting interpreted data at a higher level than a 'Topical Survey' should be considered relevant. We used this approach as a guideline when appraising reports and solving uncertainties. Except for one report excluded as a 'Topical Survey', we classified all the reports as 'Thematic Surveys', 'Conceptual Thematic Descriptions' or 'Interpretive Explanations'. Even if we did not regard all the reports as in-depth, we concluded that they contributed data that shed credible light on students' experiences. A total of 28 reports from 27 primary studies were included.

### **5.2.4 Data extraction and analysis**

Thomas and Harden's (2008) analytic approach guided the thematic synthesis. Using NVivo12 (QSR International, 2018), I inductively coded all the data on the students' experiences and perspectives from working with manikins. Next, these coded findings were grouped before I sorted them into temporary categories. These categories were confirmed by the original research reports to secure congruence. Then, the categories were reduced and concentrated before I interpreted their meaning relating to the study aim. In this interpretive phase,

recurring discussions and reflections with my supervisors were essential to reaching a meaningful understanding. Lastly, I formulated four synthesised themes, as concepts from sociocultural theory were abductively applied. Again, my supervisors' feedback helped to specify the themes. The process from codes via categories to themes and the 27 studies' contributions to these themes are presented in Paper 1 in Part 2 of this thesis.

### **5.3 Study 2: An ethnographic multi-site field study**

This study's aim was formulated into the following research question: *How does the presence and use of human-like manikins influence nursing students' learning?* This question guided the study's data collection and analysis.

#### **5.3.1 Recruitment of field and participants**

##### *Field*

Universities and university colleges were recruited from May to June 2019. At that time, 13 Norwegian educational institutions offered a bachelor's nursing degree, of which several offered parallel teaching at other campuses. I contacted eight of these based on practical considerations, such as travel distance and the project's economy. Three universities, representing four campuses, met the inclusion criteria – 'any type of manikin used during the first semester of the first year' – and were included. Even if they were organised differently and possessed different equipment, such as the number of beds and the size of the clinical laboratory, the four campuses had well-equipped clinical learning environments and provided a trustworthy healthcare environment. Together, these four campuses constituted the field.

##### *Participants*

I wanted to explore nursing students' reactions to and interactions with manikins. There are reasons to assume that nursing students' first and earliest experiences with manikins are formative and that these experiences follow them and influence their further learning (Eyikara & Baykara, 2018; Karabacak et al., 2019). Therefore, I recruited first-year nursing students as participants.

The students were recruited using a purposive sampling strategy to ensure normal variation in the sample (Etikan, 2016). First, I contacted the teachers responsible for the relevant courses. They consented to participate and selected a total of 15 sessions that were relevant for me to attend. These teachers were also

included as participants. Afterwards, they informed their students about the study and asked if they wanted to participate. The students agreed and consented to participate. This recruitment implies that the students were recruited cohort-wise based on their enrolment in the relevant course.

In total, 204 nursing students and 18 teachers participated. Of these, I interviewed 17 students and nine teachers. The interview participants were recruited ad hoc during or immediately after the sessions. Except for information about previous educational and work experiences, no personal information was collected from any of the participants. However, I collected information on age from the interviewed participants. Even if most of the students had their first experiences with manikins in these sessions, 55 students used a manikin for the second to the fourth time. The interviewed students' ages ranged from 19 to 49 years (median: 23 years), and four were men.

### **5.3.2 The sessions**

The 15 sessions followed different learning objectives. On three campuses, they focused on performing procedural skills and understanding the theoretical principles underpinning them. The fourth campus emphasised skill application and assessment in a patient scenario. Consequently, the sessions were organised differently, and the students and teachers worked differently to meet the given learning objective.

The students worked in groups of two to six in all 15 sessions. However, how they could use the manikins varied. On one campus, students had free access to manikins for training. On two campuses, the students rotated between stations, with one manikin available at each station. On the campus where they worked on a scenario, the students used the manikin only in this scenario.

The teachers also had distinct roles: at two sites, they moved between stations, while at the third, one teacher was stationed at each station. One teacher facilitated the scenario at the fourth campus, voiced the manikin, and led the debriefing sessions.

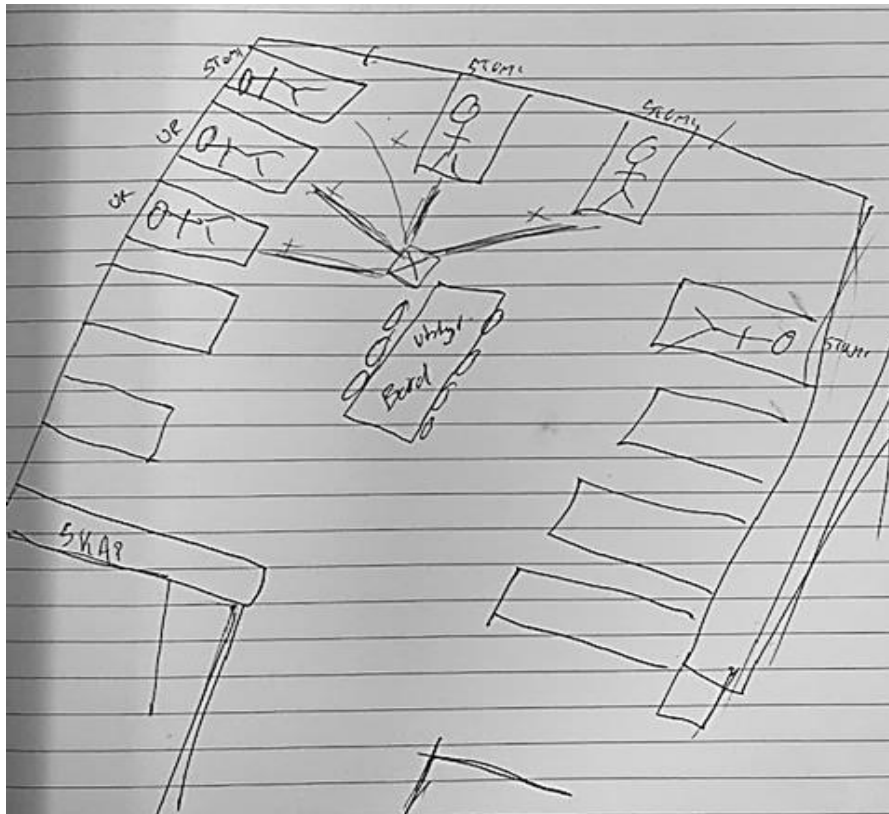
The manikins varied from nontechnological to highly advanced. At two campuses, the manikins were employed to train in taking vital signs. Here, it was central that the students could listen to different heart and lung sounds. Another campus used the manikins for psychomotor skills training, including stoma care, catheterisation, and injections. On the fourth campus, the students practised

taking vital signs with the manikin representing a nursing home resident in the scenario.

### **5.3.3 Data collection**

I collected data from September to November 2019. Two data collection methods were combined in the fieldwork: observations and interviews.

The partly participating observation was the primary data source. I developed a thematic observation guide to guide my attention towards relevant issues in the sessions (Appendix 12). This guide consisted of five focus areas: the participants' actions, their language, conversations and verbal expressions, their non-verbal communication, the social atmosphere, and the surroundings. I developed guiding questions for each area, for example: *How do the participants talk about the manikin?* I took handwritten field notes following this guide. I strived to understand, hear, and grasp what the participants communicated. Sometimes, I asked them questions or responded to their questions if they or I wondered about anything. However, I tried to limit my interactions with them and to be discrete. I made sketches of the room, marking the participants', the manikins', and my own placements and movement patterns in each session. Figure 4 exemplifies these sketches. During the 15 sessions, I observed for a total of 34.5 hours.



**Figure 4** Fieldwork sketch, Study 2

Additionally, I performed 23 face-to-face interviews: 14 interviews with 17 students and individual interviews with nine teachers. Two student interviews were group interviews with two and three students. In the interviews, we elaborated on interesting situations and moments in which students, for example, approached the manikins in a surprising way. Supported by a semi-structured thematic interview guide (Appendix 13), we talked about what happened in these situations. The guide consisted of four open questions to which the participants were allowed to respond, for example: *How was it to relate to and use the manikin?* The guide also suggested follow-up questions; however, these were unnecessary in most interviews because the conversations flowed easily. All interviews were performed and recorded in quiet, separate rooms and lasted 8 to 37 minutes, with a median of 14 minutes (mean: 16.6 min.).

The observation and interview guides were thematically open, and I adjusted their use according to specific situations. Discovering relevant data across the four campuses was possible using the same data collection guides for each session. Significant questions and issues in one session at one campus were

recalled and followed in the next session at another campus, for example, the extent to which the students treated the manikin as a patient.

#### **5.3.4 Data processing and analysis**

Immediately after each session, I wrote the handwritten field notes into full text and transcribed the interview recordings verbatim. Next, each session's full-text field description and interview transcriptions were merged into descriptive and reflective field descriptions. Here, the two data types became a unit (Hammersley & Atkinson, 2019; Madden, 2017), resulting in 15 field descriptions for which each session appeared as an independent and unique event. I then immersively read these field descriptions to grasp the meaning of each session.

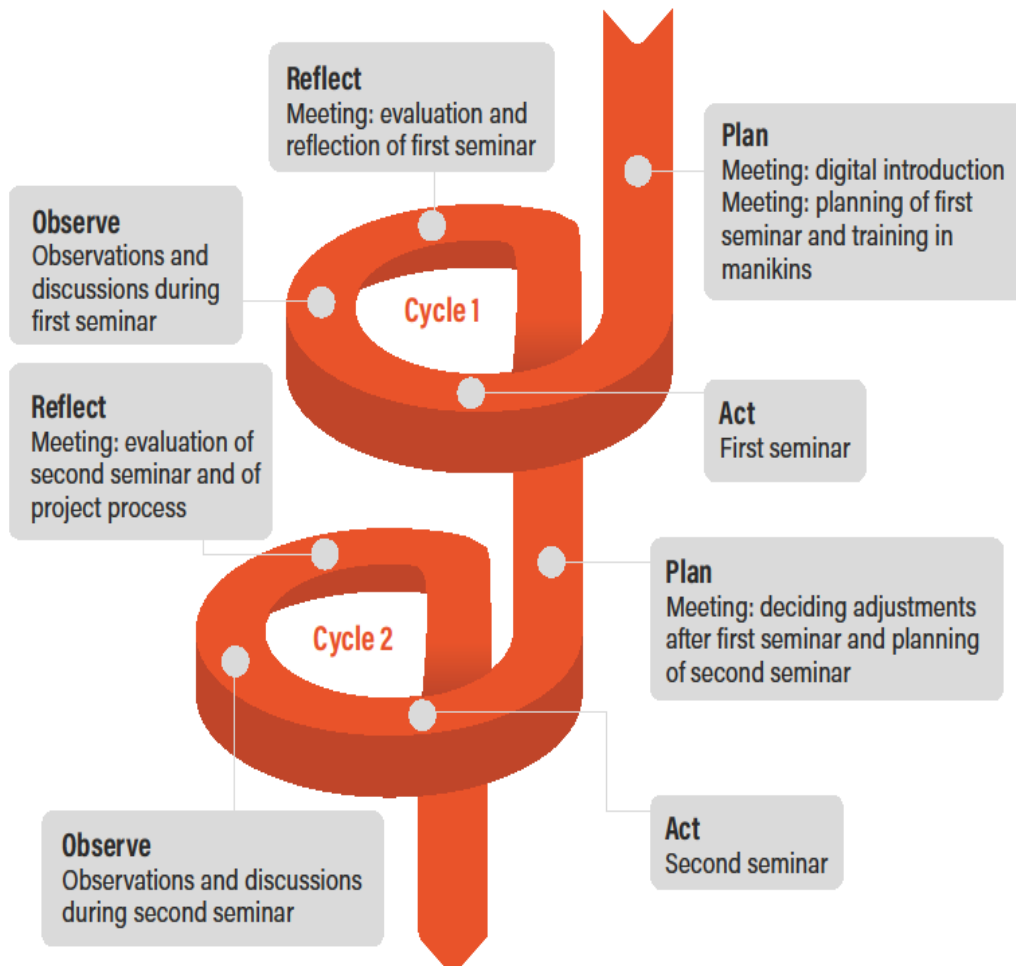
Guided by the research question, I systematically and inductively coded the field descriptions line by line using NVivo12 software (QSR International, 2018). From this coding, 19 descriptive categories were cultivated (Saldaña, 2015). I went into dialogue with the text, iteratively reading the categories and rewritings of the text. My reflections, findings, and arguments were challenged in discussions with my supervisors. As the themes were assessed according to CHAT concepts, the interpretation moved from the inductive to the more abductive. The terminus of this process was the writing of five related analytic categories.

#### **5.4 Study 3: An educational action research study**

The research question, *How may nursing students' independent and active use of human-like manikins promote learning?* guided the conduction of this study. In this section, the word 'project' refers to the specific developmental project in this study.

I applied the four AR phases to the study. These phases were connected by the participants' collaboration and conversations, in line with Carr and Kemmis (1986) and Kemmis and McTaggart (2008). In the planning phase, I met with the participants, and we planned an explorative and experimental learning intervention. Then, during the acting phase, we carried out the learning intervention according to the plan. In the observation phase, I observed how the students worked during the intervention. This means that the acting and observation phases ran in parallel. Then, in the reflection phase, we all reflected on and evaluated the intervention according to our experiences. Here, we returned to the planning phase as we adjusted how we worked. When we

repeated the process, it turned into a cyclic spiral: the AR spiral (Kemmis & Mc Taggart 2008), as illustrated in Figure 5.



**Figure 5** The project process, Study 3. (Inspired by Kemmis & McTaggart, 2008)

#### 5.4.1 Context

The project took place on one university campus from May to October 2021. This is the campus where I work as a teacher and have carried out my doctoral project. The intention was to implement a learning intervention in a course in which manikins were not usually used. The course, *Nursing to Different Patient Groups: Work Methods and Technology*, introduced second-year nursing

students to evidence-based work methods, standardised communication, assessment tools, and terminology. The nine-week course consisted of three group-work-based modules in which the students used the literature to write nursing plans based on patient cases. The students must also apply the knowledge and theory of pathology and clinical nursing when writing these cases.

In the project, the students worked according to the standard course in the first module. Then, we planned and performed the alternative intervention with manikins in modules 2 and 3. The manikins used were the medium-advanced Nursing Anne patient simulators from Laerdal® (Laerdal Medical, 2023).

#### **5.4.2 Recruitment and participants**

Usually, participants in EAR are teachers or leaders engaged in a specific educational practice. According to Carr and Kemmis (1986), knowledge development and improvement in education must happen from the teachers' perspective because they are most competent in addressing significant problems or conflicts. They may also be best equipped to outline practically implementable solutions (Kemmis, 2006; Kemmis & McTaggart, 2008). However, in this project, second-year nursing students were the main participants. The rationale for including students as participants was that they could contribute their experiences and ideas to the project from a student perspective. In parallel, their participation could bring new knowledge into the project and enhance their learning (Magee et al., 2020; Mill & Morris, 2000).

To establish the project, it was first necessary to recruit students who could participate in the planning. A purposive sample strategy was used to recruit students and one teacher (Etikan, 2016). All second-year nursing students received study information at a digital meeting and were invited to register. They were informed that up to 25 students could participate. More students than this would have been challenging to organise and acceptably include. Twenty-five students registered. Of these, 23 participated since two withdrew from participation before the project started.

The students were divided into six groups of three to five students. The students were mainly allowed to form groups based on their preferences. All of the students had some experience with using manikins from their first year in skill training and simulations. One teacher was invited and agreed to participate. This teacher had experience as a nurse and a licensed practical nurse teacher before working as a nursing teacher for the last two years. As with the students,



she had little experience with manikins and simulation and was not a trained facilitator.

EAR is based on collaboration and joint reflection, in which the researcher plays an active role (Kemmis & McTaggart, 2008; McNiff, 2013; Ulvik, 2022). Therefore, I was also considered a project participant, in addition to being the researcher.

#### **5.4.3 Design and project process**

The project ran for eight months, starting in June 2022, while the course started in August 2022. I wanted the students to have an impact on the project, and I could not plan details without them. However, the teacher and I set seminar dates based on the course schedule. I also had to book the clinical laboratory well in advance. Therefore, a preliminary timeline was laid out and presented to the students. After this stage, the students participated in all project phases.

We outlined the details for the first seminar at the first planning meeting. The students and the teacher also learned to operate the manikins. I was responsible for this training. In the first seminar, the students worked in groups based on a patient case, using the manikin as the patient. They were allowed to work and use the manikin in a way they considered appropriate according to their plan. The first seminar ended with two groups presenting their work in a plenary session. A few days later, we evaluated the first seminar and planned the second. This meeting ended the first research cycle and began the second. Based on some adjustments, we conducted the second seminar. Based on the adjustments the students prepared differently: they handed in a written text to the teacher and planned their use of the manikin in greater detail. The second cycle ended with a reflection meeting in which we evaluated the second seminar and the entire project process.

#### **5.4.4 Data collection**

The data collection and analysis aimed to follow and describe the students' activities during the project to identify if and how their activities had changed. Kemmis and McTaggart (2008) and Kemmis (2009) stated that we can identify changes in human activities at three levels: in our utterances (sayings), our actions (doings), and in how we organise socially (relatings). Therefore, data were collected corresponding to these three levels.

I collected data using three data collection methods: written responses, participative observations, and meeting recordings. The participants' written responses to open questions mirrored their individual experiences, expectations, and evaluations before and after the project (Appendices 14 and 15). These questions and responses were distributed, collected, and organised using SurveyXact software (Ramboll). The teacher answered separate questions ahead of the study (Appendix 18).

Observational notes were collected during the two seminars. I observed the students while they worked and engaged in discussions with them and the teacher. In collaboration, we found and tried ways in which the students could use the manikins to understand and solve the case assignment. I noted significant observations and happenings supported by a thematic observation guide (Appendix 16) consisting of questions, such as: *What characterises the use of the manikin?*

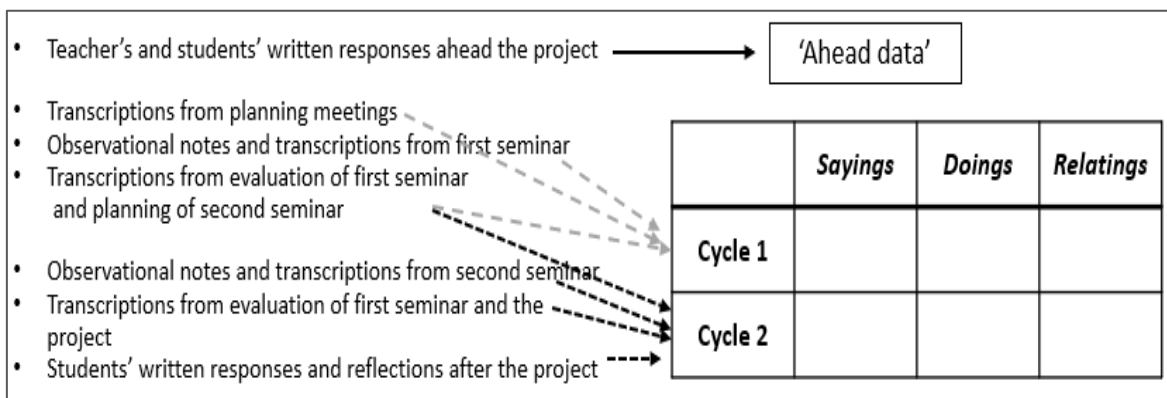
Recordings from the reflection and evaluation meetings provided rich information about the participants' experiences with the project. A thematic guide supported the groups' discussions in these meetings (Appendix 17). The students discussed whether something was problematic and what they could do to make this work. Based on the experiences and adjustments after the first cycle and because I improved my understanding of significant issues, the observation and discussion guides were revised after the first evaluation meeting and before the second seminar. The observation and discussion guides were open and used as flexible tools.

#### **5.4.5 Data processing and analysis**

The written responses were transferred from SurveyXact (Ramboll) into a Word file during the raw data processing. Adjustments were made only to improve readability. The observational notes were written into text, and the meeting recordings were transcribed to ensure understanding and readability.

McNiff's (2013) three analytic steps guided the further data analysis because they were found suitable to follow the students' activities and to identify if and how their activities changed from the first research cycle to the second. Regarding the first step, Kemmis' (2009) concepts of 'sayings, doings, and relatings' were selected as tools to trace and identify potential changes. This implies that a deductive approach or, in Timmermans' and Tavory's (2022) words, a 'focused' approach, was used.

Concerning step two, the written responses, the observational notes, and the transcriptions were organised to follow the two project cycles and coded based on the predetermined concepts of ‘sayings, doings, and relatings’. I designed a table to facilitate this first organisation and data coding (Figure 6). I used the NVivo12 software (QSR International, 2018) to code and track the data systematically. This organisation made it possible to follow potential changes in the participants’ ‘sayings, doings, and relatings’.



**Figure 6** Data organisation, Study 3

From step three, the teacher and three volunteering students participated in the analysis. They contributed their perspectives, experiences, and reflections on the data. Together, we detected key patterns in the data. While investigating and discussing these patterns with my supervisors, we gravitated toward Ryan and Deci's (2000) and Pink's (2009) ideas of motivation, as the results coincided with their theories of the prerequisites for inner motivation. This insight turned the analysis in an abductive direction, and I developed four themes in light of these theories. This shift was not planned but took shape along the way. Lastly, the three students and the teacher already engaged in the analysis, read, discussed, and verified these four themes.

## **5.5 Positionality and reflexivity**

As a doctoral candidate, I have been responsible for the planning, organisation, recruitment, and conduct of the three studies, including data collection, preparation, and coding. My role as a researcher has been significant regarding methodological choices, with further implications for the thesis' results and overall trustworthiness (Guba & Lincoln, 1994; Lincoln & Guba, 1985; Patton, 2002). The research process and data are products of the interplay between the study participants and me. Therefore, I will reflect transparently on how my role and position in the project may have influenced the data. This is also important because research in the pragmatic and social constructionism tradition is value-laden and context-bound, entailing challenges to the trustworthiness of the results (Guba & Lincoln, 1994).

### **5.5.1 Positionality**

The optimal position for an ethnographic researcher is to be an informed outsider, allowing for both a distance that makes it possible to discover things the insiders unconsciously take for granted and appreciating the significance of closeness to and knowledge of the field (Agar, 2008; Hammersley & Atkinson, 2019; Madden, 2017). According to Madden (2017), an emic perspective values the examination and understanding of the field from within as perceived by its members, while an etic perspective emphasises the outsider's point of view to analyse and explore the research phenomenon. These two perspectives blend in ethnographic research. I find this approach relevant to the doctoral project and not only to the ethnographic study. Reflection on my positionality is also central to AR (McNiff, 2013).

My previous practice and experience as a nurse and a nursing teacher have influenced my position as a researcher. My background has shaped my values, engagement, and preunderstandings of the thesis' topic. Therefore, reflecting on how my experiences influence my position has been substantial (Crang & Cook 2007). When I started to practice as a registered nurse in 1997, I was allowed to be a novice in a community of more experienced nurses, facilitating growth in the nurse role and a safe continuation of the learning process that started as a student. Working as a nursing teacher since 2012, I have observed students' remarkable ability to support and guide each other, for example, in skill training and group work. I have reflected upon whether nursing education, which has struggled to ensure that specific learning outcomes can be achieved, has

restricted students' opportunities for involvement and the development of the necessary learning abilities.

I have written this thesis primarily as a researcher, but my voices as a nurse and teacher are noticeable. At times, it has been challenging to be cognisant of the significance of these roles, but I believe that they have also contributed to a deepened understanding (Coffey, 2018). However, I acknowledge that my familiarity with nursing and nursing education may have reduced the distance between the emic and etic perspectives, with the risk of restricting the etic.

### **5.5.2 Reflexivity**

Within most qualitative research traditions, reflexivity is integral to the research process and is fundamental to establishing trustworthiness in the results. However, reflexivity is also highly relevant in ethnography (Madden, 2017) and AR (McNiff, 2013). Reflexivity denotes a critical self-reflection on how I have acted throughout the research process and how aspects related to my role and engagement may have influenced the data quality (Alvesson & Sköldbberg, 2018; Patton, 2002). Considering the hermeneutic interpretative tradition, reflexivity can help expand our understanding, as per Riese (2022). Reflexivity has helped me enter the field openly, discover relevant phenomena, and provide a nuanced exploration and description of how manikins influence nursing students' learning. Madden (2017) described the researcher as the primary research tool, and the results as a product of the researcher's observations. Due to the methodology used in Studies 2 and 3, reflexivity primarily concerns these two studies. During the data collection in these studies, I attempted to blend in by wearing a uniform. I was not involved in any conflicts or disagreements during the project.

However, the fact that Campus D in Study 2 and the university in Study 3 is where I work as a faculty member may have influenced the data collected at these places. Even though Gjøtterud (2020) acknowledges that performing research in one's practice and workplace can be a source of credible knowledge because familiarity provides opportunities for understanding, it also involves some challenges. For example, if I have not been sufficiently self-critical or balanced my various roles (McNiff, 2013), it may influence the data collected and its quality. Although I did not know any of the students from before and had no educational responsibilities for them, my familiarity with some teachers may

have facilitated the data collection. I sought to handle these challenges by openly discussing them and being transparent and honest about my multiple roles.

I collected the data in Studies 2 and 3 through my eyes and ears. My voice appeared in the recordings and field notes, and thus became part of the data material. Therefore, there is a connection between the data and me (Agar, 2008; Hammersley & Atkinson, 2019). As a partly participating observer in Study 2, I attempted not to intervene for fear of disturbing or influencing what was happening. If the students asked for my support or opinion, I sometimes turned them down, and at other times, I discreetly helped them with minor problems or answered questions. Some teachers in Study 2 said that they felt observed and disturbed by my presence, which may have made them adjust their behaviour. However, several students told me that they ignored my presence, and some even appreciated it.

In EAR, the researcher should participate in and become familiar with the practice in question (Carr & Kemmis, 1986). This methodology allowed me to participate actively. In line with Eikeland (2012), researchers' interactions with the participants can lead to knowledge of praxis. As the researcher in Study 3, I facilitated dialogue and collaboration between the participants. Therefore, the notion of a neutral and external observer is meaningless (Kemmis & Mc Taggart, 2008). I was in dialogue with the other participants, who shared their opinions. Brydon-Miller and Aragón (2018) discussed the multiple roles of AR researchers. I recognise some of these roles, such as the organiser and motor, who must secure and organise the research process. However, I foremost recognise the challenge of balancing these roles. It was sometimes demanding always to be flexible, find solutions, and adapt to others' needs. However, I experienced that my engagement facilitated and supported the students' engagement and contributions.

## **5.6 Ethical considerations**

Study 1 did not entail any significant ethical challenges for the thesis. The use of the included research reports did not challenge the thesis' overall ethical credibility, and no participants were recruited who could be exposed to harm. However, ethical matters were one of the weakest categories reported in the reports.

Foremost, the project's potential ethical challenges are related to Studies 2 and 3. I obtained ethical approval from the Faculty's Ethical Committee (FEK) to

conduct these studies (Appendix 1). The Norwegian Centre for Research Data (NSD/SIKT) approved these two studies (ref. no.: 824499, Appendix 2). Because of the delay in Study 3 caused by the COVID-19 pandemic, an updated approval was given in 2021 (Appendix 3). Hammersley and Atkinson (2007) point out five questions that may be ethically challenging in an ethnographic research tradition: informed consent, privacy, harm, exploitation, and consequences for future research. Although Study 3 was not ethnographic, I found these questions relevant for both studies. Therefore, I guide the following ethical considerations of Studies 2 and 3 from these questions.

The first question concerns *informed consent*. The field, represented by the universities' institutional boards, was contacted, and participation was approved before the following recruitment was conducted (Appendices 6 and 7). In both studies, participation was voluntary. The participants received oral and written information on all relevant aspects (Appendices 8–11). Covert fieldwork was never an option, and I was always open about my role and intentions as a researcher (Agar, 2008). Miller and Bell (2012) argued that 'consent' should be ongoing and renegotiated between the researcher and the participants throughout the research process. I attempted to do this, as the oral information was occasionally repeated. For Study 2, the participants signed a written consent form on the session day. They could opt out of being recruited for individual interviews, and some students disapproved of individual interviews. For Study 3, the consent form was signed some weeks before the first meeting. In both studies, the participants were informed that they could withdraw at any time without giving a reason or risking consequences. Two students in Study 3 used this opportunity early in the process. The participants' right to informed consent was safeguarded.

The second question concerns *privacy*. For both studies, the participants were assured that their participation was anonymous. All quotations were modified in publications to secure their anonymity. Additionally, limited personal information was collected, except for name and mail address. Study 2 collected complementary information on age, previous education, and work experience only from the interviewed students and teachers. However, in Study 3, the students' anonymity was challenged because most of the class could know which students participated. In addition, the students were open to participating and told their peers about the project. Consequently, as a researcher, I alone could not guarantee that their participation would remain anonymous. In both

studies, the participants were observed in public places. Despite this, the line between what is perceived as public and private can be thin. Occasionally, I witnessed situations that the participants might experience as private. In these cases, I tried to approach them with sensitivity, and data from situations that could appear to be personally challenging or private were not collected.

The third question of *harm* involves possible negative consequences that the studies could have for the participants and others. In both studies, no sensitive information was collected. The only personal information collected was the participants' names, mail addresses, and places of study or work. All raw data and the participants' personal information were stored in a separate locked place to which only I had access. This information will be destroyed at the end of the project according to the order from the NSD/SIKT. All data files were anonymous and tracing any data to specific persons is impossible. The participants were not considered to belong to any vulnerable groups. Although harm can occur during the research process or through publications, I do not consider any publications from this doctorate project to represent any potential harm to the participants or the field. However, even if the participants were informed that participation would not affect their relationship to the university or their grades, it would be challenging for me to guarantee this after I have left the field.

Concerning the fourth question, according to Hammersley and Atkinson (2007), some may claim that all research implies aspects of *exploitation* because the researchers pull out the information they want, while the participants often get nothing in return. This may also have been an issue in the two studies, especially in Study 3. Because of the changes introduced by the intervention, I feared that the project could jeopardise the students' learning. However, this fear subsided when I realised that they were still learning what they were supposed to, albeit differently. The students also reported that they felt that their contributions were appreciated.

Regarding the fifth question, predicting possible *consequences for future research* and practice is challenging. The value of this research is related to how it is interpreted and analysed. While writing this thesis, it is challenging to say anything about it. Although I have aimed to express myself clearly and unambiguously, I cannot guarantee how others will understand and use the results.



## 6 Results

This section first presents the main results of the three studies. Second, it presents a summary of the results related to the thesis rationale and aim. These results are discussed in Section 7.

### 6.1 Results Study 1: The role of manikins in nursing students' learning

This study is presented in Paper 1:

Handeland, J., Prinz, A., Ekra, E. M., & Fossum, M. (2021). The role of manikins in nursing students' learning: A systematic review and thematic metasynthesis. *Nurse Education Today*, 98. [doi.org/10.1016/j.nedt.2020.104661](https://doi.org/10.1016/j.nedt.2020.104661)

The systematic review included 28 papers from 27 studies. Eighteen of these studies used so-called high-fidelity manikins. Low-fidelity manikins were used in only one study and then in combination with high-fidelity manikins. Three studies used medium-fidelity manikins, two in combination with high-fidelity manikins. Five studies did not report the type of manikin or fidelity level.

Three themes providing insight from the student's perspective were extracted from the metasynthesis: seeing the manikin as a doll or a patient, experiencing yourself as a nurse caring for a patient, and being a team member.

*Seeing the manikin as a doll or patient* illuminated that a manikin is both a doll and a patient working together. When the manikins were used as dolls, the students emphasised their limited human properties, such as the absence of nonverbal communication and emotional expressions. These limitations made it challenging to use the manikins to practice and learn therapeutic communication and caring skills. Nevertheless, the manikin as a doll enabled students to focus on technical skills and provided opportunities for safely practising skills and exploring interventions. When used as patients, the students made use of the manikins' symbolic value as patients. Then, training therapeutic communication and caring skills with the manikins became possible. The students reported that realistic patient stories and the proper use of technology, such as a voice, enhanced the manikins' identity as a patient.

*Experiencing yourself as a nurse caring for a patient* continues what it means to see the manikin as a patient. When students approached the manikin as a patient, it often resulted in the feeling of being a nurse. This feeling helped them engage, enter into the nursing role, communicate with the manikin as a

patient, and feel empathy for it. Empathising with the patient encouraged the students to take responsibility. The experience of being a nurse gave them room to explore the nursing role, which could prepare them for their future nursing practice.

*Being a team member* builds on the experience of being a nurse. Simulations with manikins could evoke feelings of stress and discomfort if the students felt observed and evaluated by their peers and teachers. However, if the students worked together as if the manikin were a patient, they reinforced each other's experiences of being nurses. They could become a team with the patient's well-being as a shared goal. For many students, it was a significant insight to realise that you, as a nurse, are dependent on others to help patients. While working with the manikins, students practised discussing and prioritising interventions. The manikin played a role in supporting the students in realising the significance of teamwork, collaboration, and clear communication for nursing practice.

These three themes were considered through the sociocultural concept of mediation to deepen their meaning. Manikins played a role as learning mediators independent of technical level and learning activity. Students created a relational realism in which where they practised and realised the importance of teamwork, communication, and collaboration. Learning nursing with manikins is a social activity that can give nursing students insight into a future nursing role.

## **6.2 Results Study 2: The sense of a patient**

This study is presented in Paper 2:

Handeland, J., Prinz, A., Ekra, E. M., & Fossum, M. (2022). The sense of a patient: An ethnographic multi-site field study exploring the influence of manikins on nursing students' learning. *International Journal of Educational Research Open*, 3. [doi.org/10.1016/j.ijedro.2021.100110](https://doi.org/10.1016/j.ijedro.2021.100110)

This study's main result was the interplay between five analytic categories: manikin as an object, manikin as a subject, the interplay, the individual learning space, and the collective learning space.

The category *manikin as an object* refers to situations in which manikins are used to teach and learn technical skills. In such situations, the teachers mainly referred to the manikins as dolls and used them to teach psychomotor skills and procedures. Some teachers communicated that students must first become

acquainted with psychomotor skills before caring skills. With this approach, the manikins allowed the students to feel mastery over and confidence in their psychomotor skills. However, the manikins' human appearance was less significant.

The category *manikin as a subject* addresses situations in which the manikins were approached as patients to teach and learn to perform psychomotor skills in a caring manner. Although this was most evident in the scenario sessions, the teachers in all the sessions occasionally reminded the students to communicate with and pay attention to the patient represented by the manikin while practising procedures. With this view, the manikins' human look was significant, although it could cause discomfort.

The category of *the interplay* illustrates how the manikins' two sides, the object and the subject, worked together. Teachers and students moved between the two approaches according to their needs. Therefore, using manikins entailed learning psychomotor, communicative, and caring skills. However, sometimes the teachers behaved contradictorily or inconsistently and raised conflicting expectations, which could cause confusion and uncertainty for the students. Tensions occurred if it was unclear to the students whether they should relate to the manikin as an object or a subject.

Similarly, as the manikins' two sides existed side by side, two learning spaces existed. In *the individual learning space*, each student had their own experiences with the manikin. They could feel like they were interacting with a patient when exploring the manikin's face, talking to it, listening to sounds, and touching it. However, the specific type of manikin had limited meaning, except when hearing sounds from technical manikins. Their human resemblance was more significant. Manikins' neutral appearance and the fact that they are not alive made it possible to explore them as objects and touch them with care as subjects.

The students shared collaborative experiences in the *collective learning space*. Here, the manikins became a focus for conversation and reflection. When students and teachers gathered around a manikin, they spontaneously started to discuss and offer each other explanations. Since they did not have to pay attention to a living patient, they could discuss and reflect freely. Students could gain new understanding from these discussions and reflections.

These results were considered using the CHAT concepts of the object of activity and expansive learning to obtain an enhanced understanding. The

students and teachers shared the goal of supporting students' learning and used the manikins the way they deemed it appropriate to obtain this goal. Two learning cultures existed in parallel. In one culture, learning was approached as a stepwise process in which technical skills come first. In the other culture, learning was approached as a process for integrating technical and caring skills.

The presence and use of manikins gave the students reflective, explorative, and experiential learning opportunities that invited them to experience the balance between the technical and interpersonal aspects of nursing practice. The interplay can be a source for expansive learning in which students can realise the importance of what they do, not primarily for their learning, but for future patients.

### **6.3 Results Study 3: 'I realised it when we played with the doll'**

This study is presented in Paper 3:

Handeland, J., Prinz, A., Ekra, E. M., & Fossum, M. (2023). 'I realised it when we played with the doll!': Nursing students' learning from participation in an Action Research project that included manikins. *Educational Action Research*. [doi.org/10.1080/09650792.2023.2242425](https://doi.org/10.1080/09650792.2023.2242425)

Four themes describe how the students' participation in the project and the intervention changed their 'sayings, doings, and relatings': ownership of the learning process, collaborative learning, understanding theory's significance for practice, and taking the patient's perspective.

*Ownership of the learning process* highlights that the students were motivated by a sense of autonomy and freedom to plan and decide how to work. This resulted in a feeling of ownership of their learning process. Although this freedom was challenging, it also stimulated creativity. When the students were not obliged to hand in a written assignment, they felt better able to understand the syllabus better. However, they realised that the training in writing patient cases was helpful for preparing for the exam. Then, the written text became a tool for their learning, not primarily a task they were forced to do.

*Collaborative learning* illustrates that the students' collaborative styles changed. Instead of working individually with parts of the patient case, they worked more closely together and obtained a deeper understanding of the case as a whole. Constructive discussions and reflections characterised the group work. In the first seminar, many found the flexible frames stressful, but during the

second seminar, many appreciated this freedom. On their initiative, the groups worked through the patient cases by experimenting with and changing between the nurse, relative, and patient roles.

*Understanding theory's significance for practice* relates to how the students better understood theoretical concepts and knowledge because they were physically and practically active when using the manikins. The manikin symbolised a patient, which gave meaning to theory. Previously, many students considered the theory and literature to be relevant, mainly for the exam. During the project, they realised that for their future clinical work, it is essential to adapt theoretical knowledge to individual patients.

*Taking the patient's perspective* illustrates the manikin's primary meaning in the project. Even if the students limitedly emphasised the manikin as a patient, its presence gave them the idea of a patient. The students made little use of the manikin's technical features. However, while sitting beside it and pretending to be the patient, they were allowed to take the patient's perspective. For example, they experienced what it was like to receive challenging information. Instead of discussing the case in general terms, they talked about and to a specific patient and suggested exact and customised interventions. The manikins provided opportunities for communication training and helped the students understand what is entailed in being a nurse.

Nursing students' project participation and autonomy promoted their inner motivation. Using and exploring manikins together fostered creativity and helped them take the patient's perspective. They realised the importance of understanding theory and the significance of individualised patient care. The students experienced a more realistic learning context, making their learning more relevant to nursing practice.

## **6.4 Summary of main results**

Here, I present a summary of the results across the three studies to highlight and outline the results' meaning and relevance to the thesis' aim.

### **6.4.1 Manikins' duality**

Studies 1 and 2 significantly illustrated that manikins have a duality: they are simultaneously dead objects and patient representations. Study 3 did not examine this duality but illustrated how it unfolds and how nursing students can experiment with manikins' duality. Both sides of this duality were valuable and provided opportunities to learn the knowledge and skills essential for nursing practice.

As objects, manikins provided opportunities for training and learning psychomotor, procedural, and technical skills. Their presence attracted the students' attention and curiosity, awoke a desire to explore (Studies 1 and 2) and gave meaning to and illustrated theory (Studies 2 and 3). The manikins' varied features strengthened their sensory impressions and understanding of clinical observations. When used as objects, the manikins were referred to as dolls that the students could play with. In their interaction with a manikin as an object, the students were allowed to be inexperienced students struggling to learn and acquire fundamental competencies. However, as objects, the manikins' human appearance and attributes had limited meaning and added little to the learning experience.

As patient representations, manikins served as patient reminders that gave the students a sense of patient presence (Studies 1, 2, and 3). The manikins' human appearance provided opportunities for integrating procedural and technical skills and communication and caring skills. The manikin could stimulate engagement, empathy, and responsibility if approached as a patient. Further, the manikins encouraged the students to experiment with the nursing role. Advanced technological features seemed less critical for experiencing oneself as a nurse than the fact that the manikin resembled a person (Studies 1 and 2). However, the appropriate use of technology could amplify the feeling of patient presence. Moreover, by entering the patient role through the manikin, the students could experience what it means to adapt knowledge to patients and help them realise the importance of individualised care (Study 3).

#### **6.4.2 Manikins' influence on collaboration**

The collaborative and social aspects of using manikins is a consistent finding across all three studies. Manikins specifically influenced and stimulated discussions, reflections and collective problem-solving. However, stress and discomfort were also associated with using manikins, mainly due to the social context, a sense of being observed, and uncertain expectations.

Working with manikins helped nursing students to experience and realise the significance of teamwork and collaboration for making good decisions in nursing practice (Studies 1 and 2). In addition, the manikins constituted a shared goal of securing safe patient care and supported students in working together toward this goal (Study 1). Manikins influenced the development of the relational qualities and collaborative skills that nurses need to function in clinical practice (Studies 1, 2 and 3). For the teachers, the manikin could serve as a tool to help them direct the students' attention to a patient and stimulate reflections and discussions (Study 2).

Spontaneously, nursing students could begin to simulate together when they were presented with a manikin, meaning that they constructed or envisioned authentic situations in which they acted as nurses with the manikin being a patient (Studies 2 and 3). This way of simulating happened even in simple situations, even if the teachers did not plan it. This allowed the students to experience and experiment with the collaborative aspects of the nurse role, providing insight into the complexity of nursing practice. The manikins' human likeness in these simulations was more crucial than their technological features (Studies 1, 2 and 3).

#### **6.4.3 Manikins' meaning for self-directed learning**

Studies 1 and 2 indicate that nursing students may have limited opportunities to find their own ways of working. The educational activities explored in these two studies tended to be instructional and teacher-led. In contrast, Study 3 exemplifies how the students' self-directed use of manikins gave them a practice-relevant learning experience, meaning that they must take responsibility for their learning and exhibit planning and problem-solving skills. In the learning intervention described in Study 3, the manikins situated the students in a specific context and constituted a meeting point for discussion and reflection.

When the students were allowed to use a manikin with autonomy and within flexible frames, it supported activity, creativity, and motivation. This way

of using the manikins strengthened their decision-making ability and understanding of what it means to provide personalised care. SDL seemed to release the potential of using manikins and make the teaching relevant for future practice, which can motivate further learning.

However, the ability to work self-directedly did not come by itself. Studies 2 and 3 both emphasise the importance of the teachers' availability for guidance, support, and reflection. The results showed that the teachers' presence and participation were essential to becoming confident in exercising self-direction and responsibility.



## 7 Discussion of main results

In this section, I discuss the summarised main results. By employing concepts from sociocultural learning theory and CHAT, I will contribute to a better understanding and knowledge of how manikins as educational tools in nursing education influence nursing students' learning.

### 7.1 The meaning of manikins' duality

In all three studies, the students and teachers directed their attention and actions toward promoting nursing students' learning to become qualified nurses. This goal was stated explicitly in Study 2, in which teachers emphasised it as their primary task. However, this goal was implicitly communicated in Studies 1 and 3 because the students' learning was the reason the students and teachers related to each other and shared the same context. This implies that promoting nursing students' learning to become qualified nurses is the object of activity that gives substance and meaning to their actions, in align with CHAT (Engeström, 1987, 2015). Moreover, the students and teachers used one specific tool to attain this object of activity: the varied human-looking full-bodied manikins.

The results draw the contours of an activity system in which the manikin is *the mediating* tool that facilitates the *division of labour* and interaction between the *subjects*, the students and the teachers, in their work toward their *object of activity*. This system operates in a *community*, which is the educational arena responsible for graduating competent nurses according to society's needs and demands. However, and foremost, patients who depend on competent nurses represent the community. The *rules* regulating the system's room for action are, for example, the National Regulations on Nursing Education (Ministry of Education and Research, 2019a), as well as specific educational programs. Here, Engeström's model of the activity system (1987, 2015) serves as a lens for exploring what meaning manikins can have for nursing students' learning processes.

As mediators in this activity system, manikins influence what and how nursing students learn and what knowledge is appreciated as valuable, according to sociocultural learning theory and CHAT. The results show that manikins attract students' attention and fascination. Their appearance triggers curiosity and an impulsive urge to explore, illustrating how educational tools affect us, as maintained by Säljö (2005). Säljö (2005; 2010) also states that mediators shape

how we act, think, organise, and learn. This thesis suggests that this also applies to manikins. Therefore, it is essential to understand the manikins' meaning as learning mediators in nursing education. The results of this doctoral project provide a basis for such an understanding.

As described in the results, manikins have a dual nature as both objects and patient representations, aligning with the literature describing manikins as having a multifaceted nature (Hopwood et al., 2016; Ireland, 2017). To understand manikins' mediating meaning, we must understand their value as both physical objects and symbolic patient representations.

The side of the duality in which a manikin is in play as an object gives nursing students opportunities to learn psychomotor skills, coordination, and control when performing technical tasks. In this context, the manikin's technical features and functions provide a good support. Additionally, the students were allowed to ignore the manikins' human appearance. While focusing on techniques and procedures, it can be appropriate not to have a specific patient in mind. Students can practice safely and fail without considering a patient's well-being (Lavoie & Clarke, 2017; Olson et al., 2018). As an object, the manikin maintains the students in their novice role, in which they can perform skills sequentially (Benner, 1984; Ozdemir, 2019). At an early level in a lifelong learning process, education cannot expect students to be able to individualise their actions to individual patients or discover new action alternatives.

The side of the duality in which a manikin is used as a symbolic patient representation gives students opportunities to practice and learn caring and communicative competence. In this context, manikins' human appearance gives nursing students the feeling of a patient's presence, while their varied features seem to have limited significance. Even in psychomotor skill training, manikins can bridge students' thinking regarding a patient. The manikins as patient representations reminded the students of the reason they were there: to learn to provide professional patient care. Regarding this thesis' aim, it is as patient representations that manikins have their most relevant value. The emphasis will therefore be on the manikins as patient representations in the following section.

One specific example showing how manikins come into play as patient representations is how they inspired nursing students to simulate (Studies 2 and 3). Spontaneously, the students created and envisioned authentic situations without initiation or facilitation from the teachers in a way that can be described as simulation, as supported by INACSL's simulation definition (2016b). This is

one of the most pivotal findings of this thesis. This way of simulating exemplifies what Lavoie et al. (2020) call interactional fidelity, or what I in Study 1 call relational realism. In these simulations, the students talked to the manikin as if it was a patient and addressed each other as if they were nurses. These as-if experiences can allow nursing students to act and reflect as nurses, in line with Dieckmann et al. (2007), and mediate knowledge and an understanding of the nursing role, as supported by Ashley and Stamp (2014), Hopwood et al. (2016), and McNiesh (2015). As patient representations, the manikins invite nursing students to try the nursing role. Even if they are novices, this can motivate students to stretch toward a higher level of professional development.

Furthermore, the spontaneous simulations initiated by manikins as patient representations invited the nursing students to enter and experience the patient role (Study 3). In these situations, the manikins mediated an understanding of the patient's perspective. This aligns with Currie and Heslop (2022), who found that the experience of acting as patients in casualty simulations gave nursing students insight into the patient's experiences. Furthermore, Røssland et al. (2022) found that taking the patient role in simulations can strengthen nursing students' ability to communicate with patients. Moreover, acting out the patient role gave the students experiences in communicating and interacting with people in vulnerable situations. The students realised that they must invite patients to express their needs and preferences. I connect this to the possibility of fostering competence in individualised care, which is highly relevant to healthcare. Individualised care is closely associated with interpersonal competence. Rojas Reyes and Rivera Alvarez (2022, p. 15) define interpersonal skills as the *knowledge, abilities, attitudes, and values that nurses express in clinical situations to provide care. These skills involve knowing how to listen and communicate assertively, regulate emotions, be empathetic, respect, understand in human interactions.* Therefore, it is relevant to develop learning activities that enable nursing students to assume the patient role and engage in creative and active interactions with manikins, as demonstrated in Study 3. Doing this can foster the understanding and competence required for individualised care. Ozdemir (2019) adds to this by describing how nurses' abilities to provide individualised care grow as they develop from novices to experts, as described by Benner (1984). This is relevant to this thesis because the experiences of adopting the patient role may help nursing students move from the routine and fragmented actions of a novice to the personalised and fluid measures and approaches that characterise an expert.

Much of the reviewed literature presented in Section 2 focuses on technologically advanced manikins. Considerable resources have been invested in simulation equipment and technology (Bumbach et al., 2022). Arranging learning activities and simulations with advanced manikins can be beyond the reach of educational institutions with limited financial resources. In addition, Svellingen et al. (2021) and Zulkosky et al. (2021) argued that nursing education must balance such costly and resource-intensive teaching methods against students' needs for repeated and multiple simulations. Considering resources, it is paradoxical that manikins, in general, judging from this doctoral project, seem to offer rich opportunities for learning the qualifications required in nursing practice because of their duality and presence.

Regarding the meaning of manikins' duality, it is essential to underline that manikins are constantly present as objects and patient representations. Either side can be dimmed or highlighted but cannot be removed. Both approaches are simultaneously in play; there is no either/or. This means that manikins provide opportunities for learning psychomotor, caring, and interpersonal skills. However, the learning opportunities that arise depend on which side of the duality is emphasised. For example, by covering its face during procedural skill training, as suggested in Study 2, nursing teachers can manipulate a manikin's fidelity and draw attention to it as an object. The appropriate use of the manikins' duality presupposes an awareness of the purpose of the manikin in each learning activity. I argue that the duality of manikins allows for opportunities to understand the complexity of nursing practice.

## **7.2 Manikins' influence on collaboration: reflection, stress, and experiential learning**

The collaborative aspect of using manikins is central to the results. In the three studies, the students were eager to learn, and the teachers participated in and encouraged discussions and challenged them to reflect on their experiences. In this context, the teachers actively used the manikins to direct students' attention to a specific patient (Study 2) and encouraged them to act out a situation and try solutions with the manikins (Study 3). Using manikins in nursing education opens a space for practising collaboration, teamwork, discussions, and reflections. In other words, it gives the students experience of working in a community of practice (Lave & Wenger, 1991). Therefore, facilitating communicative spaces where students can develop knowledge through

interaction and reflection, as stated by Kemmis (2009), is significant in nursing education.

The opportunity to reflect and develop reflective skills appears particularly relevant. Reflective competence is essential for mastering the challenges that nurses face in clinical practice. Reflective competence helps nurses learn from experience and operationalise this learning in patient care, according to Patel and Metersky (2022). Scheel et al. (2021) emphasised that developing reflective competence is a hallmark of nurses' continuous professional development. Furthermore, research maintains that reflecting while in a situation is an essential professional skill (Mulli et al., 2021; Mulli et al., 2022). According to Benner (1984), the ability to reflect in action is one sign that distinguishes a novice from a more competent nurse. Reflection in action relates to how professionals think while performing in a situation and is essential to managing clinical situations, according to Schön (1987). Consequently, nursing education should facilitate opportunities for students to practice reflection in action. This project's results show that the nursing teachers helped the students practice reflection in action while using manikins during psychomotor skill training (Study 2) and working with patient cases (Study 3).

Experiencing a safe and predictable learning environment is often emphasised as essential for learning (Kolbe et al., 2020). Despite this, several reports included in the metasynthesis (Study 1) described stress arising during the simulation context. This aligns with other research that also states that nursing students often experience negative emotions such as fear, stress, and anxiety in scenario simulations (Al-Ghareeb et al., 2019; Cantrell et al., 2017). Such stress and discomfort seem connected to the social context: the presence, feedback, and assessments from peers and teachers (Boostel et al., 2018; Groot et al., 2020; Keskitalo & Ruokamo, 2020). Research supports the idea that unnecessarily high stress and negative emotions in simulations can disrupt learning (Al-Ghareeb et al., 2019; Madsgaard et al., 2022). Therefore, there are reasons to argue that nursing education should work to eliminate stress and discomfort in teaching.

It is informative that the students in Study 3 profited from and appreciated being challenged and pushed out of their comfort zones. Initially, being in a situation in which how to work was unclear and not detailed caused frustration and stress. However, supported by the teacher, the students mobilised their inherent problem-solving abilities, experimented, and came up with new solutions, illustrating experiential learning as described in Dewey's tradition

(Frandsen, 2018; Miettinen, 2000). Experiential learning was almost visible in ‘lightbulb moments’ when knowledge became understandable to the students. Problems were solved through reflection in action, and the students found new answers and solutions together. The problem-solving skills and creativity that the students showed are necessary to navigate challenges in practice, according to Hope and Waterman (2003). The initial stress seemed to force the students to focus, and they developed new working methods. In these situations, they put the manikins’ potential for fostering creativity and collaboration into play. This underlines the close relationship between collaborative learning and experiential learning. This relationship finds support in sociocultural learning theory, as it illustrates learning as a collective activity. In this experiential learning process, the teacher guided the students through unpredictable situations. By finding a balance between scaffolding support and safety and challenging students to move out of their comfort zones, nursing teachers can contribute to expanding students’ ZPD (Säljö, 2000; Vygotskij et al., 1978).

Another relevant aspect of stress as described is that students can experience a working context in which they must tolerate stressful and unpredictable situations, similar to the healthcare context, as DeMaria et al. (2016) suggested. For example, Scheel et al. (2021) describe healthcare as *busy, noisy, and characterised by interruptions and scarcity of time for supervision* (p.3270). The Norwegian Skills Reform (Ministry of Education and Research, 2019b) states that the most essential professional learning happens in daily practice. The individual nurse learns from being given new work tasks, facing new problems, or learning from colleagues and patients. According to Dunnington (2014), nursing education should move into a more contextual learning approach that appreciates the complexity and unpredictability of nursing practice. Therefore, by letting students cope with stress and unpredictability under controlled conditions during education, nursing education can allow students to learn under circumstances similar to clinical practice. From this reasoning, stress, uncertainty, and frustration should not be seen only as obstacles that should be eliminated but also be appreciated and recognised as learning triggers.

### **7.3 Manikins’ meaning for self-directed learning**

In Study 3, the nursing students had the responsibility and freedom to organise learning activities and take the initiative according to SDL principles (Knowles,

1975). The results show that SDL with manikins can strengthen the students' situational awareness, planning- and problem-solving skills, and decision-making. Gatewood (2019) described these skills as essential for nursing practice, and Kaulback (2020) found that SDL abilities can increase lifelong learning. In other words, the SDL style can prepare nursing students for practice. Moreover, the students became active and motivated in this SDL intervention, which can help them obtain deep learning and increased theoretical knowledge and critical thinking, as exemplified by Arizo-Luque (2022) and Özbay and Cinar (2021).

Furthermore, Study 3 exemplifies the value of inviting nursing students to plan, develop, and evaluate learning activities through action research. In addition to being a research methodology, Eikeland (2012) described action research as a learning process that can lead to knowledge of praxis. Therefore, including nursing students in EAR can be one way to obtain practice-relevant learning. In Norway, higher education aspires for students to actively participate in topics relevant to their educational programs and research. The Norwegian government has emphasised the need to facilitate learning activities comparable to activities carried out in practice (Ministry of Education and Research, 2021), and the University of Agder (UiA, 2020) aims to increase students' research participation and include them in research and the co-creation of knowledge.

Because nursing education must support students in developing the learning habits that are necessary for nursing, in line with Bjerkvik and Valeberg (2021), the education should engage the students in self-directed learning activities and invite them to participate in EAR, as described in Study 3. From such active strategies, nursing education can create an educational context similar to the reality that students will face in healthcare. In this educational context, the students can receive training in planning and organising their work and solving demanding situations, implying that they receive direct training in using lifelong learning skills. If students adapt such skills, it will also be easier to transfer and use them in the future.

The creative and active educational context allowed the students to explore and use the manikin's duality. Foremost, they used it as a patient representation in the collective learning space described in Study 2, helping them integrate psychomotor, caring, and interpersonal skills. They could play with different perspectives because they shifted between the roles of student, nurse, and patient. They also experienced how important teamwork is for patient care. Engaging students in working freely with manikins in SDL and EAR can allow

them to experience realistic learning situations, reflecting the continuous learning that they will encounter in their nursing careers. This approach enables them to learn similarly to how they must continue to learn when they start working as nurses, thereby becoming active participants in their professional learning process, and narrowing the distance between education and practice.

However, working self-directed can be challenging. Many students may need help and guidance in learning to become self-directed (Nazarianpirdosti et al., 2021; Wong et al., 2021). Studies 2 and 3 underline the importance of nursing teachers' close engagement with the students' work and reflections, as supported by Brookfield (2009). Teachers' guidance and availability for support and discussions are crucial for promoting SDL learning and the development of professional learning skills.

#### **7.4 The need and potential for expansive learning**

Some restrictions or challenges exist regarding what learning that the activity system outlined in Section 7.1 fosters. In Study 2, challenges or conflicts arose if teachers unconsciously and inconsistently related to the manikins' duality and to what they wanted to achieve with the manikins. For example, if they prematurely directed the students to meet the manikin as a patient representation, they could underestimate the students' need to use it as an object to master psychomotor skills. Moreover, if the teachers expressed contradictory expectations regarding what kind of nurse the students should enact, a conflict arose between two learning approaches in which one emphasised a technically competent nurse and the other emphasised a relationally competent nurse. In many of these challenging situations, it was unclear or random how the manikins were connected to the object of activity: how they promoted the nursing students' learning to become qualified nurses.

Another challenging aspect of the activity system is that the learning activities explored in Studies 1 and 2 were often organised in a way that restricted the students' initiative and influence in the planning and organisation of the activities. For example, the scenario simulations in Study 2 were characterised by routines, like Lavoie et al.'s (2020) descriptions of the conventional organisation of simulations. Even if scenario simulations are denoted as experiential (Amod & Brysiewicz, 2019), they are often organised and led by teachers from established frameworks, such as the INACSL standards or the NLN/Jeffries Simulation Theory (INACSL, 2016a; Jeffries et al., 2015).



From this doctoral project's results, I suggest that the objective of activity in the activity system tends to emphasise the students' learning before future patient care, with the risk of limiting the students' opportunities to understand how to relate what they learn to clinical patient care. I also argue that too strict teacher control and organisation can limit students' development of the independence and responsibility that nursing practice requires.

Considering practice-relevant learning, I argue that the activity system, as outlined, seems to be isolated within the educational arena. According to Engeström and Sannino (2021), this system lies at the second-generation level, describing the collective activity inside one system. It also resembles and is inspired by Berragan's (2013) depiction of the activity system of nursing education. There are reasons to argue that this activity system can make it demanding for nursing students to understand the role that they are expected to play in the healthcare arena, where patient work is pivotal, reaffirming the need to create learning activities that connect the educational arena and the healthcare arena.

Following Engeström (2001; 2011; 2015) and Engeström and Sannino (2010), expansive learning concerns knowledge that arises when an activity system begins to do things differently, organise in a new way, or direct its attention to a redefined object of activity. An expansive learning process presupposes a contradiction or tension that makes the subjects question an existing situation.

This thesis suggests that one pivotal contradiction is that the object of activity emphasises students' learning before future patient care. Questioning this objective may contribute to a redefined object of activity through changes in actions. Then, the activity system can also become a third-generation activity system, describing the interplay or connection between two interacting activity systems, such as education and healthcare (Engeström & Sannino, 2021). Therefore, I will explore the potential for expansive learning in the results.

Nursing education can challenge the existing object of activity in different ways. Benner et al. (2010) suggested that nursing education should focus on developing students' ability to understand situations and practical reasoning by focusing on concrete situations and examples. From this doctoral project, there are reasons to argue that manikins can be used to illustrate a patient in such situations and examples and can direct the students' actions toward a concrete patient situation, for example, in theoretical courses. Regular exposure to and use

of manikins in various activities can remind nursing students and teachers that patients are the central object of activity. Moreover, nursing teachers could emphasise the importance of mastering skills for future patients, not primarily for upcoming tests or exams. Even if it is relevant to test students' knowledge and competence, the students in Study 3 experienced that the focus on evaluations sometimes disturbed their attention to patient care. Evaluations and formalised learning objectives appear to limit their chances for exploring the practical relevance of what is taught. This is consistent with Almås's (2022) findings that reducing the emphasis on summative evaluations can relieve stress and improve performance. Although this study concerned teacher education, I found it applicable to nursing education.

Doing things in new ways or organising differently, such as in SDL activities and EAR interventions, as suggested in Section 7.3, can also give rise to a redefinition of the object of activity. If nursing education better directs educational strategies and activities toward patient care and less toward students' learning, it may, over time, help students develop practice-relevant learning skills.

Expansive learning involves pushing the boundaries of existing knowledge and structures to foster innovation, continuous learning and change within a system or social context (Engeström, 2001; 2011; 2015). This thesis indicates that a deliberate and purposeful use of manikins can help nursing students realise their learning's purpose for patients and promote lifelong learning skills. Additionally, because expansive learning triggers the development of new knowledge, students' engagement in an expansive learning process can also contribute to knowledge development in nursing practice.

## 8 Methodological discussions

This section addresses the central limitations and strengths of the doctoral project's design and conduction. In conclusion, summary remarks regarding the thesis' overall trustworthiness are made.

The design and conduction of the project influence the quality of the collected data and the subsequent results, with further implications for the thesis' overall trustworthiness (Patton, 2002; Stahl & King, 2020). Trustworthiness denotes how readers can rely on the results to reflect manikins' influence on nursing students' learning. Establishing this trustworthiness requires rigorous consideration and reporting regarding the criteria of credibility, transferability, dependability, and confirmability, according to Guba and Lincoln (1994) and Lincoln and Guba (1985). I have guided the following discussion of the methods according to these criteria. Regarding transferability, I also lean on the concept of usability, according to Kemmis (2009), asserting that the knowledge presented must serve a purpose and hold practical relevance. Although usability primarily applies to AR, the concept is relevant to this project because the results should inform and benefit nursing education (Feldman, 2007; Hope & Waterman, 2003).

This doctoral project's initial assignment was to develop new knowledge and understanding of nursing students' experiences from their learning with manikins. I regarded a qualitative design as the optimal way to elicit such knowledge and never considered a quantitative method. Combining the three qualitative methods: systematic review and thematic metasynthesis, ethnography, and educational action research, has contributed to variation, richness, and depth in the empirical material, enabling new and credible perspectives on manikins as learning tools in nursing education. The three studies were assessed and reported according to relevant quality criteria to enhance credibility and dependability.

Considering the project plan, it does not deviate essentially from the final project. Nevertheless, some adjustments became necessary during the project period. For example, Study 3 was postponed one year due to the COVID-19 pandemic since it was impossible to recruit students when their attendance was restricted. Even though this caused frustration, it facilitated the completion and maturing of the first two studies. Thus, the basis for the third study probably became more solid.

## 8.1 Study 1

Study 1 is discussed separately because it followed a different design from the two subsequent studies, and other considerations and assessments were applied.

One advantage of performing a qualitative metasynthesis was its ability to process findings from multiple qualitative research reports and provide a comprehensive understanding of nursing students' experiences from working with manikins, thus laying a solid knowledge base for the thesis. Another strength of the study is that its results shed light on all levels of the Bachelor of Nursing Education in an international context, increasing the results' usability and transferability.

When performing a metasynthesis, staying true to the intention of each primary study is pivotal. The search was designed to elicit data on manikins in general. However, the systematic review mainly detected reports of advanced manikins in scenario simulations. The reason for this is uncertain. The synthesised result must be congruent with each study's intention and findings (Sandelowski & Barroso, 2002, 2007). The credibility and confirmability of the metasynthesis depend on whether I have succeeded in bringing forward the relevant findings from each report and whether the synthesised results correspond with each report's results.

Another aspect lies in the quality of the included study reports. I conducted a rigorous and systematic quality assessment of each report. While most of the 28 reports clearly described the purpose, design, sample, and findings and discussed their findings, the methodological orientation and reflexivity reporting were weaker. Majid and Vanstone (2018) debated whether a report should be excluded from a metasynthesis due to poor reporting of the research process. However, Sandelowski and Barosso (2003, 2007) held that weak reporting of the research process is no evidence that it has been weak. Based on this, we set a high limit for excluding reports.

One pivotal challenge that followed the whole project, and Study 1, in particular, was the close relationship between manikins and simulations as an educational strategy. When investigating the literature, it was challenging to elucidate manikins' role in nursing education without considering them in the simulation context. Identifying and extracting data that related explicitly to manikins was sometimes demanding.

## **8.2 Studies 2 and 3**

Similar considerations and decisions were applied in the planning and conduction of Studies 2 and 3. I will therefore discuss the methodological limitations and strengths of these two studies.

### **8.2.1 Recruitment of field and participants**

The selection of the field and participants in Studies 2 and 3 was intended to elicit data on how nursing students' ways of working with manikins influence their learning. The most credible was exploring nursing students' use of manikins under real-life educational conditions. Both studies used a purposive strategy to recruit teachers and students who could provide insight into how nursing students work with manikins, emphasising variation and diversity (Etikan, 2016; Patton, 2002). The specific field and participants have provided access to varied data, enabling comprehensive insight and understanding of the use of manikins in nursing education.

Gaining access to the field in Study 2 was time-consuming because not all the universities I contacted used manikins during the first semester of the first study year. Some understood the word 'manikin' synonymously with simulation. It was challenging to explain that the focus of the study was manikins, not simulation. Local variations among the four campuses may have added credibility to the results due to reflecting a normal variation. These variations included, for example, the dominant learning culture and the student–teacher relationship. The students were recruited through their teachers, ensuring a standard variation in gender, age, and experience for a wide selection of participants and avoiding bias against highly engaged students. Even if the large number of participants is credible for an ethnographic study, it may limit the in-depth knowledge of single individuals (Hammersley & Atkinson, 2019; Patton, 2002).

Studying multiple sites is not necessarily an ethnographic strength (Hammersley & Atkinson, 2019; Madden, 2017). While collecting data from more locations may have enhanced the robustness of the data patterns and the results' dependability and credibility, it may also have emphasised breadth at the expense of in-depth knowledge. At the same time, the extensive data collection may have balanced this.

In Study 3, gaining access to the field was uncomplicated since it is the campus where I work as a staff member and am a doctoral candidate. The

purposive sampling strategy may have recruited only the most engaged students. Nevertheless, this study's conduct required engaged participants who were willing to contribute and share their ideas and experiences. The number of participants reflects a standard group size, which leads to usability. With a larger group, it would have been demanding to create good conditions for participation.

### **8.2.2 Data collection**

Studies 2 and 3 both employed multiple data collection methods. Using varied data collection methods may have reduced the limitations of each single method, enhancing the credibility of the results and the trustworthiness of the thesis (Guba & Lincoln, 1994; Lincoln & Guba, 1985). The data collection process was partly pre-planned and partly adjusted based on ongoing considerations and evaluations.

The time aspect must be considered in qualitative research (Hammersley & Atkinson, 2019). Both studies had a restricted timeframe for data collection. In Study 2, the restriction pertained to the duration of the sessions, and in Study 3, it applied to the course which the study was a part of. More flexible timeframes could have allowed confirmation of the data in Study 2. Following the project process through more EAR cycles could have strengthened the data in Study 3. However, I find the two cycles sufficient to show *how things can and should be done* (Kemmis & McTaggart 2008, p. 298). The results could also have been strengthened if the data on students' experiences had been collected after an extended period, for example, after six months.

A topic frequently discussed in qualitative research, especially ethnography, concerns saturation. Saturation can help define the extent of the data collection. However, saturation is not necessarily meaningful or achievable in qualitative research, and neither Hammersley and Atkinson (2019) nor Madden (2017) used this concept. Instead, the quality and depth of the data are more relevant (Crang & Cook, 2007). Nevertheless, during the data collection in Study 2, a saturation effect occurred as actions and statements were repeatedly observed and heard, according to Crang and Cook's (2007) description.

In Study 3, combining written answers, meeting recordings, and observations led to richness in points (Alvesson & Sköldbberg, 2018). The meeting recordings provided valuable and direct access to the students' discussions. I argue that the collected data enabled a credible, systematic, and dependable exploration of changes in the participants' 'sayings, doings, and

relationships' (Kemmis, 2009). Considering the two patient cases in Study 3, they were not written explicitly for this project, and the students did not experience them as optimal. The best case would be to design cases that are appropriate for this specific project.

### **8.3 Data analysis**

The three studies were built according to the same hermeneutic interpretative tradition. The three methods used were compatible with pragmatism and social constructionism, and the results were developed based on abductive principles (Timmermans & Tavory, 2022). These aspects facilitated viewing the studies together from the perspective of the thesis' aim. However, this may imply an analytic homogeneity that limits a descriptive variation, which is desirable in qualitative research.

Allowing participants to assess, evaluate, or confirm results and interpretations can lend credibility to qualitative research (Guba & Lincoln, 1994; Lincoln & Guba, 1985). In Study 2, the results were not presented to any participants. Therefore, these results mirror the researchers' interpretations. On the contrary, Madden (2017) questions whether the participants' confirmation of the results is appropriate in ethnography because the interpretations unavoidably reflect the researcher's outsider perspective, which can be foreign to the participants. The participants' contributions to the analysis in Study 3 substantially improved the credibility of the interpretations, enhancing the results' dependability and confirmability. Additionally, the participants added an insider's perspective to the project, which may have been limited by Study 2.

In the interpretive process, from data to results, I worked to ensure that my ideas and reasoning aligned with and were rooted in the empirical data. The relationship between the data and results was maintained and described through quotations in the three papers. These quotes depict the participants' views and enhance the credibility of the interpretations.

### **8.4 Overall trustworthiness**

According to the pragmatic and social constructionism perspective, knowledge must be considered a relative, social, and human product. Knowledge is trustworthy to the extent that it is usable, appropriate, and credible in a specific context (Guba & Lincoln, 1994; Tavory and Timmermanns, 2014). The thesis' results and conclusions are generated from data collected in specific and unique

social situations (Alvesson & Sköldberg, 2018). This strengthens the trustworthiness of the thesis, since the three studies' results reinforce each other and point in the same direction.

The overall trustworthiness of this thesis can be defined by its transferability and usability in practice (Kemmis, 2009). The project was conducted in actual nursing education contexts and illuminates all levels of bachelor's nursing education, enhancing the results' transferability and usability for educational practice. I believe that the students' spontaneous reactions to the manikins fundamentally mirror the meeting between humans and technology. For this reason, the results may be recognisable and relevant in other contexts in which manikins are used. Even though the project was conducted in Norway and most data were collected within Norwegian nursing education, the results and conclusions can be transferable to and usable in nursing education internationally. For example, the thesis' emphasis on using simple manikins and alternative learning strategies can increase the results' usability to contexts with fewer resources, equipment, and facilities than the Norwegian.

The theoretical frameworks applied influenced the knowledge developed and the conclusions drawn. Other theoretical perspectives could have been suitable for exploring the meaning of manikins in nursing education. I have experienced sociocultural theory and cultural-historical activity theory as useful perspectives that have directed the project in a fruitful way. I argue that this thesis offers trustworthy knowledge and an understanding of how manikins influence nursing students' learning based on the given theoretical and methodological perspectives.



## **9 Conclusions and implications**

This thesis contributes new knowledge and an in-depth understanding of how manikins influence nursing students' learning, which can guide nursing education in developing educational strategies that support practice-relevant learning.

### **9.1 Conclusions**

Human-looking full-bodied manikins are not neutral patient substitutes, but complex and dynamic learning tools that nursing education must use with awareness.

Beyond confirming that manikins play a dual role as objects and patient representations, this thesis demonstrates how this duality can mediate an understanding of nursing that encompasses both technical and caring dimensions. Working with manikins can provide opportunities to integrate psychomotor skills and caring and communicative competence, independent of how technologically advanced the manikin is.

Manikins' human resemblance gives nursing students a sense of patient presence that encourages them to explore and experiment with the various dimensions of the nursing role. It also triggers the students to create simulated situations together in which they act like nurses attending to a patient. Moreover, the manikins' human appearance invites nursing students to immerse themselves in the patient role. This immersion aids in understanding the patient's situation, promotes interpersonal competence, and provides insight into the importance of individualised patient care.

Working with manikins is a profoundly social and collective activity. Manikins' presence stimulates discussions and reflection in action, teamwork, and collaboration. These aspects are substantial for problem-solving and decision-making in healthcare and professional nurses' continuous learning and development.

Manikins also show potential for fostering creativity, experimentation, and motivation. By collaborating with manikins in unpredictable or unclear situations, nursing students can put this potential into play, train their problem-solving abilities, and develop solutions, illustrating experiential learning.

This thesis demonstrates that manikins can serve as learning mediators in self-directed learning, educational action research, and other strategies in which

nursing students must demonstrate initiative, planning, and decision-making. In the context of such strategies, the students engage in a learning environment that mirrors how they must continue to work and learn as nurses within the healthcare arena. In these situations, the manikin illustrates a specific patient who attracts attention, becomes a common focal point, fosters discussions, and illustrates theoretical knowledge. This provides nursing students with practice-relevant experiences and may equip them to meet the responsibilities of healthcare.

This thesis highlights the value of facilitating practice-relevant learning in early nursing education. With simple means and methods, nursing students can actively work and learn in a manner that resembles how professionals work and learn in healthcare, establishing a foundation for lifelong, continuous learning that can bring the educational arena closer to the healthcare arena. This thesis underscores the role that manikins can play in establishing practice-relevant learning conditions and supporting the development of lifelong learning skills.

## **9.2 Implications for nursing education**

This thesis may inspire nursing teachers to rethink what manikins are and how they can be used in education. Understanding manikins' duality, an aware and targeted use, and a clearly articulated purpose for using a manikin is necessary for effectively implementing them.

By introducing nursing students to different manikins early, providing training in operating them, and giving access to freely use manikins in self-training, nursing education can release the collective and explorative learning potentials that lie in the use of manikins. In this context, there is a need to acknowledge the value of spontaneous simulations among the students.

Regular exposure to and use of manikins in various educational activities can strengthen an awareness of patient care as the core of nursing. Nursing teachers can use manikins to direct students' thinking toward a patient and stimulate critical reflections and discussions about the varied aspects of nursing. The thesis also encourages more frequent use of simple manikins, such as for support in theoretical courses and activities.

This thesis challenges nursing education to organise and design more self-directed and student-active learning strategies. In this regard, manikins can be a resource. Developing learning activities in which students creatively use manikins can strengthen and support their experiential and experimental learning. However, teachers' presence and support are pivotal in self-directed learning.

Guiding nursing students in dealing with stress and unpredictability is especially relevant for managing healthcare. By using manikins in various educational activities, nursing teachers can empower nursing students to take responsibility for their professional development and lifelong learning.

### **9.3 Implications for future research**

With this thesis, I wish to stimulate continuous research and knowledge development on the underlying basis of nursing education.

This thesis elicits a need for more profound knowledge about how the various educational tools used in nursing education influence educational practice and learning. This thesis exemplifies how one such tool, manikins, can be explored.

Although manikins are commonly used in various learning activities, there remains a gap in the knowledge of manikins as learning tools for nursing students' learning. There is also limited knowledge and understanding about simple manikins and how students can use them. Therefore, there is a need for targeted research to develop knowledge of the potential for using human-looking manikins, especially the simplest ones.

Future research should investigate the spontaneous simulations that this thesis has found to take place among students when they work with manikins. There is a need to explore the nature of these simulations and to develop knowledge about what and how students learn from them. It will also be necessary to learn what transfer value this kind of simulation has for practice. Here, both qualitative and quantitative research will be suitable.

Performing action research in nursing education can create relevant, practical, and usable knowledge. Engaging and collaborating with nursing students in research can provide dual benefits by enhancing their learning and advancing the educational knowledge base.

Moreover, the research field is responsible for participating with knowledge in the debate surrounding the relationship between simulation and practical studies in nursing education. Future research should critically investigate how simulation and practical studies can complement, rather than only replace, each other in a way that can bring about positive changes in the education of competent nurses who can provide and enhance secure patient care.



## References

- Adelman, C. (1993). Kurt Lewin and the origins of action research. *Educational Action Research*, 1(1), 7–24. <https://doi.org/10.1080/0965079930010102>
- Aebersold, M. (2018). Simulation-based learning: No longer a novelty in undergraduate education. *Online Journal of Issues in Nursing*, 23. <https://doi.org/10.3912/OJIN.Vol23No02PPT39>
- Agar, M. H. (2008). *The Professional Stranger: An Informal Introduction to Ethnography* (2<sup>nd</sup>. ed.). Emerald.
- UiA, University of Agder (2020). *Strategy 2021–2024*. <https://www.uia.no/en/about-uia/organisation/strategy-2021-2024>
- Ahn, S. E., & Rimpiläinen, S. (2018). Maintaining Sofia - or how to reach the intended learning outcomes during a medical simulation training. *International Journal of Learning Technology*, 13(2), 115. <https://doi.org/10.1504/ijlt.2018.092095>
- Al-Ghareeb, A., McKenna, L., & Cooper, S. (2019). The influence of anxiety on student nurse performance in a simulated clinical setting: A mixed methods design. *International Journal of Nursing Studies*, 98, 57–66. <https://doi.org/10.1016/j.ijnurstu.2019.06.006>
- Almås, L. K. (2022). Korleis verkar karakterdempa vurdering i norsk inn på læringa til elevane? [How does grade-moderated assessment in Norwegian affect the students' learning?]. In M. Ulvik, H. Riese, & D. Roness (Eds.), *Å Forske På Egen Praksis: Aksjonsforskning og Andre Tilnærminger til Profesjonell Utvikling i Utdanningsfeltet [Researching One's Own Practice: Action Research and Other Approaches to Professional Development in The Field of Education]* (2<sup>nd</sup> ed., pp. 241–263). Fagbokforlaget.
- Alshehri, F. D., Jones, S., & Harrison, D. (2023). The effectiveness of high-fidelity simulation on undergraduate nursing students' clinical reasoning-related skills: A systematic review. *Nurse Education Today*, 121. <https://doi.org/10.1016/j.nedt.2022.105679>
- Alvesson, M., & Sköldberg, K. (2018). *Reflexive Methodology: New Vistas for Qualitative Research* (3<sup>rd</sup> ed.). SAGE.
- Alvsvåg, H. (2022). *Å Tenke Sykepleiefaglig: Essay i Utvalg [To Think Nursing Professionally: Selected Essay]*. Bergen, Fagbokforlaget.
- Amod, H. B., & Brysiewicz, P. (2019). Promoting experiential learning through the use of high-fidelity human patient simulators in midwifery: A qualitative study. *Curationis*, 42(1), 1–7. <https://doi.org/10.4102/curationis.v42i1.1882>
- Arizo-Luque, V., Ramirez-Baena, L., Pujalte-Jesus, M. J., Rodriguez-Herrera, M. A., Lozano-Molina, A., Arrogante, O., & Diaz-Agea, J. L. (2022). Does self-directed learning with simulation improve critical thinking and motivation of nursing students? A pre-post intervention study with the MAES© Methodology. *Healthcare*, 10(5). <https://doi.org/https://dx.doi.org/10.3390/healthcare10050927>

- Ashley, J., & Stamp, K. (2014). Learning to think like a nurse: the development of clinical judgment in nursing students. *Journal of Nursing Education*, 53(9), 519–525. <https://doi.org/10.3928/01484834-20140821-14>
- Bailey, L., & Emory, J. (2022). High-fidelity simulation improves confidence in nursing students. *Teaching & Learning in Nursing*, 17(2), 191–194. <https://doi.org/10.1016/j.teln.2021.12.004>
- Bandura, A. (1997). *Self-Efficacy: The Exercise of Control*. New York, Freeman.
- Benner, P. (1984). *From Novice to Expert: Excellence and Power in Clinical Nursing Practice*. California, Addison-Wesley.
- Benner, P., Sutphen, M., Leonard, V., & Day, L. (2010). *Educating Nurses: A Call for Radical Transformation*. California, Jossey-Bass.
- Berragan, L. (2013). Conceptualising learning through simulation: An expansive approach for professional and personal learning. *Nurse Education in Practice*, 13(4), 250–255. <https://doi.org/10.1016/j.nepr.2013.01.004>
- Bjerkvik, L. K., Tschudi-Madsen, C., & Valeberg, B. T. (2022). Nyutdannet sykepleier, - forventninger og utfordringer i møte med yrkesrollen [Newly qualified nurse, - expectations and challenges in meeting the professional role]. *Nordisk Tidsskrift for Helseforskning*, 18. <https://doi.org/10.7557/14.5744>
- Bjerkvik, L. K., & Valeberg, B. T. (2021). Forberedt for yrkesrollen? - En spørreundersøkelse om egenvurdert kompetanse blant nyutdannede sykepleiere [Prepared for the professional role? - A survey on self-assessed competence among newly qualified nurses]. *Nordisk Sygeplejeforskning*, 11(3), 221–234. <https://doi.org/10.18261/issn.1892-2686-2021-03-05>
- Blake, T., & Blake, T. (2019). Improving therapeutic communication in nursing through simulation exercise. *Teaching & Learning in Nursing*, 14(4), 260–264. <https://doi.org/10.1016/j.teln.2019.06.003>
- Boostel, R., Felix, J. V. C., Bortolato-Major, C., Pedrolo, E., Vayego, S. A., & Mantovani, M. F. (2018). Stress of nursing students in clinical simulation: a randomized clinical trial. *Revista Brasileira de Enfermagem*, 71(3), 967–974. <https://doi.org/10.1590/0034-7167-2017-0187>
- Bradbury, H., Glenzer, K., Ku, B., Columbia, D., Kjellström, S., Aragón, A. O., Warwick, R., Traeger, J., Apgar, M., Friedman, V., Hsia, H. C., Lifvergren, S., & Gray, P. (2019). What is good action research: Quality choice points with a refreshed urgency. *Action Research*, 17(1), 14–18. <https://doi.org/10.1177/1476750319835607>
- Bramer, W., & Bain, P. (2017). Updating search strategies for systematic reviews using EndNote. *Journal of the Medical Library Association*, 105(3). <https://doi.org/10.5195/jmla.2017.183>
- Braun, V., & Clarke, V. (2022). *Thematic Analysis: A Practical Guide*. California SAGE.
- Brookfield, S. D. (2009). Self-Directed Learning. In R. Maclean & D. Wilson (Eds.), *International Handbook of Education for the Changing World of Work* (pp. 2615–2627). Dordrecht, Springer. [https://doi.org/10.1007/978-1-4020-5281-1\\_172](https://doi.org/10.1007/978-1-4020-5281-1_172)

- Brydon-Miller, M., & Ortiz Aragón, A. (2018). The 500 hats of the Action researcher. In J. Andersen, A. Bilfeldt, M. S. Jørgensen, & K. A. Perry (Eds.), *Den Ufærdige Fremtid: Aktionsforskningens Potentialer og Udfordringer [The Unfinished Future: The Potentials and Challenges of Action Research]* (pp. 19–47). Aalborg, Universitetsforlag.
- Bumbach, M. D., Culross, B. A., & Datta, S. K. (2022). Assessing the financial sustainability of high-fidelity and virtual reality simulation for nursing education: A retrospective case analysis. *CIN: Computers, Informatics, Nursing*, 40(9).  
[https://journals.lww.com/cinjjournal/Fulltext/2022/09000/Assessing\\_the\\_Financial\\_Sustainability\\_of.6.aspx](https://journals.lww.com/cinjjournal/Fulltext/2022/09000/Assessing_the_Financial_Sustainability_of.6.aspx)
- Campbell, J. (2015). A history of pragmatism. In S. Pihlström (Ed.), *The Bloomsbury Companion to Pragmatism* (pp. 64–78). London, Bloomsbury Academic.  
<https://search.ebscohost.com/login.aspx?direct=true&db=e000xww&AN=2298958&site=ehost-live>
- Cantrell, M. L., Meyer, S. L., & Mosack, V. (2017). Effects of simulation on nursing student stress: An integrative review. *Journal of Nursing Education*, 56(3), 139–144.  
<https://doi.org/https://doi.org/10.3928/01484834-20170222-04>
- Carr, W., & Kemmis, S. (1986). *Becoming Critical: Education, Knowledge, and Action Research*. Falmer Press.
- Carrero-Planells, A., Pol-Castañeda, S., Alamillos-Guardiola, M. C., Prieto-Alomar, A., Tomás-Sánchez, M., & Moreno-Mulet, C. (2021). Students and teachers' satisfaction and perspectives on high-fidelity simulation for learning fundamental nursing procedures: A mixed-method study. *Nurse Education Today*, 104. <https://doi.org/10.1016/j.nedt.2021.104981>
- Christiansen, B., Heggen, K., & Karseth, B. (2004). *Klinikk og Akademia: Reformer, Rammer og Roller i Sykepleierutdanning [Clinic and Academia: Reforms, Frameworks and Roles in Nursing Education]*. Oslo, Universitetsforlaget.
- Clarivate EndNote™. *EndNoteX9*. <https://endnote.com/?language=en>
- Coffey, A. (2018). *Doing Ethnography* (Second ed.). SAGE Publications.
- Cole, M., & Derry, J. (2005). We have met technology and it is us. In R. J. Sternberg & D. D. Preiss (Eds.), *Intelligence and Technology: The Impact of Tools on the Nature and Development of Human Abilities* (pp. 209–227). New York, Routledge.
- Cooper, J. B., & Taqueti, V. R. (2004). A brief history of the development of mannequin simulators for clinical education and training. *Quality & Safety in Health Care*, 13, i11–i18.  
<https://doi.org/http://dx.doi.org/10.1136/qshc.2004.009886>
- Cowperthwait, A. (2020). NLN/Jeffries Simulation Framework for Simulated Participant Methodology. *Clinical Simulation in Nursing*, 42, 12–21.  
<https://doi.org/10.1016/j.ecns.2019.12.009>
- Crang, M., & Cook, I. (2007). *Doing Ethnographies*. Sage.

- Currie, J., & Heslop, D. (2022). Playing sick and injured: The experiences of undergraduate nurses as casualty actors in a mass casualty simulation exercise. *Clinical Simulation in Nursing*, 62, 73–82. <https://doi.org/https://doi.org/10.1016/j.ecns.2021.08.005>
- Davies, H., Schultz, R., Sundin, D., & Jacob, E. (2020). ‘Ward for the day’: A case study of extended immersive ward-based simulation. *Nurse Education Today*, 90. <https://doi.org/10.1016/j.nedt.2020.104430>
- De Weerd, S., Hovelynck, J., & Dewulf, A. (2009). A closer look at learning in and around simulations: a perspective of experiential learning. In P. Dieckmann (Ed.), *Using simulations for Education, Training and Research* (pp. 139–156). Lengerich, Pabst Science Publishers
- DeMaria, S., Silverman, E. R., Lapidus, K. A. B., Williams, C. H., Spivack, J., Levine, A., & Goldberg, A. (2016). The impact of simulated patient death on medical students’ stress response and learning of ACLS. *Medical Teacher*, 38(7), 730–737. <https://doi.org/10.3109/0142159X.2016.1150986>
- Dewey, J. (1997). *How We Think*. New York, Dover Publ.
- Díaz-Agea, J. L., Manresa-Parres, M., Pujalte-Jesús, M. J., Soto-Castellón, M. B., Aroca-Lucas, M., Rojo-Rojo, A., & Leal-Costa, C. (2022). What do I take home after the simulation? The importance of emergent learning outcomes in clinical simulation. *Nurse Education Today*, 109. <https://doi.org/10.1016/j.nedt.2021.105186>
- Díaz-Agea, J. L., Pujalte-Jesús, M. J., Leal-Costa, C., García-Méndez, J. A., Adánez-Martínez, M. G., & Jiménez-Rodríguez, D. (2021). Motivation: bringing up the rear in nursing education. Motivational elements in simulation. The participants' perspective. *Nurse Education Today*, 103. <https://doi.org/10.1016/j.nedt.2021.104925>
- Dieckmann, P., Gaba, D., & Rall, M. (2007). Deepening the theoretical foundations of patient simulation as social practice. *Simulation in Healthcare: Journal of the Society for Simulation in Healthcare*, 2(3), 183–193. <https://doi.org/10.1097/sih.0b013e3180f637f5>
- Dix, S., Morphet, J., Jones, T., Kiprillis, N., O'Halloran, M., Piper, K., & Innes, K. (2021). Perceptions of final year nursing students transfer of clinical judgement skills from simulation to clinical practice: A qualitative study. *Nurse Education in Practice*, 56. <https://doi.org/10.1016/j.nepr.2021.103218>
- Dunnington, R. M. (2014). The nature of reality represented in high fidelity human patient simulation: philosophical perspectives and implications for nursing education. *15*(1), 14–22. <https://doi.org/10.1111/nup.12034>
- Edwards, S., Lee, M., & Sluman, K. (2018). Student-led simulation: preparing students for leadership. *Nursing Management*. <https://doi.org/https://dx.doi.org/10.7748/nm.2018.e1778>
- Ehrenberg, A. C., & Häggblom, M. (2007). Problem-based learning in clinical nursing education: Integrating theory and practice. *Nurse Education in Practice*, 7(2), 67–74. <https://doi.org/10.1016/j.nepr.2006.04.005>



- Eikeland, O. (2012). Action research: Applied research, intervention research, collaborative research, practitioner research, or praxis research? *International Journal of Action Research*, 8(1), 9–44. [https://doi.org/10.1688/1861-9916\\_IJAR\\_2012\\_01\\_Eikeland](https://doi.org/10.1688/1861-9916_IJAR_2012_01_Eikeland)
- Elliott, J. (1991). *Action Research for Educational Change*. Open University Press.
- Engeström, Y. (1987). *Learning by Expanding: An Activity-Theoretical Approach to Developmental Research*. Cambridge University Press.
- Engeström, Y. (1999). Innovative learning in work teams: Analyzing cycles of knowledge creation in practice. In Y. Engeström, R. Miettinen, & R.-L. Punamäki (Eds.), *Perspectives on Activity Theory* (pp. 377–404). Cambridge, Cambridge University Press
- Engeström, Y. (2001). Expansive learning at work: Toward an activity theoretical reconceptualization. *Journal of Education and Work*, 14(1), 133–156. <https://doi.org/10.1080/13639080020028747>
- Engeström, Y. (2011). From design experiments to formative interventions. *Theory & Psychology*, 21(5), 598–628. <https://doi.org/10.1177/0959354311419252>
- Engeström, Y. (2015). *Learning by Expanding: An Activity-Theoretical Approach to Developmental Research* (2<sup>nd</sup> ed.). Cambridge University Press.
- Engeström, Y., & Sannino, A. (2010). Studies of expansive learning: Foundations, findings and future challenges. *Educational Research Review*, 5(1), 1–24. <https://doi.org/10.1016/j.edurev.2009.12.002>
- Engeström, Y., & Sannino, A. (2021). From mediated actions to heterogenous coalitions: four generations of activity-theoretical studies of work and learning. *Mind, Culture, and Activity*, 28(1), 4–23. <https://doi.org/10.1080/10749039.2020.1806328>
- Engeström, Y., & Toiviainen, H. (2011). Co- configurational design of learning instrumentalities: an activity- theoretical perspective. In S. Ludvigsen, A. Lund, I. Rasmussen, & R. Säljö (Eds.), *Learning Across Sites. New Tools, Infrastructures and Practices* (pp. 33–52). London, Routledge.
- Etikan, I. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, 5(1). <https://doi.org/10.11648/j.ajtas.20160501.11>
- Eyikara, E., & Baykara, Z. G. (2018). Effect of simulation on the ability of first year nursing students to learn vital signs. *Nurse Education Today*, 60, 101–106. <https://doi.org/10.1016/j.nedt.2017.09.023>
- Feldman, A. (2007). Validity and quality in action research. *Educational Action Research*, 15(1), 21–32. <https://doi.org/10.1080/09650790601150766>
- Fenzi, G., Díaz-Agea, J. L., Pethick, D., Bertolin-Delgado, R., Hernandez-Donoso, N., & Lorente-Corral, L. (2022). An undergraduate interprofessional experience with self-learning methodology in simulation environment (MAES©): A qualitative study. *Nursing Reports*, 12(3), 446–463. <https://doi.org/10.3390/nursrep12030043>

- Foster, M., Gilbert, M., Hanson, D., Whitcomb, K., & Graham, C. (2019). Use of simulation to develop teamwork skills in relicensure nursing students: An integrative review. *Nurse Educator*, 44(5), E7–E11.  
<https://doi.org/10.1097/NNE.0000000000000616>
- Frandsen, M. S. (2018). Sociale læreprocesser - John Deweys pragmatisme som udgangspunkt for aktionsforskning [Social Learning Processes - John Dewey's Pragmatism as a Starting Point for Action Research]. In A. Bilfeldt, M. S. Jørgensen, J. Andersen, & K. Perry (Eds.), *Den Ufærdige Fremtid - Aktionsforskningens Potentialer og Udfordringer [The Unfinished Future - Action Research's Potential and Challenges]* (pp. 69–99). Aalborg Universitet.
- Gaba, D. M. (2004). The future vision of simulation in health care. *Quality and Safety in Health Care*, 13, i2–i10.  
<https://doi.org/10.1136/qshc.2004.009878>
- Gadamer, H.-G. (2004). *Truth and Method* (2<sup>nd</sup> revised ed.). Continuum.
- Gardner, L. (2012). From Novice to Expert: Benner's legacy for nurse education. *Nurse Education Today*, 32(4), 339–340.  
<https://doi.org/10.1016/j.nedt.2011.11.011>
- Gatewood, E. (2019). Use of simulation to increase self-directed learning for nurse practitioner students. *Journal of Nursing Education*, 58(2), 102–106. <https://doi.org/10.3928/01484834-20190122-07>
- Gjøtterud, S. (2020). Forskning i egen undervisningspraksis i høyere utdanning [Research into own teaching practice in higher education]. In S. Gjøtterud, H. Hiim, D. Husebø, & L. H. Jensen (Eds.), *Aksjonsforskning i Norge, Volum 2: Grunnlagstenkning, Forskerroller og Bidrag til Endring i Ulike Kontekster [Action Research in Norway, Volume 2: Basic Thinking, Researcher Roles and Contribution to Change in Different Contexts]* (Vol. 2, pp. 225–251). Cappelen Damm Akademisk.
- Groot, F., Jonker, G., Rinia, M., Ten Cate, O., & Hoff, R. G. (2020). Simulation at the frontier of the Zone of Proximal Development: A test in acute care for inexperienced learners. *Academic Medicine*, 95(7), 1098–1105.  
<https://doi.org/10.1097/acm.0000000000003265>
- Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of Qualitative Research*. (pp. 105–117). Sage Publications, Inc.
- Hammersley, M., & Atkinson, P. (2019). *Ethnography: Principles in Practice* (4th ed.). Routledge.
- Hanshaw, S. L., & Dickerson, S. S. (2020). High fidelity simulation evaluation studies in nursing education: A review of the literature. *Nurse Education in Practice*, 46. <https://doi.org/10.1016/j.nepr.2020.102818>
- Hayden, J. K., Smiley, R. A., Alexander, M., Kardong-Edgren, S., & Jeffries, P. R. (2014). The NCSBN national simulation study: A longitudinal, randomized, controlled study replacing clinical hours with simulation in prelicensure nursing education. *Journal of Nursing Regulation*, 5(2), S3–S40. [https://doi.org/10.1016/s2155-8256\(15\)30062-4](https://doi.org/10.1016/s2155-8256(15)30062-4)

- Hiemstra, R. (1994). Self-Directed Learning. In T. Husen & T. N. Postlethwaite (Eds.), *The International Encyclopedia of Education* (2<sup>nd</sup> ed.). Pergamon Press.
- Hope, K. W., & Waterman, H. A. (2003). Praiseworthy pragmatism? Validity and action research. *Journal of Advanced Nursing*, 44(2), 120–127. <https://doi.org/10.1046/j.1365-2648.2003.02777.x>
- Hopwood, N., Rooney, D., Boud, D., & Kelly, M. (2016). Simulation in higher education: A sociomaterial view. *Educational Philosophy and Theory*, 48(2), 165–178. <https://doi.org/10.1080/00131857.2014.971403>
- INACSL. (2016a). INACSL Standards of Best Practice: Simulation<sup>SM</sup> Simulation Design. *Clinical Simulation in Nursing*, 12, S5–S12. <https://doi.org/https://doi.org/10.1016/j.ecns.2016.09.005>
- INACSL. (2016b). INACSL Standards of Best Practice: Simulation<sup>SM</sup> Simulation Glossary. 12, S39–S47. <https://doi.org/https://doi.org/10.1016/j.ecns.2016.09.012>
- QSR International. (2018). *NVivo Qualitative Data Analysis Software (Version 12)*. <https://www.qsrinternational.com/nvivo-qualitative-data-analysis-software/home>
- Ireland, A. V. (2017). Simulated human patients and patient-centredness: The uncanny hybridity of nursing education, technology, and learning to care. *Nursing Philosophy*, 18(1). <https://doi.org/10.1111/nup.12157>
- Jarden, R. J., Jarden, A., Weiland, T. J., Taylor, G., Brockenshire, N., & Gerdtz, M. (2021). Registered Nurses' experiences of psychological well-being and ill-being in their first year of practice: A qualitative meta-synthesis. *Journal of Advanced Nursing*, 77(3), 1172–1187. <https://doi.org/10.1111/jan.14667>
- Jeffries, P. R., Bigley, M. B., McNelis, A. M., Cartier, J. M., Williams, D. B., Pintz, C., Slaven-Lee, P. W., & Zychowicz, M. E. (2019). A call to action: Building evidence for use of simulation in nurse practitioner education. *Journal of the American Association of Nurse Practitioners*, 31(11), 627–632. <https://doi.org/10.1097/JXX.0000000000000335>
- Jeffries, P. R., Rodgers, B., & Adamson, K. (2015). NLN Jeffries Simulation Theory: Brief narrative description. *Nursing Education Perspectives*, 36(5), 292–293. [https://journals.lww.com/neponline/Fulltext/2015/09000/NLN\\_Jeffries\\_Simulation\\_Theory\\_Brief\\_Narrative.4.aspx](https://journals.lww.com/neponline/Fulltext/2015/09000/NLN_Jeffries_Simulation_Theory_Brief_Narrative.4.aspx)
- Johnson, E. (2009). Extending the simulator: Good practice for instructors using medical simulators. In P. Dieckmann (Ed.), *Using Simulators and Simulations for Education, Training and Research* (pp. 180–201). Pabst.
- Karabacak, U., Unver, V., Ugur, E., Kocatepe, V., Ocaktan, N., Ates, E., & Uslu, Y. (2019). Examining the effect of simulation based learning on self-efficacy and performance of first-year nursing students. *Nurse Education in Practice*, 36, 139–143. <https://doi.org/10.1016/j.nepr.2019.03.012>

- Kaulback, M. K. (2020). Correlating self-directed learning abilities to lifelong learning orientation in baccalaureate nursing students. *Nurse Educator*, 45(6), 347–351. <https://doi.org/10.1097/nne.0000000000000803>
- Keith, A. C., Warshawsky, N., & Talbert, S. (2021). Factors that influence millennial generation nurses' intention to stay: An integrated literature review. *The Journal of Nursing Administration*, 51(4), 220–226. <https://doi.org/https://doi.org/10.1097/NNA.0000000000001001>
- Kemmis, S. (2006). Participatory action research and the public sphere. *Educational Action Research*, 14(4), 459–476. <https://doi.org/10.1080/09650790600975593>
- Kemmis, S. (2009). Action research as a practice-based practice. *Educational Action Research*, 17(3), 463–474. <https://doi.org/10.1080/09650790903093284>
- Kemmis, S., & McTaggart, R. (2008). Participatory action research: communicative actions and the public sphere. In N. K. Denzin & Y. S. Lincoln (Eds.), *Strategies of Qualitative Inquiry* (3<sup>rd</sup> ed., pp. 271–330). Sage Publications. Thousand Oaks.
- Kerr, D., Ratcliff, J., Tabb, L., & Walter, R. (2020). Undergraduate nursing student perceptions of directed self-guidance in a learning laboratory: An educational strategy to enhance confidence and workplace readiness. *Nurse Education in Practice*, 42. <https://doi.org/https://dx.doi.org/10.1016/j.nepr.2019.102669>
- Keskitalo, T., & Ruokamo, H. (2020). Exploring learners' emotions and emotional profiles in simulation-based medical education. *Australasian Journal of Educational Technology*, 15–26. <https://doi.org/10.14742/ajet.5761>
- Kim, J., Park, J.-H., & Shin, S. (2016). Effectiveness of simulation-based nursing education depending on fidelity: a meta-analysis. *BMC Medical Education*, 16(1). <https://doi.org/10.1186/s12909-016-0672-7>
- Kim, Y.-J., & Yoo, J.-H. (2020). The utilization of debriefing for simulation in healthcare: A literature review. *Nurse Education in Practice*, 43. <https://doi.org/10.1016/j.nepr.2020.102698>
- Kim, Y.-J., & Yoo, J.-H. (2022). Effects of manikin fidelity on simulation-based nursing education: A systematic review and meta-analysis. *Journal of Nursing Education*, 61(2), 67–72. <https://doi.org/10.3928/01484834-20211213-03>
- Kirkevold, M. (2022). *Fem endringer kan forbedre sykepleierutdanningen [Five changes for better nursing education]* [Debate post]. <https://sykepleien.no/meninger/2022/05/fem-endringer-kan-forbedre-sykepleierutdanningen>
- Knowles, M. (1975). *Self-Directed learning: A Guide for Learners and Teachers*. New York: Association Press.

- Kolbe, M., Eppich, W., Rudolph, J., Meguerdichian, M., Catena, H., Cripps, A., Grant, V., & Cheng, A. (2020). Managing psychological safety in debriefings: a dynamic balancing act. *BMJ Simulation & Technology Enhanced Learning*, 6(3), 164–171. <https://doi.org/10.1136/bmjstel-2019-000470>
- Laerdal Medical. Retrieved 08.09.2023 from <https://laerdal.com/>
- Lapkin, S., Levett-Jones, T., Bellchambers, H., & Fernandez, R. (2010). Effectiveness of patient simulation manikins in teaching clinical reasoning skills to undergraduate nursing students: A systematic review. *Clinical Simulation in Nursing*, 6(6), e207–e222. <https://doi.org/10.1016/j.ecns.2010.05.005>
- Lave, J., & Wenger, E. (1991). *Situated Learning: Legitimate Peripheral Participation*. Cambridge University Press.
- Lavoie, P., & Clarke, S. P. (2017). Simulation in nursing education. *Nursing*, 47(7), 18–20. <https://doi.org/10.1097/01.nurse.0000520520.99696.9a>
- Lavoie, P., Deschênes, M.-F., Nolin, R., Bélisle, M., Blanchet Garneau, A., Boyer, L., Lapierre, A., & Fernandez, N. (2020). Beyond technology: A scoping review of features that promote fidelity and authenticity in simulation-based health professional education. *Clinical Simulation in Nursing*, 42, 22–41. <https://doi.org/10.1016/j.ecns.2020.02.001>
- Lawrence, K., Messias, D. K. H., Estrada, R. D., & Long, V. (2018). Peer teaching in high-fidelity simulation: participant experiences and reflections. *Nurse Educator*, 43(6), 312–316. <https://doi.org/10.1097/NNE.0000000000000540>
- Lee, J., & Oh, P. J. (2015). Effects of the use of high-fidelity human simulation in nursing education: A meta-analysis. *Journal of Nursing Education*, 54(9), 501–507. <https://doi.org/10.3928/01484834-20150814-04>
- Lee, J. J., Yeung, K. C. Y., Clarke, C. L., & Yoo, J. (2019). Nursing students' learning dynamics and perception of high-fidelity simulation-based learning. *Clinical Simulation in Nursing*, 33, 7–16. <https://doi.org/10.1016/j.ecns.2019.04.008>
- Leighton, K., Kardong-Edgren, S., & Gilbert, G. E. (2021). Are traditional and simulated clinical environments meeting nursing students' learning needs? *Clinical Simulation in Nursing*, 59, 85–93. <https://doi.org/10.1016/j.ecns.2021.06.003>
- Levett-Jones, T., Cant, R., & Lapkin, S. (2019). A systematic review of the effectiveness of empathy education for undergraduate nursing students. *Nurse Education Today*, 75, 80–94. <https://doi.org/10.1016/j.nedt.2019.01.006>
- Levett-Jones, T. L. (2005). Self-directed learning: Implications and limitations for undergraduate nursing education. *Nurse Education Today*, 25(5), 363–368. <https://doi.org/https://doi.org/10.1016/j.nedt.2005.03.003>
- Li, Y. Y., Au, M. L., Tong, L. K., Ng, W. I., & Wang, S. C. (2022). High-fidelity simulation in undergraduate nursing education: A meta-analysis. *Nurse Education Today*, 111. <https://doi.org/10.1016/j.nedt.2022.105291>

- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic Inquiry*. Sage, Thousands Oaks.
- Ludvigsen, M. S., Hall, E. O. C., Meyer, G., Fegran, L., Aagaard, H., & Uhrenfeldt, L. (2016). Using Sandelowski and Barroso's Meta-Synthesis Method in Advancing Qualitative Evidence. *Qualitative Health Research*, 26(3), 320–329. <https://doi.org/10.1177/1049732315576493>
- Ludvigsen, S., Lund, A., Rasmussen, I., & Säljö, R. (2011). *Learning Across Sites: New Tools, Infrastructures and Practices*. Routledge.
- Madden, R. (2017). *Being Ethnographic: A Guide to the Theory and Practice of Ethnography* (2nd ed.). Sage Publications Ltd. <https://doi.org/https://dx.doi.org/10.4135/9781529716689>
- Madsgaard, A., Smith-Strom, H., Hunskar, I., & Roykenes, K. (2022). A rollercoaster of emotions: An integrative review of emotions and its impact on health professional students' learning in simulation-based education. *Nursing Open*, 9(1), 108–121. <https://doi.org/https://dx.doi.org/10.1002/nop2.1100>
- Magee, D., Bramble, M., & Stanley, D. (2020). Expanding an Action Research framework for an evidence based mentoring program in nursing: an exploration of cooperative inquiry. *Educational Action Research*, 28(4), 597–608. <https://doi.org/10.1080/09650792.2019.1636695>
- Majid, U., & Vanstone, M. (2018). Appraising qualitative research for evidence syntheses: A compendium of quality appraisal tools. *Qualitative Health Research*, 28(13), 2115–2131. <https://doi.org/10.1177/1049732318785358>
- Maran, N. J., & Glavin, R. J. (2003). Low- to high-fidelity simulation – a continuum of medical education? *Medical Education*, 37(s1), 22–28. <https://doi.org/10.1046/j.1365-2923.37.s1.9.x>
- Mathisen, J. (2006). *Sykepleiehistorie: ideer - mennesker - muligheter [Nursing history: ideas - people - opportunities]* (2<sup>nd</sup> ed.). Gyldendal Akademisk.
- McLuhan, M. (1964). *Understanding Media: the Extensions of a Man*. Routledge.
- McNiesh, S. G. (2015). Cultural norms of clinical simulation in undergraduate nursing education. *Global Qualitative Nursing Research*, 2. <https://doi.org/10.1177/2333393615571361>
- McNiff, J. (2013). *Action Research: Principles and Practice* (3<sup>rd</sup> ed.). Taylor & Francis Ltd.
- Miettinen, R. (2000). The concept of experiential learning and John Dewey's theory of reflective thought and action. *International Journal of Lifelong Education*, 19(1), 54–72. <https://doi.org/10.1080/026013700293458>
- Miles, D. A. (2017). A taxonomy of research gaps: Identifying and defining the seven research gaps. Doctoral Student Workshop: Finding Research Gaps- Research Methods and Strategies, Dallas, Texas. [https://www.academia.edu/35505149/ARTICLE\\_RESEARCH\\_A\\_Taxonomy\\_of\\_Research\\_Gaps\\_Identifying\\_and\\_Defining\\_the\\_Seven\\_Research\\_Gaps](https://www.academia.edu/35505149/ARTICLE_RESEARCH_A_Taxonomy_of_Research_Gaps_Identifying_and_Defining_the_Seven_Research_Gaps)

- Mill, J. E., & Morris, H. M. (2000). The ambivalence of ownership: nursing graduate students as collaborators in action research. *Educational Action Research*, 8(1), 137–149. <https://doi.org/10.1080/09650790000200110>
- Miller, T., & Bell, L. (2012). Consenting to what? Issues of access, gate-keeping and ‘informed’ consent. In T. Miller, M. Birch, M. Mauthner, & J. Jessop (Eds.), *Ethics in Qualitative Research* (2 ed., pp. 61–75). SAGE Publications Ltd. <https://doi.org/10.4135/9781473913912.n5>
- Ministry of Education and Research, K. (2017). *Forskrift om felles rammeplan for helse- og sosialfagutdanninger (RETHOS) - [National Curriculum Regulations for Norwegian Health and Welfare Education]*. <https://lovdata.no/dokument/SF/forskrift/2017-09-06-1353>
- Ministry of Education and Research, K. (2019a). *Forskrift om nasjonal retningslinje for sykepleierutdanning - [National Regulations on Nursing Education]*. <https://lovdata.no/dokument/SF/forskrift/2019-03-15-412>
- Ministry of Education and Research, K. (2019b). *Kompetansereformen - Lære hele livet [The Competence reform - Learning throughout life]* (Mld. St. 14). <https://www.regjeringen.no/no/dokumenter/meld.-st.-14-20192020/id2698284/?ch=1>
- Ministry of Education and Research, K. (2021). *Utdanning for omstilling [Education for Change]* (Meld. St. 16). <https://www.regjeringen.no/contentassets/96e28f2c72f64844843597e104dc23bc/no/pdfs/stm202020210016000dddpdfs.pdf>
- Ministry of Health and Care Services, H. o. o. (2023). *Tid for handling. Personellet i en bærekraftig helse- og omsorgstjeneste [Time for action. The personnel in a sustainable health and care service]* (NOU 2023: 4). <https://www.regjeringen.no/contentassets/337fef958f2148bebd326f0749a1213d/no/pdfs/nou202320230004000dddpdfs.pdf>
- Mlambo, M., Silén, C., & McGrath, C. (2021). Lifelong learning and nurses’ continuing professional development, a metasynthesis of the literature. *BMC Nursing*, 20(1). <https://doi.org/10.1186/s12912-021-00579-2>
- Morse, C., Fey, M., Kardong-Edgren, S., Mullen, A., Barlow, M., & Barwick, S. (2019). The changing landscape of simulation-based education. *American Journal of Nursing*, 119(8), 42–48. <https://doi.org/10.1097/01.NAJ.0000577436.23986.81>
- Mulli, J., Nowell, L., & Lind, C. (2021). Reflection-in-action during high-fidelity simulation: A concept analysis. *Nurse Education Today*, 97. <https://doi.org/10.1016/j.nedt.2020.104709>
- Mulli, J., Nowell, L., Swart, R., & Estefan, A. (2022). Undergraduate nursing simulation facilitators lived experience of facilitating reflection-in-action during high-fidelity simulation: A phenomenological study. *Nurse Education Today*, 109. <https://doi.org/10.1016/j.nedt.2021.105251>
- Mutlu, B., Yılmaz, O. E., & Dur, S. (2019). The effect of high- and low-fidelity simulators in learning heart and lung sounds by undergraduate nurses: a randomized controlled trial. *Contemporary Nurse: A Journal for the Australian Nursing Profession*, 55(4/5), 351–359. <https://doi.org/10.1080/10376178.2019.1662321>

- Nazarianpirdosti, M., Janatolmakan, M., Andayeshgar, B., & Khatony, A. (2021). Evaluation of self-directed learning in nursing students: A systematic review and meta-analysis. *Education Research International*, 2021, 1–8. <https://doi.org/10.1155/2021/2112108>
- Nehring, W. M., & Lashley, F. R. (2009). Nursing simulation: A review of the past 40 years. *Simulation & Gaming*, 40(4), 528–552. <https://doi.org/10.1177/1046878109332282>
- Nickerson, M., & Pollard, M. (2010). Mrs. Chase and her descendants: a historical view of simulation. *Creative Nursing*, 16(3), 101. <https://doi.org/10.1891/1078-4535.16.3.101>
- Norman, G., Dore, K., & Grierson, L. (2012). The minimal relationship between simulation fidelity and transfer of learning. *Medical Education*, 46(7), 636–647. <https://doi.org/10.1111/j.1365-2923.2012.04243.x>
- O'Shea, E. (2003). Self-directed learning in nurse education: a review of the literature. *Journal of Advanced Nursing*, 43(1), 62–70. <https://doi.org/10.1046/j.1365-2648.2003.02673.x>
- O'Brien, B. C., Harris, I. B., Beckman, T. J., Reed, D. A., & Cook, D. A. (2014). Standards for Reporting Qualitative Research. *Academic Medicine*, 89(9), 1245–1251. <https://doi.org/10.1097/acm.0000000000000388>
- Oftedal, B. F. (2022). *Simulering bør erstatte deler av praksis i sykepleierutdanningen [Simulation should replace parts of practice in nursing education]* [Debate post]. Norsk Sykepleierforbund. <https://sykepleien.no/meninger/2022/10/simulering-bor-erstatte-deler-av-praksis-i-sykepleierutdanningen>
- Olaussen, C., Heggdal, K., & Tvedt, C. R. (2020). Elements in scenario-based simulation associated with nursing students' self-confidence and satisfaction: A cross-sectional study. *Nursing Open*, 7(1), 170–179. <https://doi.org/https://dx.doi.org/10.1002/nop2.375>
- Oldenburg, N. L., Brandt, K., Maney, C., & Selig, K. (2012). Student-created scenarios in the high-fidelity simulation laboratory. *The Journal of nursing education*, 51(12), 702–705. <https://doi.org/https://dx.doi.org/10.3928/01484834-20121030-02>
- Oliveira Silva, G., Oliveira, F. S. e., Coelho, A. S. G., Cavalcante, A. M. R. Z., Vieira, F. V. M., Fonseca, L. M. M., Campbell, S. H., & Aredes, N. D. A. (2022). Effect of simulation on stress, anxiety, and self-confidence in nursing students: Systematic review with meta-analysis and meta-regression. *International Journal of Nursing Studies*, 133. <https://doi.org/10.1016/j.ijnurstu.2022.104282>
- Olson, J. K., Paul, P., Lasiuk, G., Davidson, S., Wilson-Keates, B., Ellis, R., Marks, N., Nesari, M., & Savard, W. (2018). The State of Knowledge Regarding the Use of Simulation in Pre-Licensure Nursing Education: A Mixed Methods Systematic Review. *International Journal of Nursing Education Scholarship*, 15(1). <https://doi.org/https://dx.doi.org/10.1515/ijnes-2017-0050>



- Ouzzani, M., Hammady, H., Fedorowicz, Z., & Elmagarmid, A. (2016). *Rayyan - a web and mobile app for systematic reviews*. <https://www.rayyan.ai/>
- Ozdemir, N. G. (2019). The development of nurses' individualized care perceptions and practices: Benner's novice to expert model perspective. *International Journal of Caring Sciences*, 12(2), 1279–1285.
- Parker, B., & Myrick, F. (2010). Transformative learning as a context for human patient simulation. *Journal of Nursing Education*, 49(6), 326–332. <https://doi.org/10.3928/01484834-20100224-02>
- Parker, B. C. (2011). *The social-psychological process involved in using human patient simulators as a teaching/learning modality in undergraduate nursing education*. University of Alberta. <https://era.library.ualberta.ca/items/496da726-a00f-4e30-94a8-ab3cc3b99e61>
- Patel, K. M., & Metersky, K. (2022). Reflective practice in nursing: A concept analysis. *International Journal of Nursing Knowledge*, 33(3), 180–187. <https://doi.org/10.1111/2047-3095.12350>
- Patton, M. Q. (2002). *Qualitative Research & Evaluation Methods* (3<sup>rd</sup> ed.). Sage Publications.
- Pink, D. H. (2009). *Drive: The Surprising Truth About What Motivates Us*. Canongate.
- Rajaguru, V., & Park, J. (2021). Contemporary integrative review in simulation-based learning in nursing. *International Journal of Environmental Research and Public Health*, 18(2). <https://doi.org/https://dx.doi.org/10.3390/ijerph18020726>
- Ramboll, SurveyXact. <https://rambollxact.no/>
- Reason, P., & Bradbury, H. (2008). *The SAGE Handbook of Action Research: Participative Inquiry and Practice* (2<sup>nd</sup> ed.). SAGE.
- Riese, H. (2022). Å være lærer og forsker innenfor et kvalitativt design: Aksjonsforskning som en autoetnografisk praksis [Being a teacher and researcher within a qualitative design: Action research as an autoethnographic practice]. In M. Ulvik, H. Riese, & D. Roness (Eds.), *Å Forske På Egen Praksis: Aksjonsforskning og Andre Tilnærminger til Profesjonell Utvikling i Utdanningsfeltet [Researching One's Own Practice: Action Research and Other Approaches to Professional Development in The Field of Education]* (2 ed., pp. 63–86). Fagbokforlaget.
- Roberts, D., & Greene, L. (2011). The theatre of high-fidelity simulation education. *Nurse Education Today*, 31(7), 694–698. <https://doi.org/https://doi.org/10.1016/j.nedt.2010.06.003>
- Roberts, E., Kaak, V., & Rolley, J. (2019). Simulation to replace clinical hours in nursing: A meta-narrative review. *Clinical Simulation in Nursing*, 37, 5–13. <https://doi.org/10.1016/j.ecns.2019.07.003>
- Rojas Reyes, J., & Rivera Alvarez, L. N. (2022). Concept analysis of interpersonal skills in nursing. *Aquichan*, 22. [http://www.scielo.org.co/scielo.php?script=sci\\_arttext&pid=S1657-59972022000102213&nrm=iso](http://www.scielo.org.co/scielo.php?script=sci_arttext&pid=S1657-59972022000102213&nrm=iso)

- Roth, W.-M., & Lee, Y.-J. (2007). 'Vygotsky's Neglected Legacy': Cultural-Historical Activity Theory. *Review of Educational Research*, 77(2), 186–232. <http://www.jstor.org.ezproxy.oslomet.no/stable/4624893>
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55(1), 68–78.
- Røsstand, A., Svellingen, A., & Røykenes, K. (2022). Role exchange in student-led simulation: The importance of nursing students taking the role of patients. *SAGE Open Nurs*, 8. <https://doi.org/10.1177/23779608221130605>
- Saldaña, J. (2015). *The Coding Manual for Qualitative Researchers* (3<sup>rd</sup> ed.). Sage.
- Salifu, D. A., Christmals, C. D., & Reitsma, G. M. (2022). Frameworks for the design, implementation, and evaluation of simulation-based nursing education: A scoping review. *Nursing & Health Sciences*, 24(3), 545–563. <https://doi.org/10.1111/nhs.12955>
- Sami, P. (2015). Introduction. In P. Sami (Ed.), *The Bloomsbury Companion to Pragmatism* (pp. 1–36). London. Bloomsbury Academic. <https://search.ebscohost.com/login.aspx?direct=true&db=e000xww&AN=2298958&site=ehost-live>
- Sandelowski, M., & Barroso, J. (2002). Reading qualitative studies. *International Journal of Qualitative Methods*, 1(1), 74–108. <https://doi.org/10.1177/160940690200100107>
- Sandelowski, M., & Barroso, J. (2003). Classifying the findings in qualitative studies. *Qualitative Health Research*, 13(7), 905–923. <https://doi.org/10.1177/1049732303253488>
- Sandelowski, M., & Barroso, J. (2007). *Handbook for Synthesizing Qualitative Research*. Springer.
- Sanko, J. S. (2017). Simulation as a teaching technology: A Brief History of Its Use in Nursing Education. *Quarterly Review of Distance Education*, 18(2), 77.
- Sannino, A., & Engeström, Y. (2018). Cultural-historical activity theory: founding insights and new challenges. *Cultural-Historical Psychology*, 14(3), 43–56. <https://doi.org/10.17759/chp.2018140305>
- Scheel, L. S., Bydam, J., & Peters, M. D. J. (2021). Reflection as a learning strategy for the training of nurses in clinical practice setting: a scoping review. *JBI Evidence Synthesis*, 19(12), 3268–3300. <https://doi.org/10.11124/jbies-21-00005>
- Schoenherr, J. R., & Hamstra, S. J. (2017). Beyond fidelity: deconstructing the seductive simplicity of fidelity in simulator-based education in the health care professions. *Simulation in Healthcare*, 12(2), 117–123. <https://doi.org/10.1097/sih.0000000000000226>
- Schön, D. A. (1987). *Educating the Reflective Practitioner*. Jossey-Bass.

- Sedgwick, M., Yanicki, S., Harder, N., & Scott, D. (2021). A scoping review of the integration of ethics education in undergraduate nursing high-fidelity human simulation-based learning. *Journal of Clinical Nursing*, 30(5/6), 605–614. <https://doi.org/10.1111/jocn.15552>
- Shin, S., Park, J.-H., & Kim, J.-H. (2015). Effectiveness of patient simulation in nursing education: Meta-analysis. *Nurse Education Today*, 35(1), 176–182. <https://doi.org/10.1016/j.nedt.2014.09.009>
- Stahl, N. A., & King, J. R. (2020). Expanding approaches for research: Understanding and using trustworthiness in qualitative research. *Journal of Developmental Education*, 44(1), 26–28.
- Svellingen, A. H., Sovik, M. B., Roykenes, K., & Brattebo, G. (2021). The effect of multiple exposures in scenario-based simulation-A mixed study systematic review. *Nursing Open*, 8(1), 380–394. <https://doi.org/https://dx.doi.org/10.1002/nop2.639>
- Säljö, R. (2000). *Lärande i Praktiken: Ett Sociokulturellt Perspektiv [Learning in Practice: A Sociocultural Perspective]*. Prisma.
- Säljö, R. (2005). *Lärande och Kulturella Redskap: Om Lärprocesser och Det Kollektiva Minnet [Learning and Cultural Tools: About Learning Processes and Collective Memory]*. Norstedts Akademiska Förlag.
- Säljö, R. (2010). Learning in a Sociocultural Perspective. In P. Peterson, E. Baker, & B. McGaw (Eds.), *International Encyclopedia of Education* (3<sup>rd</sup> Edition) (pp. 498–502). Elsevier. <https://doi.org/https://doi.org/10.1016/B978-0-08-044894-7.00471-1>
- Tavory, I., & Timmermans, S. (2014). *Abductive Analysis: Theorizing Qualitative Research*. University of Chicago Press.
- Theobald, K. A., Tutticci, N., Ramsbotham, J., & Johnston, S. (2021). Effectiveness of using simulation in the development of clinical reasoning in undergraduate nursing students: A systematic review. *Nurse Education in Practice*, 57. <https://doi.org/10.1016/j.nepr.2021.103220>
- Thomas, J., & Harden, A. (2008). Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC Medical Research Methodology*, 8(1). <https://doi.org/10.1186/1471-2288-8-45>
- Timmermans, S., & Tavory, I. (2022). *Data Analysis in Qualitative Research: Theorizing With Abductive Analysis*. University of Chicago Press.
- Tong, A., Flemming, K., McInnes, E., Oliver, S., & Craig, J. (2012). Enhancing transparency in reporting the synthesis of qualitative research: ENTREQ. *BMC Medical Research Methodology*, 12(1), 181. <https://doi.org/10.1186/1471-2288-12-181>
- Ulupinar, S., & Aydoğan, Y. (2021). New graduate nurses' satisfaction, adaptation and intention to leave in their first year: A descriptive study. *Journal of Nursing Management*, 29(6), 1830–1840. <https://doi.org/10.1111/jonm.13296>

- Ulvik, M. (2022). Aksjonsforskning - en oversikt In M. Ulvik, H. Riese, & D. Roness (Eds.), *Å Forske på Egen Praksis: Aksjonsforskning og Andre Tilnærminger til Profesjonell Utvikling i Utdanningsfeltet [Researching One's Own Practice: Action Research and Other Approaches to Professional Development in the Field of Education]* (2<sup>nd</sup> ed., pp. 39–61). Fagbokforlaget.
- The European Parliament and the Council of the European Union. (2013). Directive 2013/55/EU of the European Parliament and of the Council of 20 November 2013 amending Directive 2005/36/EC on the recognition of professional qualifications and Regulation (EU) No 1024/2012 on administrative cooperation through the Internal Market Information System. *Official Journal of the European Union*, 55(354) 132–170. <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:354:0132:0170:en:PDF>
- Vygotskij, L. S., Cole, M., John-Steiner, V., Scribner, S., & Souberman, E. (1978). *Mind in Society: The Development of Higher Psychological Processes*. Harvard University Press.
- Vygotsky, L. S. (1965). Psychology and localization of functions. *Neuropsychologia*, 3(4), 381–386. [https://doi.org/10.1016/0028-3932\(65\)90011-4](https://doi.org/10.1016/0028-3932(65)90011-4)
- WHO, World Health Organisation. (2022). *Health and care workforce in Europe: time to act*. <https://www.who.int/europe/publications/i/item/9789289058339>
- Wong, F. M. F., Tang, A. C. Y., & Cheng, W. L. S. (2021). Factors associated with self-directed learning among undergraduate nursing students: A systematic review. *Nurse Education Today*, 104. <https://doi.org/https://doi.org/10.1016/j.nedt.2021.104998>
- Zulkosky, K., Minchhoff, D., Dommel, L., Price, A., & Handzlik, B. M. (2021). Effect of repeating simulation scenarios on student knowledge, performance, satisfaction and self-confidence. *Clinical Simulation in Nursing*, 55, 27–36. <https://doi.org/10.1016/j.ecns.2021.03.004>
- Özbay, Ö., & Çınar, S. (2021). Effectiveness of flipped classroom teaching models in nursing education: A systematic review. *Nurse Education Today*, 102. <https://doi.org/https://doi.org/10.1016/j.nedt.2021.104922>

## **Part II**

### **Papers 1–3**

### **Appendices**

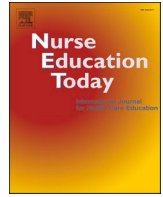


## Paper 1

Handeland, J., Prinz, A., Ekra, E. M., & Fossum, M. (2021).  
The role of manikins in nursing students' learning:  
A systematic review and thematic metasynthesis.  
*Nurse Education Today*, 98.  
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## Review



# The role of manikins in nursing students' learning: A systematic review and thematic metasynthesis

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## ABSTRACT

**Objectives:** To summarise and synthesise findings from qualitative primary research studies of nursing students' experiences from educational activities using manikins to gain a deeper understanding of the role these manikins play in the students' learning.

**Design and data sources:** A systematic review and thematic metasynthesis were conducted. Cinahl+, Ovid Medline, ERIC and Embase were searched systematically.

**Review methods:** Sandelowski and Barroso's framework guided the review process. A comprehensive search to identify qualitative studies of nursing students' experiences from learning with manikins was performed in January 2019 and updated in April 2020. Study selection was guided by six screening questions derived from these inclusion criteria: qualitative primary studies, published from 2008, in English or Scandinavian, presenting findings of undergraduate nursing students' experiences with manikins at all fidelity levels. Thomas and Harden's method for thematic synthesis was followed.

**Results:** Twenty-eight articles of twenty-seven studies were included. We identified three synthesised analytic themes: *Seeing the manikin as a doll or a patient*, *Experiencing yourself as a nurse caring for a patient*, and *Being a team member*.

**Conclusions:** When it is perceived as a patient, a manikin can give students a realistic experience of what it means to behave like nurses. Consequently, this realism lets students practice and acquire relational, communicative, and collaborative nursing skills. Using a manikin can facilitate the development of students' professional identity.

## 1. Introduction

Quite often, considerable amounts of resources are invested in simulation labs to make the learning environment in nursing education resemble real clinical settings. It has become commonplace for educators to integrate human-like manikins into this learning environment. Today's sophisticated manikins offer a multitude of features that can increase the idea of realism (Dunnington, 2014; Nehring and Lashley, 2009; Sanko, 2017). However, independent of the manikin's sophistication, the rationale behind replacing a patient with a manikin is that students can practice and raise their skills and competencies without any risk of harming human patients (Hopwood et al., 2016; Nehring and Lashley, 2009; Sanko, 2017).

Despite extensive research that has provided knowledge about

learning outcomes of simulation-based education, knowledge about how students learn from using manikins is scarce (Mariani and Doolen, 2016; Rutherford-Hemming, 2012). This study takes a sociocultural approach to understand the role manikins play in students' learning. By bringing together existing research of students' experiences from activities with manikins, we may gain a deeper understanding of the learning opportunities that lie embedded in education with manikins.

## 2. Background

Review studies indicate that simulation-based learning with manikins benefits nursing students' knowledge acquisition, critical thinking and problem-solving skills as well as their ability to clinical judgment (Lapkin et al., 2010; Lee and Oh, 2015; Yuan et al., 2012). It has also

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shown an effect on the development of psychomotor skills (Kim et al., 2016; Lee and Oh, 2015; Shin et al., 2015). Research indicates that simulation activities with manikins can enhance students' self-efficacy (Cant and Cooper, 2010; Labrague et al., 2019; Lee and Oh, 2015) and increase their self-confidence (Labrague et al., 2019; Yuan et al., 2012).

Generally, we range manikins' ability to imitate realistic functions in fidelity levels, from low to high (Nehring and Lashley, 2009; Schoenherr and Hamstra, 2017). This grading ranks the manikin's ability to create realistic experiences based on its technological features. Low-fidelity manikins have minimal ability to replicate human responses and are often limited to task-trainers. High-fidelity refers to advanced manikins that can replicate a wide range of human responses (Basak et al., 2016; Lioce, 2020). A related concept is Maran and Glavin's (2003) concept of 'engineered fidelity'.

It is tempting to assume that advanced technology and high-fidelity simulations contribute to the highest learning effect (Dieckmann et al., 2007). However, studies find no significant correlation between fidelity level and learning (Kardong-Edgren et al., 2007; Lavoie and Clarke, 2017; Mok et al., 2016), or when comparing high- and low-fidelity learning activities (Chen et al., 2015; Norman, 2012). Even if both medium- and high-fidelity simulations have shown significant learning effects, the effect is not proportional to the fidelity level (Kim et al., 2016; Shin et al., 2015).

While fidelity and authenticity are related concepts, authenticity can be achieved using low-fidelity equipment. Moreover, it depends on how we use manikins (Bland et al., 2014). Authenticity resembles Maran and Glavin's (2003) concept of 'psychological fidelity', which measures the experienced realism of the situation and the manikin. The perception of realism also depends on the participants' subjective experiences of the manikin. Even if students can learn from the manikin's instant feedback, its' limited ability to exhibit physical changes and lack of nonverbal communication can reduce the sense of authenticity (Lasater, 2007). Nonetheless, social and health care students can value the mere presence of a manikin because it looks like a patient (Aakrog, 2019).

The knowledge surrounding what creates realism and its meaning remains inconclusive (Mariani and Doolen, 2016). Dieckmann et al. (2007) and Schoenherr and Hamstra (2017) warn that a dominant focus on equipment can come at the expense of social aspects integrated into the learning environment. Despite extensive knowledge of manikins' contributions to nursing education, it is challenging to discover what role they play in the students' learning. To our knowledge, there exists no qualitative review-study offering an integrated interpretation of nursing students' experiences from participating in activities using manikins.

### 3. Methods

#### 3.1. Aims

The aim of this systematic review and thematic metasynthesis study was to summarise and synthesise findings from qualitative primary research studies of nursing students' experiences from educational activities using manikins to gain a deeper understanding of the role these manikins play in the students' learning.

#### 3.2. Design

Sandelowski and Barroso's (2007) framework guided the review process. They emphasise that a metasynthesis must integrate and reinterpret findings from existing qualitative studies. Here, we can take different analytical approaches according to what best suits the study aim. We employed Thomas and Harden's (2008) method for thematic synthesis. A review protocol was registered in PROSPERO (reg. nr.: CRD42019123523).

#### 3.3. Search methods

After formulating the aim, we designed a search strategy from the parameters: *Who*, *What* and *How*, referring to undergraduate level nursing students, use of manikins, and qualitative studies of students' experiences (Table 1). Regarding the parameter *When*, we limited the search to reports published from 2008 because simulation research started to increase from this time (Sanko, 2017). The systematic, comprehensive search was conducted in four databases relevant to nursing education (Cinahl+, Ovid Medline, ERIC, Embase). The search was run in January 2019 and updated in April 2020 (Bramer and Bain, 2017). A PRISMA flowchart illustrates the search and screening process (Fig. 1).

#### 3.4. Screening and search outcomes

Unique reports were transferred to Rayyan (Ouzzani et al., 2016). Inclusion criteria were incorporated into six screening questions (Table 2). Titles and abstracts were screened, first independently and then in collaboration. The full texts were then screened, first independently, then in collaboration. Disagreements were resolved by discussions based on the screening questions. Only studies using individual interviews, focus-groups or written reflections were included because they reflect students' experiences. A manual search of the literature lists in the included reports was conducted. No additional studies were included.

#### 3.5. Quality appraisal

Twenty-nine full-text reports were included for appraisal, twenty-five from the primary search and four from the updated search. Sandelowski and Barroso's (2002, 2007) reading guide formed the basis of the appraisal and was operationalised into ten headings (Table 3). The appraisal was conducted, first individually, then in collaboration until consensus. During the appraisal, we discussed the presence and relevance of the information rendered regarding each study's aim. No reports were excluded based on their appraised quality. However, according to Sandelowski and Barroso's (2003, 2007) typology, one report was classified as a 'topical survey' and was therefore excluded as equivocal as qualitative research.

#### 3.6. Data extraction and synthesis

We performed a thematic synthesis following Thomas and Harden's (2008) three steps (Table 4). The NVivo12 software (QSR International,

**Table 1**  
Structure of search parameters.

Who	What	How
Education, Nursing, Baccalaureate	Simulations	Qualitative studies, research, design
Students, Nursing, Baccalaureate	Patient simulations	Hermeneutics
Students, Nursing, Undergraduate	Simulation training	Phenomenological Research
Nursing Education	High Fidelity Simulation	Phenomenology
Nursing Students	Training	Ethnographic Research
	Patient Simulation	Grounded Theory
	AND Patient Simulation	AND Interviews, semi-structured, structured
	Models, Anatomic, Manikins	Focus group
	Human-like simulators	Experience, Perception, Attitude, Opinion
	Mannequin/ Manikin	

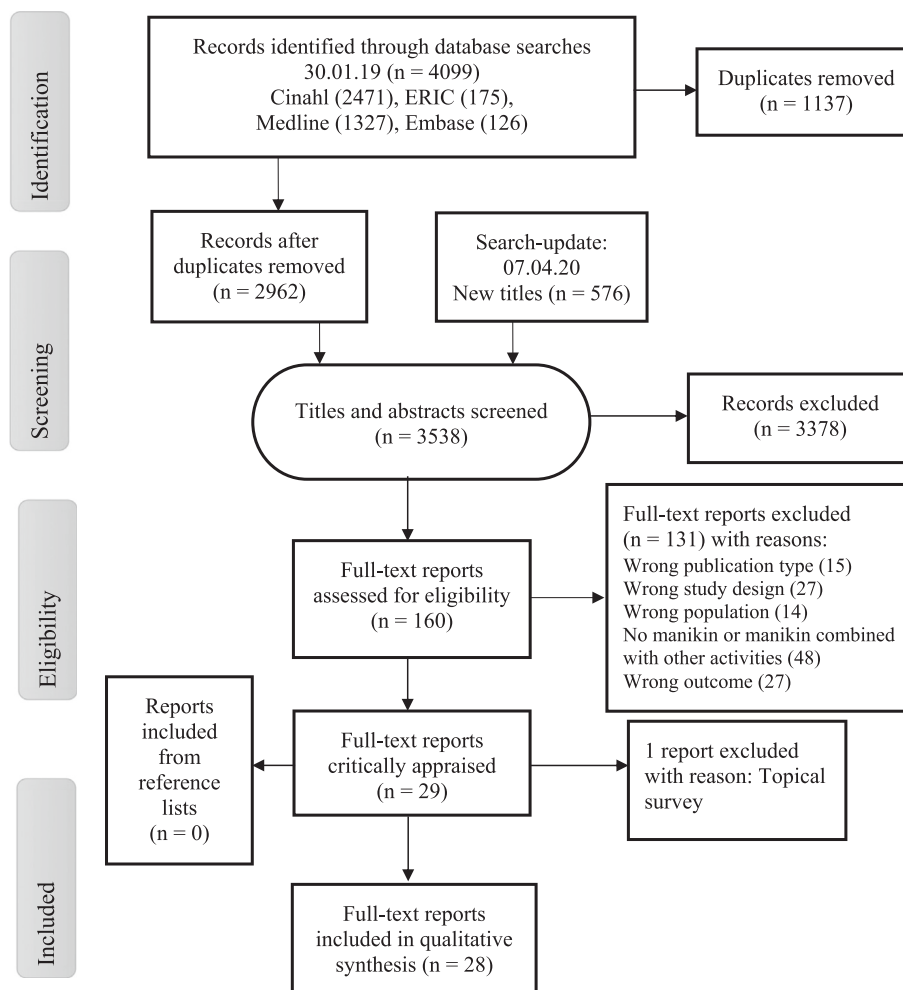


Fig. 1. PRISMA flowchart of screening process.

Table 2  
Screening questions.

Instructions:	
- All questions are answered yes/no/unclear - Screen only until one question is answered 'no' - If any question is answered 'no': exclude	
Question	Implication
1. Is the report in English or a Scandinavian language?	If 'no': <i>Wrong language</i>
2. Is it a research study?	If 'no': <i>Wrong publication type</i>
3. Is it a qualitative research study?	If 'no': <i>Wrong study design</i> Exclude: quantitative, mixed-methods and review studies
4. Is the study about nursing students at the baccalaureate, undergraduate or equivalent level?	If 'no': <i>Wrong population</i> Exclude: Graduate or continuing students, midwife, Masters. Students from other health educations. Interdisciplinary. Clinical practice. Faculty/instructor/teacher
5. Does the study include a full-size human-like manikin?	If 'no': <i>No manikin</i> Exclude: studies that do not specify the use of manikin, or use a manikin in combination with other methods
6. Does the study report findings of students' experiences, feelings, views, or opinions of activities with human-like manikins?	If 'no': <i>Wrong outcome</i> Exclude: observational studies, standardised questionnaires, or these in combination with other methods

2018) was used to administer the findings. First, relevant and meaningful findings that pointed to students' experiences with manikins were identified and coded inductively during the reading of each report. The coded findings were grouped into categories. Findings from the reports included after the updated search were coded and integrated into the categories. Secondly, the categories were organised and derived into four descriptive themes. These themes were repeatedly verified with the original reports, representing a synthesis of the findings' recurrence and relevance across the reports. Thirdly, we interpreted the descriptive themes into three analytic themes to understand the role the manikins play in students' learning. Table 5 shows each study's contribution to the analytic themes.

## 4. Results

### 4.1. Study characteristics

Twenty-eight reports of twenty-seven studies were included (Table 6). All were published in 2010 or later. Four reports were included after the search update. Three of these were published in 2019. All studies come from industrialised, high-income countries.

The methodological approaches taken were: Hermeneutic Phenomenological (3), Phenomenology (7), Grounded Theory (6). Seven studies used other designs. In four studies, no explicit approach was stated. Four data collection methods were used: focus groups (11), individual interviews (9), written reflective responses (4) or a combination of these three (3).

**Table 3**  
Quality appraisal of the included studies.

Study	Problem, purpose	Methodological orientation	Design, data collection	Analysis techniques	Reflexivity	Limitations	Ethics	Sampling strategy, sample	Findings	Discussion of findings
Christiansen et al. (2015)	+	+	+	+	+	+	+	+	+	+
Cordeau (2010)	+	+	+	+	\	\	\	+	+	+
Cordeau (2012)	+	+	+	+	+	+	+	+	+	+
Dean et al. (2015)	+	\	+	\	\	\	\	+	+	+
DiFederico-Amicone Yates (2013)	+	+	+	+	+	+	+	+	+	+
Dove Ward et al. (2017)	+	+	+	\	\	+	+	+	+	+
Eaton et al. (2012)	+	+	+	+	+	+	+	+	+	+
Eggenberger et al. (2010)	+	+	+	+	\	\	+	+	+	+
Fuselier et al. (2016)	+	+	+	+	+	+	+	+	+	\
Graham and Atz (2015)	+	+	+	+	+	+	\	+	+	+
Hustad et al. (2019)	+	\	+	+	\	+	+	+	+	+
Lanzara (2014)	+	+	+	+	+	+	+	+	+	+
Lee et al. (2019)	+	+	+	+	+	+	+	+	+	+
Lestander et al. (2016)	+	+	+	+	+	+	+	+	+	+
Liaw et al. (2012)	+	+	+	+	\	+	+	+	+	+
McClimens et al. (2012)	+	\	\	\	\	+	\	+	+	+
Miles (2016)	+	+	+	+	+	+	+	+	+	+
Miles (2018)	+	+	+	+	+	+	+	+	+	+
Miller et al. (2016)	+	+	+	+	+	+	+	+	+	+
Najjar et al. (2015)	+	+	+	+	+	+	+	+	+	+
Phillips (2016)	+	+	+	+	+	+	+	+	+	+
Pierazzo et al. (2017)	+	\	+	+	\	+	+	+	+	+
Raman et al. (2019)	+	\	+	\	\	+	+	+	+	+
Roy (2014)	+	+	+	+	+	+	+	+	+	+
Small et al. (2018)	+	+	+	+	+	+	+	+	+	+
Stockmann and Diaz (2017)	+	+	+	+	\	\	+	+	+	+
Sundler et al. (2015)	+	+	\	+	\	+	+	\	+	+
Walton et al. (2011)	+	+	+	+	+	+	+	+	+	+

Sample sizes varied from six to seventy-seven participants. Three studies included associate degree students. Three studies included Bachelor of nursing students from first-year or junior level, two studies included participants from second-year level, and ten studies included participants from third- or fourth-year or senior level. Nine studies collected data from more than one or all study levels. Three studies also focused on specific student groups: students with prior health care experiences (Miller et al., 2016), minority students (Graham and Atz, 2015) and male students (Raman et al., 2019).

High-fidelity manikins were used in eighteen studies. In two studies, medium- and high-fidelity manikins were combined, and one study used only medium-fidelity manikins. In one study, low- and high-fidelity manikins were used. In five studies, the fidelity-level was not explicitly stated.

#### 4.2. Metasynthesis

This thematic metasynthesis of nursing students' experience from activities with manikins revealed three analytic themes: *Seeing the manikin as a doll or a patient*, *Experiencing yourself as a nurse caring for a patient*, and *Being a team member*.

##### 4.2.1. Seeing the manikin as a doll or a patient

This theme was derived from findings of whether the students perceived the manikin as either a doll or a patient. These views were often integrated into the same experience.

Experiencing the manikin as a doll relates to descriptions of it as a dead, plastic equipment. Its' absence of human features, such as body language, nonverbal communication and emotional expressions, emphasise this point (Dean et al., 2015; Dove Ward et al., 2017; Fuselier et al., 2016; Graham and Atz, 2015; Lanzara, 2014; Lee et al., 2019; Liaw et al., 2012; McClimens et al., 2012; Najjar et al., 2015; Phillips, 2016; Raman et al., 2019; Roy, 2014; Stockmann and Diaz, 2017). This experience made it difficult, even unnatural, for some students to practice communication and relational skills with the manikin; skills they regarded as cornerstones of nursing (Christiansen et al., 2015; Dean et al., 2015; Dove Ward et al., 2017; Lanzara, 2014; Lee et al., 2019; McClimens et al., 2012; Miller et al., 2016; Najjar et al., 2015; Phillips, 2016; Roy, 2014; Small et al., 2018; Stockmann and Diaz, 2017). The activity quickly became task-oriented because the manikin encouraged students to focus on technical skills (Cordeau, 2012; Dean et al., 2015; Dove Ward et al., 2017). Consequently, some students felt that the manikin almost hindered learning of what they perceived to be 'real nursing' (Christiansen et al., 2015; Lee et al., 2019; Roy, 2014).

**Table 4**  
Examples from the analysis process and identification of themes.

Coded findings from the included reports	Categories	Descriptive themes	Analytic themes
<p><i>It gives you a chance to get your technique down, even if you're not actually doing it on a person.</i> (Fuselier et al., 2016, p. 199)</p> <p><i>I think a challenge is not receiving feedback from the manikin. Like you can't watch its facial expression, um, or nonverbal cues, um, so that was very challenging.</i> (Lanzara, 2014, p. 78)</p> <p><i>Nursing should be delivered with the heartfelt practice. If a patient is sick, a nurse should be able to feel empathy. Do you think I can learn the feeling during HF-SBL? I have learnt how to provide nursing care to simulators, not humans.</i> (Lee et al., 2019, p. 12)</p> <p><i>We just apply [our practice] to a doll, pretending to do [nursing practice] rather than actually doing it. And [the simulator] doesn't have any feelings, so it doesn't complain of pain. So, I end up handling the simulator harshly.</i> (Lee et al., 2019, p. 12)</p> <p><i>Manikins are cold to the touch and made of rubber and plastic. Their appearance is unnatural, and even with the capability to generate a human voice, there are limits to how real these devices can seem.</i> (McClimens et al., 2012, p. 24)</p> <p><i>During the simulation my mind was really changed. Rather than looking at the patient as a plastic mannequin, I really felt as if I was with a human. Having a human voice to interact with and understand was really life-like.</i> (Cordeau, 2010, p. 12)</p> <p><i>We had an elderly patient and the operator was doing an elderly man's voice, and that really helped me connect that the patient is an older adult.</i> (Dove Ward et al., 2017, p. 203)</p> <p><i>You're not treating the monitor, your treating the patient... you are listening, you are looking at the vital signs, but your main focus is that patient, getting that patient stable and caring for that patient. You definitely come to care for that patient.</i> (Eggenberger et al., 2010, p. 27)</p> <p><i>Students described a feeling of paralysis during the care of the patient. Fears of failure were linked to the consequences that malpractice could have for the patient.</i> (Lestander et al., 2016, p. 221)</p> <p><i>So, it doesn't matter that it is not real flesh and blood. I still took it as this is a child that has gone into cardiac arrest. (...). Once the child started going into the code... everything was focused now on saving this child.</i> (Small et al., 2018, p. 149)</p> <p><i>You learn how to communicate and deal with patients because you take the role of the nurse in that same setting.</i> (DiFederico-Amicone Yates, 2013, p. 68)</p> <p><i>I feel like simulation gives us more of a chance to, like, actually act as a nurse and do the things like the nurse would do, because it is not a real patient we could practice with that so we are not as limited.</i> (Miles, 2016, p. 109)</p> <p><i>Like in real life, if I was working as a nurse, that is what it felt like. It felt like I was doing this for my patient, or I was saving my patient's life</i> (Small et al., 2018, p. 149)</p> <p><i>Technically, it has increased my confidence and made me realize that you can't sit in the back, especially when you are a nurse. You have to be an advocate for the patient and you have to step out there.</i> (Walton et al., 2011, p. 306)</p> <p><i>The student participants saw themselves as nurses; they were feeling, acting, and thinking as nurses. They were serious about simulation and set their minds to thinking about how they would respond in a situation with a real patient. They looked and acted the role, (...).</i> (Walton et al., 2011, p. 305)</p> <p><i>'It depends on the group you're working with if they take it seriously'.</i> (Dean et al., 2015, p.265)</p> <p><i>Patient care is a team effort that requires good communication. One student describes feeling "as if a weight was lifted from her chest" when she realized she could call the doctor for help.</i> (Lestander et al., 2016, p. 222)</p> <p><i>Some students wanted their peers to feel comfortable giving them honest feedback, even if not positive, to support continued learning. "...the feedback that you get from your classmates is only to help you and it's not to tear you down"</i> (Najjar et al., 2015, p. 5)</p> <p><i>One participant commented that being able to work in a team was beneficial because it prepared them to function as a member of the healthcare team.</i> (Phillips, 2016, p. 45)</p> <p><i>Students collaborated with one another to provide care: "We were like 'You're gonna do this. You're gonna do this' and we all went in doing it from a physical aspect. (...)." They felt comforted having a partner: "Alone, I don't think I would have gotten the same result."</i> (Stockmann and Diaz, 2017, p. 743)</p>	<p>Manikins as patient, human being Manikin as doll, plastic Fidelity, realism Learning environment Facilitator, teacher, instructor Feelings regarding simulation: Anxiety</p> <p>The nursing role Communication Learning environment</p> <p>Team, group, peers Cooperation Feelings regarding simulation: Stress Debriefing, reflection, feedback</p>	<p>Manikin as plastic doll</p> <p>Manikin as real patient</p> <p>Being a nurse</p> <p>Teamwork</p>	<p>Seeing the manikin as a doll or a patient</p> <p>Experiencing yourself as a nurse caring for a patient</p> <p>Being a team member</p>

However, the manikin as a doll also had its advantages. It allowed students to practice skills and explore interventions without the fear of hurting anyone. Many felt in control and safe because they could not harm real patients (Christiansen et al., 2015; DiFederico-Amicone Yates, 2013; Dove Ward et al., 2017; Fuselier et al., 2016; Lee et al., 2019; McClimens et al., 2012; Miles, 2016; Miller et al., 2016; Roy, 2014; Walton et al., 2011). The thought of the manikin being a patient almost paralysed some students for fear of making mistakes (Lestander et al., 2016).

Experiencing the manikin as a patient represents a shift in the students' experiences. Realistic scenarios, patient stories, and names could humanise the manikin. When considered together with functioning technology, this could make the idea of the manikin being a patient

credible (Cordeau, 2010, 2012; Dean et al., 2015; Dove Ward et al., 2017; Eggenberger et al., 2010; Lestander et al., 2016; Small et al., 2018; Walton et al., 2011). Here, the facilitators played a role. If they convincingly gave the manikin a voice, they contributed to students' regarding the manikin as a patient (Christiansen et al., 2015; Cordeau, 2010; Dean et al., 2015; Dove Ward et al., 2017; Eggenberger et al., 2010; Roy, 2014; Small et al., 2018; Walton et al., 2011). Facilitators strengthened this experience by interacting with the manikin as if it was a patient. This motivated the students to follow suit and treat the manikin as a patient (Cordeau, 2010; Dean et al., 2015; Dove Ward et al., 2017; Eggenberger et al., 2010; Walton et al., 2011).

One consequence of viewing the manikin as a patient was that students felt it was possible to practice communication, caring and

**Table 5**  
Studies' contributions to analytic themes.

Study	Seeing the manikin as a doll or a patient	Experiencing yourself as a nurse caring for a patient	Being a team member
Christiansen et al. (2015)	x	x	x
Cordeau (2010)	x	x	–
Cordeau (2012)	x	x	x
Dean et al. (2015)	x	–	x
DiFederico-Amicone Yates (2013)	x	x	x
Dove Ward et al. (2017)	x	x	x
Eaton et al. (2012)	–	x	–
Eggenberger et al. (2010)	x	x	x
Fuselier et al. (2016)	x	–	–
Hustad et al. (2019)	–	x	x
Graham and Atz (2015)	x	–	x
Lanzara (2014)	x	x	x
Lee et al. (2019)	x	x	x
Lestander et al. (2016)	x	x	x
Liaw et al. (2012)	x	–	–
McClimens et al. (2012)	x	–	–
Miles (2016 & 2018)	–	x	–
Miller et al. (2016)	x	–	–
Najjar et al. (2015)	x	–	x
Phillips (2016)	x	x	x
Pierazzo et al. (2017)	–	–	x
Raman et al. (2019)	x	–	–
Roy (2014)	x	x	x
Small et al. (2018)	x	x	x
Stockmann and Diaz (2017)	x	–	x
Sundler et al. (2015)	–	x	–
Walton et al. (2011)	x	x	x
Studies' contributing	22	17	18

relational skills (Cordeau, 2010, 2012; Dove Ward et al., 2017; Eggenberger et al., 2010; Fuselier et al., 2016; Lestander et al., 2016; Raman et al., 2019; Walton et al., 2011). Descriptions of how emergent situations drew the students into the scenario exemplified this point (Eggenberger et al., 2010; Small et al., 2018). If the manikin represented a critically ill patient, it created an engagement that enabled the students to look beyond the manikin and relate to and feel empathy for the patient it intended to represent (Lestander et al., 2016).

**4.2.2. Experiencing yourself as a nurse caring for a patient**

This theme emerged from findings of how the students perceived themselves when approaching the manikin, and it is intertwined with the first theme.

This theme was linked to the students' experience that they provided real nursing to real patients. If the students regarded the manikin as a patient, this contributed to their feeling like a nurse, which in turn made it easier to behave seriously and engage with the patient (Christiansen et al., 2015; Cordeau, 2010, 2012; Roy, 2014; Small et al., 2018; Walton et al., 2011). If students viewed themselves as nurses, they seemed to, almost automatically, treat the manikins as patients when it came to communication (DiFederico-Amicone Yates, 2013). Students could experience what it was like is to communicate with patients through their interaction with the manikin (Christiansen et al., 2015; DiFederico-Amicone Yates, 2013; Lestander et al., 2016; Sundler et al., 2015;

Walton et al., 2011). Students' descriptions of how they fought for patients' lives, felt empathy for them or a feeling of failure if they failed to relieve their patient's sufferings, show that the manikin encouraged them to act as nurses (Lee et al., 2019; Small et al., 2018).

Students described how they got realistic experiences and opportunities to explore the nursing role more freely than they would have been able to in a clinical setting (Christiansen et al., 2015; Cordeau, 2012; Lanzara, 2014; Miles, 2016, 2018; Sundler et al., 2015; Walton et al., 2011). When talking and behaving like nurses in interaction with the manikin, students could understand the responsibilities and skills clinical practice requires. They could enhance qualities to be kept in their future practice, such as prioritising and taking responsibility (Christiansen et al., 2015; Cordeau, 2010, 2012; Eaton et al., 2012; Hustad et al., 2019; Lee et al., 2019; Walton et al., 2011). Other results were increased confidence and independence (Christiansen et al., 2015; DiFederico-Amicone Yates, 2013; Eaton et al., 2012; Lee et al., 2019; Lestander et al., 2016; Miles, 2016, 2018; Walton et al., 2011). In this way, students could prepare for their future practice (DiFederico-Amicone Yates, 2013; Eaton et al., 2012; Lee et al., 2019; Lestander et al., 2016; Roy, 2014).

**4.2.3. Being a team member**

This theme became evident from findings of how students, if they collectively perceived the manikin as a patient, could see themselves as a team providing patient care.

Descriptions of teamwork represent a pivotal experience for many students. Some described it as eye-opening and a relief to realise that they were both allowed and obliged to ask for help (DiFederico-Amicone Yates, 2013; Lestander et al., 2016; Small et al., 2018). As a result, they experienced that patient care is not something they could achieve alone. They were dependent on colleagues to save the patient presented in the form of a manikin (Hustad et al., 2019; Lee et al., 2019; Lestander et al., 2016; Pierazzo et al., 2017; Roy, 2014; Small et al., 2018; Walton et al., 2011).

Much of students' experiences depended on how seriously the team behaved and how realistically they handled the situation together. Group dynamics affected this experience. In mal-functioning groups, students found it challenging to take the situation seriously because the patient was not real (Christiansen et al., 2015; Dean et al., 2015; Lanzara, 2014; Najjar et al., 2015). In functioning groups, students seemed to view each other as nurses who were all acting to treat the manikin as a patient. They realised that saving the patient was their common goal. Consequently, they felt responsible for peers' learning, and they supported each other (Christiansen et al., 2015; Cordeau, 2012; Dean et al., 2015; Eggenberger et al., 2010; Pierazzo et al., 2017; Walton et al., 2011).

Observing peers' performance made students reflect on their own actions, and they learnt from observing others' successes or mistakes when providing patient care (Dean et al., 2015; DiFederico-Amicone Yates, 2013; Dove Ward et al., 2017; Lanzara, 2014; Lestander et al., 2016; Najjar et al., 2015; Roy, 2014). Nevertheless, relating to peers was also considered to be stressful. Many students felt vulnerable if peers observed them during their interactions with the manikin (Dean et al., 2015; Lanzara, 2014; Najjar et al., 2015; Roy, 2014; Walton et al., 2011).

Working with peers provided insight into what teamwork requires. Students became aware of the necessity of collaboration and clear communication (Graham and Atz, 2015; Hustad et al., 2019; Lanzara, 2014; Lee et al., 2019; Lestander et al., 2016; Miles, 2016, 2018; Phillips, 2016; Pierazzo et al., 2017; Roy, 2014; Small et al., 2018; Stockmann and Diaz, 2017). Teamwork gave students opportunities to discuss the patient's condition and the interventions that should be taken (Hustad et al., 2019; Pierazzo et al., 2017; Roy, 2014). The manikin played an essential role in getting the students to realise the importance of teamwork and preparing for future practice (Dove Ward et al., 2017; Lanzara, 2014; Phillips, 2016).

**Table 6**  
Study characteristics.

Author(s) Year Country	Purpose	Design	Sampling strategy	Number of participants, study-level	collection	Manikin's fidelity level
Christiansen et al. (2015) Denmark	To explore students' learning when problem-based learning is used as a pedagogical strategy in simulation-based learning	Hermeneutic phenomenological	Convenience	6 First-year	Individual interviews	Medium
Cordeau (2010) USA	To understand graded simulation from students' perspectives as a basis for the most effective use of simulation and learner-centred teaching	Hermeneutic phenomenological	Purposive	19 Junior	Written descriptions	High
Cordeau (2012) USA	To develop a substantive theory of high-stakes simulation and identify how this theory can be used as a framework to foster situational transition	Grounded theory	Theoretical	30 Baccalaureate	Individual interviews, Written descriptions	High
Dean et al. (2015) Australia	To explore students' experiences of assessing and responding to patients' emotional states, and if and how these skills transferred to manikins	Exploratory case study	Convenience	8 Third-year	Focus groups	Medium and High
DiFederico-Amicone Yates (2013) USA	To explore and gain an understanding of the meaning of the lived experience of associate degree students during a paediatric simulation	Hermeneutic phenomenological	Purposive, criterion, convenience	10 Second-year, Associate	Individual interviews	Not stated
Dove Ward et al. (2017) USA	To investigate and uncover the meaning of the lived experiences of students participating in HFS <sup>a</sup>	Phenomenology	Purposive	31 Senior	Focus groups	High
Eaton et al. (2012) USA	To explore whether end-of-life simulation enhances students' learning in a home health and hospice practicum setting	Phenomenology	Convenience	30 Senior	Written descriptions	High
Eggenberger et al. (2010) USA	To describe how students come to know the person being nursed as caring. To explore how caring is expressed in an emergent situation using a manikin	Not stated	Purposive	77 Baccalaureate	Written descriptions, Focus groups	High
Fuselier et al. (2016) USA	To explore students' perceptions of the use of manikins of colour to determine the effect on their caring for patients of colour	Not stated	Convenience	38 Baccalaureate	Focus groups	Not stated
Graham and Atz (2015) USA	To examine the minority students' perceptions of HFS	Grounded theory	Purposive	16 Junior, senior Minority	Focus groups	Not stated
Hustad et al. (2019) <sup>b</sup> Norway	To explore students' experiences of simulation-based training and how they perceive the transfer of learning to clinical practice	Descriptive	Purposive	32 Second- and third-year	Focus groups	High
Lanzara (2014) USA	To describe the experience of students during medium- to HFS-learning activities	Phenomenology	Purposive	15 Baccalaureate	Individual interviews	Medium and High
Lee et al. (2019) <sup>b</sup> Hong Kong/UK/ USA	To construct a substantive theory of students' HFS-based learning dynamics and identifying factors that influence HFS- based learning	Grounded theory	Purposive	16 Fourth-year	Individual interviews	High
Lestander et al. (2016) Sweden	To explore the value of reflections after HFS by investigating students' perceptions of their learning with a three-step post-simulation reflection model	Descriptive	Convenience	16 Baccalaureate	Written descriptions	High
Liaw et al. (2012) Singapore/ Netherlands/ Australia	To explore students' experiences of how a simulation program has prepared them to transfer their performance in encounters with deteriorating patients	Critical incident techniques	Purposive	15 Third-year	Individual interviews	Not stated
McClimens et al. (2012) UK	To find out about the efficacy of using manikins as an aid to teaching and learning about epilepsy management	Not stated	Convenience	11 First-year	Written descriptions	High
Miles (2016, 2018) USA	To conceptualize the process by which simulation learning transfers to the clinical environment	Grounded theory	Purposive	25 Fourth-year	Individual interviews	High
Miller et al. (2016) USA	To find out paramedics or licensed practical nurses' perceptions regarding their engagement in simulation and how prior experiences influence their learning needs	Phenomenology	Purposive	19 Associate	Individual interviews	Manikins in general
Najjar et al. (2015) USA	To describe students' experience of HFS and to develop a model which explicates this experience	Grounded theory	Purposive	26 Baccalaureate	Focus groups	High
Phillips (2016) USA	To explore students' experiences and confidence levels with and perceptions regarding HFS	Constructivism case study	Purposive homogenous	12 Second-year, Associate	Individual interviews	High
Pierazzo et al. (2017) <sup>b</sup> Canada	To understand students' learning experience in a problem-based learning (PBL) course when HFS- activity was introduced	Case study	Purposive convenience	19 Second-year	Focus groups	High
Raman et al. (2019) <sup>b</sup> Oman	To describe the experiences of Arab male students who were exposed to HFS-training as part of a maternity nursing course	Phenomenology	Purposive	15 Fourth-year, Male	Focus groups	High

(continued on next page)

Table 6 (continued)

Author(s) Year Country	Purpose	Design	Sampling strategy	Number of participants, study-level	collection	Manikin's fidelity level
Roy (2014) USA	To describe students' perceptions of simulation and how simulation influenced their development of clinical judgment	Descriptive naturalistic	Purposive convenience	34 Junior, Senior	Focus groups	Low and High
Small et al. (2018) Canada	To learn about students' lived experience of HFS of paediatric cardiopulmonary arrest	Phenomenology	Purposive	12 Third-year	Individual interviews	High
Stockmann and Diaz (2017) USA	To explore undergraduate students' experiences providing mental health care for a transgender client through simulation	Not stated	Criterion	20 Senior	Focus groups	High
Sundler et al. (2015) Sweden	To explore and analyse undergraduate students' experiences when examining knowledge, skills and competences in simulation laboratories.	Phenomenology	Not stated	23 Second-year	Focus groups	High
Walton et al. (2011) USA	To gain an understanding of how students learn through simulation to identify basic social processes and supportive teaching strategies	Grounded theory	Convenience	26 Senior	Individual interviews, Focus groups	High

<sup>a</sup> HFS: high-fidelity simulations.

<sup>b</sup> Included after search-update, April 2020.

### 5. Discussion

This metasynthesis provides insight into nursing students' experiences from working with manikins. We elaborate on these experiences in order to understand the role manikins play in students' learning. Concepts from the sociocultural learning tradition are brought into the discussion to deepen this understanding (Parker and Myrick, 2012; Rutherford-Hemming, 2012; Säljö, 2010).

The manikin is central in the students' experiences as a 'mediating tool'. Mediating tools are instruments we use to communicate and develop knowledge during social interaction (Säljö, 2010; Wertsch, 1991). For these students, the manikin has appeared as both a doll and a patient incarnated in one object. This object represents a dualism that makes the manikin unique as a tool because it evokes different learning opportunities. If perceived as a doll, it encouraged students to practice psychomotor skills. Similarly, students found it challenging to express care and apply relational skills because the manikin had limited abilities to promote empathy (Dean et al., 2015; Dove Ward et al., 2017; Lee et al., 2019). Dunnington (2014) explains this in manikins' inability to capture human nature and lack of human reactions. However, our synthesised findings do not fully support this explanation. Many students felt it was possible to practice relational skills if they regarded the manikin as a patient. So, if perceived as a patient, the manikin can facilitate students' practice of caring and relational skills.

The manikin's duality allowed the students to move back and forth between two roles. The students seemed to stay in the student role if they perceive it as a doll. But if perceived as a patient, the manikin allowed them to experience the nursing role. Hopwood et al. (2016) support this assertion when arguing that students simulate themselves as nurses when interacting with the manikin. Therefore, each student's learning will depend on his/her ability to immerse himself/herself into the experience of acting, thinking and feeling as if they were nurses (Ashley and Stamp, 2014; Berragan, 2013; McNiesh, 2015; Roberts and Greene, 2011). Students that experienced themselves as nurses seemed to forget themselves as students. They became less self-conscious, which enabled them to focus on the patient and the task at hand. When feeling and behaving like nurses, they seemed to get access to knowledge inherent to the nursing role (Berragan, 2014; Johannesson et al., 2013; Miles, 2018), such as responsibility and independence. Christiansen et al. (2015) and Berragan (2014) stress that this experience can influence the development of a professional identity.

The experience of being a team member visualises how simulated patient care is a collective activity where students act together as nurses in their efforts to comfort the patient in the manikin (Hopwood et al., 2016). Despite its unrealistic reactions, the manikin triggered real emotions. This was especially prominent in situations where they had to

fight together to save dying patients. These experiences can make imprints on the students' minds and increase their awareness of professional responsibility (Dunnington, 2014; Lasater, 2007). The manikin seems to place the students in the scenario and connects them in a community of practice (Lave and Wenger, 1991; Wenger, 1998). It is debatable whether a group of students can be defined as a community of practice, as they are not professionals. To solve this ambiguity, Cordeau (2012) calls this relationship a *community of learners* (p. E100). We agree with this, as we find similarities between these two communities: the participants develop a shared understanding of the situation and a common goal (Lave and Wenger, 1991; Wenger, 1998). The manikin can introduce the students to a community where they can enhance their skills in communication, collaboration, and leadership.

Considering our synthesised findings, we view grading fidelity in levels based on the manikin's technological features somewhat limited. We believe it is more relevant to describe the students' performance with the manikin (Aakrog, 2019; Nyström et al., 2016). If students choose to act as if the situation is not real, the learning experience collapses. It seems like something happens when students discover the patient beyond the plastic doll. Similarly, they can experience what it means to behave like nurses. If students all act like nurses that treat the manikin as a patient, they support each other in this experience. Together, they can create an immersive and expansive learning environment where they can experience realistic nursing. We argue that this is about realism, and we choose to call it 'relational realism', one which permeates the findings as realism that rises among the students. As we see it, here lies much of the learning potential in simulated learning activities with manikins.

#### 5.1. Limitations

We have considered this study through the 'Enhancing transparency in reporting the synthesis of qualitative research statement' (ENTREQ) (Tong et al., 2012). We find possible limitations in the sensitivity and specificity of the search. Relevant reports in non-English or non-Scandinavian languages that could have affected the results were not detected. The included studies are culturally homogenous, so the results may not apply to other cultural contexts. The fact that no studies using low-fidelity manikins were included can be explained if the search strategy was not appropriate for detecting such studies. As descriptive themes emerged during the extraction of findings, these may have influenced the focus for the reading of the remaining reports. There is a risk that the themes became self-affirmative, so that other relevant findings were unintentionally ignored. The last included studies have inevitably been read in light of the first studies' analysis. We cannot state anything about differences between manikins, as most of the included



studies addressed only high-fidelity manikins. We can only conclude from the fact that manikins were used.

## 6. Conclusion

Upon completing this study, we can better understand the role human-like manikins play in nursing students' learning, regardless of fidelity-level and learning activity. The sociocultural perspective firmly places the study in a theoretical tradition and enhances the understanding of manikins as mediating tools.

Supported by our findings, we would state that nursing students' learning with human-like manikins is a deeply social experience. If experienced as patients, manikins can introduce students to other aspects of nursing than psychomotor skills. It is in relation to a patient that the students can get a realistic understanding of what it means to behave like a nurse. Through this relation, students can practice relational and caring skills, as well as responsibility and independence. Students can create and increase a sense of realism if they relate to each other as nurses whom all treat the manikin as a patient. Subsequently, they can practice communicative and collaborative skills and understand more of the complexity surrounding the nursing role. Together they create and share a profoundly relational realism. A manikin may play the role as a facilitator who supports the development of the students' professional identity.

### 6.1. Implications for nursing education and research

The significance of this study lies in its challenge to educators to create learning methods that amplify the students' experience of manikins as patients and themselves as nurses. We believe this may be obtained by integrating patient scenarios that personalise the manikin and situates the students in a specific situation. This way, even skill trainers or low-fidelity manikins may appear as 'real patients' for the students. Regularly use of human-like manikins throughout the nursing program may contribute to increased engagement, so the students become familiar with the manikin as a learning tool. Learning methods should invite students to actively experiment with their skills and knowledge as it may increase their understanding of the nurse's role. Educators should view the students as active participants in the simulated learning activity.

Another challenge raised is to design methods that make use of manikins' ability to promote teamwork, leadership, and collaboration. This can be achieved in learning activities where the students are encouraged to find solutions together. Learning activities can be designed to facilitate and encourage, e.g. peer learning and critical thinking. Lastly, this study can increase educators' awareness of how they, through their interaction with manikins, affect the students' experienced realism. Each time a manikin is used, the educators should be consistent in how they refer to and approach the manikin. Educators should agree whether they should highlight the manikin as a doll or a patient in a way that harmonises with the learning objective.

This metasynthesis mainly provides insight into medium- and high-fidelity manikins. Future research should investigate ways to increase the authenticity of low-fidelity manikins. Using less costly manikins more effectively may be of significant interest for many educational institutions. In order to develop manikin-based learning to its full potential, future research should explore the learning opportunities found in the students' interactions with the manikins. This study calls for an investigation of the meaning and implications of the relational learning environment in nursing students' education.

### Ethical approval

Not applicable.

### Funding statement

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### Declaration of competing interest

There are no conflicts of interest to declare. The authors declare that they have no conflicting interests in the study.

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### Appendix A. Supplementary data

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### References

- Aakrog, V., 2019. 'The mannequin is more lifelike': the significance of fidelity for students' learning in simulation-based training in the social-and healthcare programmes. *Nordic Journal of Vocational Education and Training* 9 (2), 1–18. <https://doi.org/10.3384/njvet.2242-458X.19921>.
- Ashley, J., Stamp, K., 2014. Learning to think like a nurse: the development of clinical judgment in nursing students. *J. Nurs. Educ.* 53 (9), 519–525. <https://doi.org/10.3928/01484834-20140821-14>.
- Basak, T., Unver, V., Moss, J., Watts, P., Gaiosio, V., 2016. Beginning and advanced students' perceptions of the use of low- and high-fidelity mannequins in nursing simulation. *Nurse Educ. Today* 36, 37–43. <https://doi.org/10.1016/j.nedt.2015.07.020>.
- Berragan, L., 2013. Conceptualising learning through simulation: an expansive approach for professional and personal learning. *Nurse Educ. Pract.* 13 (4), 250–255. <https://doi.org/10.1016/j.nepr.2013.01.004>.
- Berragan, L., 2014. Learning nursing through simulation: a case approach towards an expansive model of learning. *Nurse Educ. Today* 34 (8), 1143–1148. <https://doi.org/10.1016/j.nedt.2014.03.005>.
- Bland, A.J., Topping, A., Tobbell, J., 2014. Time to unravel the conceptual confusion of authenticity and fidelity and their contribution to learning within simulation-based nurse education. A discussion paper. *Nurse Educ. Today* 34 (7), 1112–1118. <https://doi.org/10.1016/j.nedt.2014.03.009>.
- Bramer, W., Bain, P., 2017. Updating search strategies for systematic reviews using EndNote. *Journal of the Medical Library Association* 105 (3), 285–289. <https://doi.org/10.5195/jmla.2017.183>.
- Cant, R.P., Cooper, S.J., 2010. Simulation-based learning in nurse education: systematic review. *J. Adv. Nurs.* 66 (1), 3–15. <https://doi.org/10.1111/j.1365-2648.2009.05240.x>.
- Chen, R., Grierson, L.E., Norman, G.R., 2015. Evaluating the impact of high- and low-fidelity instruction in the development of auscultation skills. *Med. Educ.* 49 (3), 276–285. <https://doi.org/10.1111/medu.12653>.
- Christiansen, S., Buus Boje, R., Frederiksen, K., 2015. The use of problem- and simulation-based learning: the student's perspective. *Nordic Journal of Nursing Research* 35 (3), 186–192. <https://doi.org/10.1177/0107408315591777>.
- Cordeau, M. A. (2010). The lived experience of clinical simulation of novice nursing students. *International Journal for Human Caring*, 14(2), 9–15. doi:10.20467/1091-5710.14.2.8.
- Cordeau, M.A., 2012. Linking the transition: a substantive theory of high-stakes clinical simulation. *Adv. Nurs. Sci.* 35 (3), E90–E102. <https://doi.org/10.1097/ANS.0b013e318262614f>.
- Dean, S., Williams, C., Balnaves, M., 2015. Practising on plastic people: can I really care? *Contemp. Nurse* 51 (2), 257–271. <https://doi.org/10.1080/10376178.2016.1163231>.
- Dieckmann, P., Gaba, D., Rall, M., 2007. Deepening the theoretical foundations of patient simulation as social practice. *Simulation in Healthcare: Journal of the Society for*

- Simulation in Healthcare 2 (3), 183–193. <https://doi.org/10.1097/sih.0b013e3180f637f5>.
- DiFederico-Amicone Yates, A., 2013. The Lived Experience of Associate Degree Nursing Students Following a Pediatric Simulation Experience: A Phenomenological Inquiry. Barry University School of Nursing. Retrieved from. <http://proxy.library.mcgill.ca/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=rzh&AN=109859900> (Doctoral dissertation).
- Dove Ward, G., Robinson, L., Jowers Ware, L., 2017. The lived experience of nursing students participating in high-fidelity simulation at a school grounded in caring. *International Journal for Human Caring* 21 (4), 200–207.
- Dunnington, R.M., 2014. The nature of reality represented in high fidelity human patient simulation: philosophical perspectives and implications for nursing education, 15 (1), 14–22. <https://doi.org/10.1111/nup.12034>.
- Eaton, M.K., Floyd, K., Brooks, S., 2012. Student perceptions of simulation's influence on home health and hospice practicum learning. *Clinical Simulation in Nursing* 8 (6), e239–e247. <https://doi.org/10.1016/j.ecns.2010.11.003>.
- Eggenberger, T., Keller, K., and Locsin, R. C. (2010). Valuing caring behaviors within simulated emergent nursing situations. *International Journal for Human Caring*, 14 (2), 23–29. <https://doi.org/10.20467/1091-5710.14.2.22>.
- Fuselier, J., Baldwin, D., Townsend-Chambers, C., 2016. Nursing students' perspectives on manikins of color in simulation laboratories. *Clinical Simulation in Nursing* 12 (6), 197–201. <https://doi.org/10.1016/j.ecns.2016.01.011>.
- Graham, C.L., Atz, T., 2015. Baccalaureate minority nursing students' perceptions of high-fidelity simulation. *Clinical Simulation in Nursing* 11 (11), 482–488. <https://doi.org/10.1016/j.ecns.2015.10.003>.
- Hopwood, N., Rooney, D., Boud, D., Kelly, M., 2016. Simulation in higher education: a sociomaterial view. *Educ. Philos. Theory* 48 (2), 165–178. <https://doi.org/10.1080/00131857.2014.971403>.
- Hustad, J., Johannesen, B., Fossum, M., Hovland, O.J., 2019. Nursing students' transfer of learning outcomes from simulation-based training to clinical practice: a focus-group study. *BMC Nurs*. 18 (1) <https://doi.org/10.1186/s12912-019-0376-5>.
- Johannesson, E., Silén, C., Kvist, J., Hult, H., 2013. Students' experiences of learning manual clinical skills through simulation. *Adv. Health Sci. Educ.* 18 (1), 99–114. <https://doi.org/10.1007/s10459-012-9358-z>.
- Kardong-Edgren, S., Anderson, M., Michaels, J., 2007. Does simulation fidelity improve student test scores? *Clinical Simulation in Nursing* 3 (1), e21–e24. <https://doi.org/10.1016/j.ecns.2009.05.035>.
- Kim, J., Park, J.-H., Shin, S., 2016. Effectiveness of simulation-based nursing education depending on fidelity: a meta-analysis. *BMC Medical Education* 16 (1). <https://doi.org/10.1186/s12909-016-0672-7>.
- Labrague, L.J., McEnroe-Petitte, D.M., Bowling, A.M., Nwafor, C.E., Tsaras, K., 2019. High-fidelity simulation and nursing students' anxiety and self-confidence: a systematic review. *Nurs. Forum* 54 (3), 358–368. <https://doi.org/10.1111/nuf.12337>.
- Lanzara, S., 2014. A Phenomenological Study Exploring Baccalaureate Nursing Students' Experiences in Simulation. Indiana University of Pennsylvania. Retrieved from. <http://ezproxy.vid.no/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=c8h&AN=109786566&site=ehost-live> (Doctoral dissertation).
- Lapkin, S., Levett-Jones, T., Bellchambers, H., Fernandez, R., 2010. Effectiveness of patient simulation manikins in teaching clinical reasoning skills to undergraduate nursing students: a systematic review. *Clinical Simulation in Nursing* 6 (6), e207–e222. <https://doi.org/10.1016/j.ecns.2010.05.005>.
- Lasater, K., 2007. High-fidelity simulation and the development of clinical judgment: students' experiences. *J. Nurs. Educ.* 46 (6), 269–276. <https://doi.org/10.3928/01484834-20070601-06>.
- Lave, J., Wenger, E., 1991. *Situated Learning: Legitimate Peripheral Participation*. Cambridge University Press, Cambridge.
- Lavoie, P., Clarke, S.P., 2017. Simulation in nursing education. *Nursing* 2018 47 (7), 18–20. <https://doi.org/10.1097/01.NURSE.0000520520.99696.9a>.
- Lee, J., Oh, P.-J., 2015. Effects of the use of high-fidelity human simulation in nursing education: a meta-analysis. *J. Nurs. Educ.* 54 (9), 501–507. <https://doi.org/10.3928/01484834-20150814-04>.
- Lee, J.J., Yeung, K.C.Y., Clarke, C.L., Yoo, J., 2019. Nursing students' learning dynamics and perception of high-fidelity simulation-based learning. *Clinical Simulation in Nursing* 33, 7–16. <https://doi.org/10.1016/j.ecns.2019.04.008>.
- Lestander, O., Lehto, N., Engstrom, A., 2016. Nursing students' perceptions of learning after high fidelity simulation: effects of a three-step post-simulation reflection model. *Nurse Educ. Today* 40, 219–224.
- Liaw, S.Y., Chan, S.W.-C., Scherpbier, A., Rethans, J.-J., Pua, G.G., 2012. Recognizing, responding to and reporting patient deterioration: transferring simulation learning to patient care settings. *Resuscitation* 83 (3), 395–398.
- Lioce, L., 2020. *Healthcare Simulation Dictionary – Second Edition*. Agency for Healthcare Research and Quality, Rockville, MD. <https://doi.org/10.23970/simulationv2>. Retrieved from. <https://www.ssih.org/dictionary> (January 2020, AHRQ Publication No. 20-0019).
- Maran, N.J., Glavin, R.J., 2003. Low- to high-fidelity simulation - a continuum of medical education? *Med. Educ.* 37, 22–28. <https://doi.org/10.1046/j.1365-2923.37.s1.9.x>.
- Mariani, B., Doolen, J., 2016. Nursing simulation research: what are the perceived gaps? *Clinical Simulation in Nursing* 12 (1), 30–36. <https://doi.org/10.1016/j.ecns.2015.11.004>.
- McClimens, A., Lewis, R., Brewster, J., 2012. The anatomy lesson of Dr Nicolaes Tulp: what can it teach us today? *J. Intellect. Disabil.* 16 (1), 17–27. <https://doi.org/10.1177/1744629512438037>.
- McNiesh, S.G., 2015. Cultural norms of clinical simulation in undergraduate nursing education. *Global Qualitative Nursing Research* 2. <https://doi.org/10.1177/2333393615571361>.
- Miles, D.A., 2016. Simulation learning and transfer to the clinical environment in undergraduate nursing students. (Doctoral dissertation), Loyola University Chicago. Retrieved from. [https://ecommons.luc.edu/cgi/viewcontent.cgi?article=3289&context=luc\\_diss](https://ecommons.luc.edu/cgi/viewcontent.cgi?article=3289&context=luc_diss).
- Miles, D.A., 2018. Simulation learning and transfer in undergraduate nursing education: a grounded theory study. *J. Nurs. Educ.* 57 (6), 347–353. <https://doi.org/10.3928/01484834-20180522-05>.
- Miller, B.A., Kimble, L.P., Sudia, T., Gee, R.M., 2016. A phenomenological inquiry of the perceptions of simulation among ADN students with prior health care experience. *Teach. Learn. Nurs.* 11 (4), 189–193.
- Mok, H.T., So, C.F., Chung, J.W.Y., 2016. Effectiveness of high-fidelity patient simulation in teaching clinical reasoning skills. *Clinical Simulation in Nursing* 12 (10), 453–467. <https://doi.org/10.1016/j.ecns.2016.06.003>.
- Najjar, R.H., Lyman, B., Miehle, N., 2015. Nursing students' experiences with high-fidelity simulation. *Int. J. Nurs. Educ. Scholarsh.* 12, 1–9. <https://doi.org/10.1515/ijnes-2015-0010>.
- Nehring, W.M., Lashley, F.R., 2009. Nursing simulation: a review of the past 40 years. *Simul. Gaming* 40 (4), 528–552. <https://doi.org/10.1177/1046878109332282>.
- Norman, J., 2012. Systematic review of the literature on simulation in nursing education. *The ABNF Journal: Official Journal of the Association of Black Nursing Faculty in Higher Education* 23 (2), 24–28.
- Nyström, S., Dahlberg, J., Hult, H., Dahlgren, M.A., 2016. Enacting simulation: a sociomaterial perspective on students' interprofessional collaboration. *Journal of Interprofessional Care* 30 (4), 441–447. <https://doi.org/10.3109/13561820.2016.1152234>.
- Ouzzani, M., Hammady, H., Fedorowicz, Z., Elmagarmid, A., 2016. Rayyan- a web and mobile app for systematic reviews. (version 5:210). Retrieved from. <https://rayyan.qcri.org/welcome>.
- Parker, B.C., Myrick, F., 2012. The pedagogical ebb and flow of human patient simulation: empowering through a process of fading support. *J. Nurs. Educ.* 51 (7), 365–372. <https://doi.org/10.3928/01484834-20120509-01>.
- Phillips, T.M., 2016. Using simulation to improve clinical confidence in associate-degree nursing students. (Doctoral dissertation), USA, Walden University. Retrieved from. <http://ezproxy.vid.no/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=c8h&AN=124413666&site=ehost-live>.
- Pierazzo, J., Allan, M., McLaren, G., Baby, D., 2017. Using case study to examine simulation in a problem-based course. *Quality Advancement in Nursing Education - Avancées en Formation Infirmière* 3 (2), 1–10. <https://doi.org/10.17483/2368-6669.1007>.
- QSR International Pty Ltd, 2018. *NVivo Qualitative Data Analysis Software (Version 12)*.
- Raman, S., Labrague, L.J., Arulappan, J., Al-Zaabi, O.A.M., Natarajan, J., Cyril Vincent, S., 2019. Experiences of Arab male nursing students during high fidelity maternity simulation training. *Nurs. Forum* 2019, 1–7. <https://doi.org/10.1111/nuf.12402>.
- Roberts, D., Greene, L., 2011. The theatre of high-fidelity simulation education. *Nurse Educ. Today* 31 (7), 694–698. <https://doi.org/10.1016/j.nedt.2010.06.003>.
- Roy, L., 2014. Baccalaureate nursing students' perceptions of simulation and the development of clinical judgment. (Doctoral dissertation), Widener University. Retrieved from. <http://search.ebscohost.com/login.aspx?direct=true&db=c8h&AN=109828656&site=ehost-live>.
- Rutherford-Hemming, T., 2012. Simulation methodology in nursing education and adult learning theory. *Adult Learning* 23 (3), 129–137.
- Säljö, R., 2010. Learning in a sociocultural perspective. In: Peterson, P., Baker, E., McGaw, B. (Eds.), *International Encyclopedia of Education*, 3 ed. Elsevier Science, pp. 498–502.
- Sandelowski, M., Barroso, J., 2002. Reading qualitative studies. *Int. J. Qual. Methods* 1 (1), 74–108. <https://doi.org/10.1177/160940690200100107>.
- Sandelowski, M., Barroso, J., 2003. Classifying the findings in qualitative studies. *Qual. Health Res.* 13 (7), 905–923. <https://doi.org/10.1177/1049732303253488>.
- Sandelowski, M., Barroso, J., 2007. *Handbook for Synthesizing Qualitative Research*. Springer Publishing Company, United States.
- Sanko, J.S., 2017. Simulation as a teaching technology: a brief history of its use in nursing education. *Quarterly Review of Distance Education* 18 (2), 77.
- Schoenherr, J.R., Hamstra, S.J., 2017. Beyond fidelity: deconstructing the seductive simplicity of fidelity in simulator-based education in the health care professions. *Simul. Healthc.* 12 (2), 117–123. <https://doi.org/10.1097/sih.0000000000000226>.
- Shin, S., Park, J.-H., Kim, J.-H., 2015. Effectiveness of patient simulation in nursing education: meta-analysis. *Nurse Educ. Today* 35 (1), 176–182. <https://doi.org/10.1016/j.nedt.2014.09.009>.
- Small, S.P., Colbourne, P.A., Murray, C.L., 2018. High-Fidelity simulation of pediatric emergency care: an eye-opening experience for Baccalaureate nursing students. *The Canadian Journal of Nursing Research. Revue Canadienne de Recherche en Sciences Infirmières* 50 (3), 145–154. <https://doi.org/10.1177/0844562118767786>.
- Stockmann, C., Diaz, D.A., 2017. Students' perceptions of the psychological well-being of a transgender client through simulation. *J. Nurs. Educ.* 56 (12), 741–744. <https://doi.org/10.3928/01484834-20171120-07>.
- Sundler, A.J., Pettersson, A., Berglund, M., 2015. Undergraduate nursing students' experiences when examining nursing skills in clinical simulation laboratories with high-fidelity patient simulators: a phenomenological research study. *Nurse Educ. Today* 35 (12), 1257–1261. <https://doi.org/10.1016/j.nedt.2015.04.008>.
- Thomas, J., Harden, A., 2008. Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC Medical Research Methodology* 8 (1), 45, 1–10. <https://doi.org/10.1186/1471-2288-8-45>.
- Tong, A., Flemming, K., McInnes, E., Oliver, S., Craig, J., 2012. Enhancing transparency in reporting the synthesis of qualitative research: ENTREQ. *BMC Med. Res. Methodol.* 12 (1), 181. <https://doi.org/10.1186/1471-2288-12-181>.

- Walton, J., Chute, E., Ball, L., 2011. Negotiating the role of the professional nurse: the pedagogy of simulation: a grounded theory study. *J. Prof. Nurs.* 27 (5), 299–310. <https://doi.org/10.1016/j.profnurs.2011.04.005>.
- Wenger, E., 1998. *Communities of Practice: Learning, Meaning, and Identity*. Cambridge University Press, Cambridge.
- Wertsch, J.V., 1991. *Voices of the Mind: A Sociocultural Approach to Mediated Action*. Harvard University Press, Cambridge, Massachusetts.
- Yuan, H.B., Williams, B.A., Fang, J.B., 2012. The contribution of high-fidelity simulation to nursing students' confidence and competence: a systematic review. *Int. Nurs. Rev.* 59 (1), 26–33. <https://doi.org/10.1111/j.1466-7657.2011.00964.x>.



## Paper 2

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# The sense of a patient: An ethnographic multi-site field study exploring the influence of manikins on nursing students' learning



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## ABSTRACT

The purpose of this ethnographic study was to gain insight into the influence of full-body human-like manikins on nursing students' learning. The research question that guided the study was: How do the presence and use of human-like manikins influence nursing students' learning? Data were collected during 15 educational sessions, using different manikins for various activities. Applying cultural-historical activity theory, this study explored the use of manikins as a mediated activity.

The study's main result was the interplay of five categories. In the first category, manikin as an object, manikins were used to teach and learn technical skills. In the second category, manikin as a subject, manikins were used to teach and learn to perform those skills with care. The third category, the interplay, illustrates how these two approaches were present in all sessions. Category four, the individual learning space, provided students with a feeling of working with a patient. Category five, the collective learning space, awarded collaborative and reflexive learning opportunities.

We concluded from this study that manikins may introduce students to the balance between the technical and interpersonal aspects of nursing practice. Being aware of how manikins influence learning, educators can make more targeted use of manikins and support lower-grade nursing students in their learning process and professional development.

## 1. Introduction

Simulation-based activities are prominent and appreciated educational methods that contribute to the acquirement of many qualifications required in nursing practice, such as cardiopulmonary resuscitation (Ackerman, 2009) and medication administration (Fusco et al., 2021). The simulation field covers a complex range of methods, where the use of full-sized human-like simulators with varying technological features is prominent. In educational practice, the simulator, or manikin, represents the patient (Cooper & Taqueti, 2004; Liocce et al., 2020). The most advanced manikins can respond with a wide range of reactions, and different parameters can be monitored. Medium-range manikins have fewer responses and afford fewer options. The simplest manikins may have no technological features and are commonly used for practising technical skills. This study focuses on all kinds of full-body manikins and their impact on nursing students' learning, regardless of technological level, excluding body parts, such as arms to practice injections or skin pads to learn suturing. Fig. 1 shows nursing students training vital skills with a medium-range manikin.



Fig. 1. Nursing students training vital skills with a medium-range manikin.

Comprehensive, systematic reviews mirror what nursing students learn from manikin-simulated activities. Several studies postulate that

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deploying manikins in simulations enhances the acquisition of theoretical knowledge and supports students in developing critical thinking and clinical judgement competencies (Cant & Cooper, 2010; Lapkin et al., 2012). Furthermore, it is reported to improve internalisation of psychomotor skills (Kim et al., 2016; Shin et al., 2015) and strengthen self-confidence and self-efficacy (Cant & Cooper, 2010, 2017; Labrague, et al., 2019). Levett-Jones et al. (2019) found immersive simulations with manikins, superior to other methods in enhancing empathy for vulnerable patients. In other words, using manikins as educational tools in simulations supports nursing students in developing essential qualifications.

However, much of this empirical knowledge originates from evaluative studies in which technologically advanced manikins that can imitate human features are assigned a name and a medical history and used in scenario-based high-fidelity activities. Consequently, we possess a lesser understanding of what employing simpler manikins means. There is also limited knowledge of how manikins' looks influence participants. For example, the limited use of manikins with dark skin tones influences dark-skinned participants' possibilities to identify with the patient represented by the manikin and their feeling of belonging in the learning environment (Graham & Atz, 2015; Graham et al., 2018).

To summarise, we have limited insight into how manikins themselves contribute to learning. The current status of knowledge may underestimate hidden possibilities that the use of less technologically advanced manikins is invested with. To make more efficient and targeted use of manikins, a broader insight into the significance of manikins in nursing students' learning is needed.

### 1.1. Manikins' influence on learning

Investigations into the nature of manikins provide insight into the core using manikins in nursing education: they seem to have inherent multi-sidedness. Hopwood et al. (2016) explained that manikins consist of a technical, clinical, and human body, and depending on the situation, students turn to one or more of these natures. Ireland (2017) described the manikin as a hybrid of technology and human sides, present as both a physical object and symbolical as a human. It is noteworthy that manikins' multiple natures may contribute to the development of a professional identity, as it allows students to act and think as if they were nurses treating patients (Ashley & Stamp, 2014; Berragan, 2014; McNiesh, 2015; Handeland, Prinz, Ekra, & Fossum, 2021). Similarly, nursing students approach a manikin as a doll and patient, stimulating technical and caring skills simultaneously (Handeland, Prinz, Ekra, & Fossum, 2021). Since a manikin's simulated form resembles reality, it may inculcate experiences that provide an understanding of reality. Hence, nursing students retain their experiences with manikins, which may significantly impact their learning (Dunnington, 2014).

Manikins influence the social learning environment in education. Anderson and Nelson (2015) concluded that manikin simulations could provide an environment for developing therapeutic communication skills. Lavoie et al. (2020) investigated simulation-based activities in various health professional educations, highlighting how manikins support authentic interactions and communication, creating an interactional authenticity. The study indicates that manikins' meaning for learning is connected to how users perceive them. Advanced manikins in realistic scenarios are not synonymous with high-fidelity or realism. What is more relevant is to what degree the participants experience the situation as authentic (Bland et al., 2014; Dieckmann et al., 2007; Lavoie & Clarke, 2017).

Against this backdrop, it seems decisive to learn how manikins are understood and used. Helle and Säljöe (2012) called for a shift from evaluative research to investigative research on learning mechanisms when technological tools are used in health education. Moreover, Dunnington (2014) demanded a more contextual application of high-fidelity simulations beyond the instrumental and technical aspects.

Concerning the use of manikins in nursing education, we find these calls relevant.

### 1.2. Theoretical framework

Social constructionism supports our work, as the results cannot be viewed as fixed or static but coloured by both the researchers' and the participants' interactions and the researchers' analytic process (Alvesson & Sköldbberg, 2018). Specifically, we draw on cultural-historical activity theory (CHAT) to explore how the use of manikins influences nursing students' learning. CHAT descends from Vygotsky's sociocultural tradition, commonly used to investigate educational practice and learning. Among others, Leontjev and Engeström developed Vygotsky's ideas into the contemporary activity theory (Engeström, 2001; Roth & Lee, 2007; Säljö, 2010; Sannino & Engeström, 2018). While the Vygotskian tradition emphasises how individual actions are mediated and evolve in a specific cultural and historical context, CHAT recognises collective activity systems as the focal point of analysis.

CHAT understands activity systems as patterns of meaningful individual actions that form a specific and shared target: the object of activity (Engeström, 2001, 2011; Sannino & Engeström, 2018). Activity systems occur as communities of multitudes of norms, meanings, traditions, and interests that shape the actors' behaviours; they are multi-voiced (Engeström, 2001). Activity systems continually constitute and reproduce cultures, and in most cases, multiple cultures exist within one system (Claxton, 2002; Kumar, 2019; Kumpulainen & Renshaw, 2007). Since learning and education occur in a specific cultural context, a learning culture mirrors the system's conceptions of what knowledge is, what learners should learn, and how they learn (Kumar, 2019). In other words, the learning culture affects how we organise education.

Knowledge and learning are inseparable in CHAT. Knowledge arises and develops among people through activities directed towards the object of activity, while learning is the distribution of knowledge in the process. Learning is a dynamic process of interactional patterns mediated by culturally developed tools: mediators of knowledge. Mediators shape how people think and act and link individuals' minds to the social world (Engeström, 2001; Sannino & Engeström, 2018; Wells & Claxton, 2002).

Inner tensions and contradictions occur in all activity systems. Such contradictions may become sources of development and innovation that, in the succeeding step, initiate a change in the object of activity (Engeström, 2011; Sannino & Engeström, 2018). When actors direct their activity towards a new object, the activity system transforms. Engeström (2001) depicts this change as expansive learning, which implies an augmentation of the system's possibilities and potential. While research on nursing education in the context of CHAT is limited, Berragan (2013) outlines two activity systems of educational nursing activity and clinical healthcare practice, suggesting that simulation learning can initiate expansive learning that bridges the two systems.

### 1.3. Purpose

The purpose of this ethnographic study was to gain new insight into the influence of human-like manikins on nursing students' learning. The following research question guided this study: *How do the presence and use of human-like manikins influence nursing students' learning?*

## 2. Methods and design

An ethnographic multi-site field study based on the frameworks proposed by Hammersley and Atkinson (2019) and Madden (2017) was conducted. These frameworks understand ethnography as systematic and participative investigations into peoples' lives and activities. Ethnography is appropriate for capturing and understanding the meaning of everyday practices and activities, such as education (Pole & Morrison, 2003; Reeves et al., 2013), and is suitable and complementary



to CHAT (Kumpulainen & Renshaw, 2007). Combining data collection methods is common while investigating the topic from several perspectives and eliciting relevant data. In this study, observations and interviews were used. The categories were generated from the interpretation of data (Hammersley & Atkinson, 2019). We used the Standards for Reporting Qualitative Research (SRQR; O'Brien et al. 2014) since it is suitable for various qualitative studies and not limited to interviews.

### 2.1. Field and participants

Following Madden (2017), we view the field as a social and mental construct that can be shared across similar sites; the field is more of a situation than a physical place. Thirteen university colleges and universities in Norway provide a three-year bachelor's degree in nursing (Norwegian Nurses Organisation, 2021) and were eligible for inclusion. However, we contacted eight of these institutions due to a long distance for data collection. The inclusion criterion was that a full-body manikin, of any type, was used in an educational activity during the students' first semester. In addition, we searched for variations in how different manikins were used in various learning activities. Three of the eight universities representing four campuses (A-D) met the inclusion criterion, and the relevant institutional boards approved participation. Together, these four campuses constituted our field.

A purposive sampling strategy was used to select participants (Etikan, 2016). The teachers responsible for the relevant courses were contacted and they gave their consent for participation. Most of these teachers were experienced educators and simulation facilitators. First-year students were recruited because we sought to capture their initial and early actions, reactions, and experiences with manikins. We wanted them to have limited experiences with both patients and manikins prior to the study. Consequently, the data collection was performed before the students' first placement in nursing homes. Written information about the study and invitations to participate were provided to the students before they gave their consent to participate. Participants for interviews were recruited during the observations.

The four campuses had different skill training facilities and equipment. There were variations in the room sizes, from small single-bed rooms to ward units with 11 beds. However, the similarity in equipment and interiors was striking. All the facilities were designed to imitate a realistic hospital context. Learning activities varied from skill training to scenario-simulation. The manikins ranged from advanced simulators to simple ones. At campuses A, B, and C, the students worked in groups of two to four when practising basic clinical skills. At Campus A, the groups used manikins freely when they were available. At Campus B, students moved between workstations. At campuses A and B, the teachers walked between groups. At Campus C, the groups shifted between three workstations, with one teacher positioned at each station. At campus D, the students worked in groups of three to six and applied basic assessment skills in a patient scenario, with one teacher facilitating and voicing the manikin. Here, a debriefing session was used after every session. Table 1 provides an overview of these sessions.

### 2.2. Data collection

The first author collected data during 15 educational sessions from mid-September to late November 2019. Data collection was set from the start and bound to the timeframe and the location of each session. We optimised continuity as questions and topics of significance were carried over from one session to another for further investigations, connecting one session to the next and across the campuses. We experienced saturation effect during data collection as we realised that the participants' descriptions and experiences were being repeated and confirmed (Crang & Cook, 2007). This served to validate the upcoming data interpretation.

Partly participating observations were the primary data sources. With observations, we aimed to capture the actions and conversations

related to manikins. A thematic observation form guided the observations (see Table 2). Observations were turned into text, as field notes were taken during the sessions. The field notes were structured chronologically depending on what happened throughout the sessions, and significant or surprising statements or occurrences were described in detail (Hammersley & Atkinson, 2019).

Since we aimed to deepen and explore significant observed events, 23 conversational interviews complemented the observations. All interviews were performed and recorded in separate rooms immediately after each session. The informants were encouraged to describe their experiences using a semi-structured, thematic interview guide (see Table 3). The interviews lasted for 8 to 37 minutes (mean: 16.6 minutes). Nine teachers were interviewed individually, and a total of 14 interviews were conducted with 17 students. In two interviews, two and three students, respectively, were interviewed together because they had interacted in a way that had caught interest. Table 4 presents an overview of the interviews.

### 2.3. Reflexivity

Through self-reflection on the researchers' role during data collection, we attempted to increase transparency, dependability, and credibility (Hammersley & Atkinson, 2019; Madden, 2017). The first author entered the field primarily as a researcher, secondarily as a nurse and nurse teacher. To fit in and follow the dress code for skill laboratories, the researcher wore a uniform. Depending on the context of each session, the researcher shifted between standing still and walking around. During the observations, spontaneous conversations were held with the participants if they said or did things that raised questions. Sometimes, the participants were eager to discuss and answer questions, and, at other times, they ignored the researcher, with some students indicating that they had not noticed the researcher. Some teachers expressed a feeling of being supervised by the researcher's presence. With a background as a nurse and nurse teacher, the surroundings, equipment, and language, in the sessions were familiar to the first author, enabling an understanding of what was going on and where to direct attention. It facilitated an emic perspective and enabled the asking of relevant questions. One campus was the researcher's workplace, and most teachers and facilities were known, which may have affected both the required etic perspective and ability to pay attention to new things (Madden, 2017). However, data from the other three campuses helped balance out the situation.

### 2.4. Analysis

In line with the epistemological assumptions in ethnography, we prepared a systematic yet flexible analysis process, combining coding and ethnographic writing. Ethnographic writing is about structuring and writing up what the interpreted data is 'really' about (Madden, 2017). CHAT was applied to the discussion, but it also influenced the analysis because it was performed with us bearing these concepts in mind, and we investigated the sessions as one activity system. Table 5 provides an example of the analysis process.

The handwritten field notes were transformed electronically into descriptive, full-text field notes immediately after each session. The recorded interviews were transcribed verbatim and slightly adjusted to the written text. Subsequently, the field notes and transcribed interviews were merged into 15 descriptive and reflective field descriptions, aiming to depict each session as a unique event. The field descriptions were uploaded into the NVIVO12 software tool (QSR International, 2018), facilitating the coding process. An immersive reading of each field description was followed by systematic line-by-line coding of all the texts to identify data relevant to our research question. Coded data were inductively given descriptive labels, resulting in 19 descriptive categories (Saldaña, 2015). The corresponding author was responsible for the initial preparation and coding of the data.

**Table 1**  
Overview of observed sessions.

Campus	Observation hours	Learning objective	Manikin	Previous experience with manikins	Teachers (Trained facilitators)	Students (Men)	Teachers interviewed	Students interviewed
A	9h 30min	To learn assessment of vital signs and place the patient into Fowler's position	Laerdal® Nursing Anne Simulator® with SimPad	First experience	7 (4)	92 (30)	3	2
B	8 h 30min	To learn ostomy care, urinary catheterisation, and intramuscular and subcutaneous injections	Laerdal Nursing Anne® for skill training/ non-technological	Second to fourth experiences. One previous experience in insertion of nasogastric tube	3 (1)	23 (0)	2	3
C	5h 25min	To learn assessment of vital signs and experience normal respiration, heart rate, and blood pressure values	Laerdal Nursing Anne Simulator® with SimPad and Laerdal 3G SimMan® with LEAP	First experience	5 (3)	57 (8)	1	3
D	11h 25min	To practice assessment of vital signs, implement nursing actions, and communicate and cooperate in scenario	Laerdal Nursing Anne Smulator® with SimPad	Second experience. One previous experience in the assessment of vital signs	3 (3)	32 (7)	3	6
<b>34h 30min (Mean: 2h 30 min/session)</b>					<b>18 (11)</b>	<b>204 (45)</b>	<b>9</b>	<b>14</b>

\* It was a coincidence that all manikins were from Laerdal, though is the largest manufacturer of simulation equipment in Norway.

**Table 2**  
Contents of the observation form (original table translated from Norwegian).

Focus	Specification
<b>Participants' actions:</b>	How do the participants: <ul style="list-style-type: none"> <li>- Approach the manikin?</li> <li>- Handle the manikin?</li> <li>- Act throughout the session?</li> </ul>
<b>Language, conversations, and verbal expressions:</b>	<ul style="list-style-type: none"> <li>- What do the participants say to each other?</li> <li>- How do the participants talk to/address each other?</li> <li>- How do the participants talk about/to the manikin?</li> <li>- What spontaneous expressions and utterances occur?</li> <li>- What emotions are expressed and how?</li> </ul>
<b>Non-verbal communication:</b>	What nonverbal expressions occur: facial expressions, gaze/eye contact, gestures?
<b>Social atmosphere:</b>	<ul style="list-style-type: none"> <li>- How do I experience the social climate?</li> <li>- How do the participants organise themselves?</li> <li>- How do the groups work?</li> <li>- How do the participants cooperate?</li> </ul>
<b>Objects and surroundings:</b>	<ul style="list-style-type: none"> <li>- How do the participants stand?</li> <li>- Where do they position themselves in the room?</li> <li>- Are specific items shown attention? Which, how?</li> <li>- How do the participants relate to physical objects in the room?</li> </ul>

The authors individually read the data for each category, and, in collaboration, the categories were cleaned by merging some and removing others whose data were not relevant to the research question. To protect and bring out the original data content, the data were processed in Norwegian. From this point, the text was written in English, as the authors' writing became freer. Thereafter, the categories were interpreted and organised to capture and formulate relevant patterns in the data,

resulting in five analytic categories that formed the base of the ethnographic writing. Since patterns appeared both inside and between the categories, the categories were interwoven. We sought persistent interactional patterns, repeating events, and contradictions. Iteratively, we verified our interpretations by re-reading the field descriptions to understand the findings in their original context and consulted the literature and theory to explore and elaborate on our reflections and test our ideas.

**Table 3**  
 Contents of the interview guide (original table translated from Norwegian).

Questions for students and teachers	Follow-up questions
<b>Introduction: Experience of session and own participation</b>	<ul style="list-style-type: none"> <li>- Can you tell what you have done today?</li> <li>- What attitude and expectations did you have?</li> <li>- Can you tell your experiences and how you felt?</li> <li>- Can you describe your experience in a few words?</li> </ul>
<b>Ending: Events or moments of significance</b>	<ul style="list-style-type: none"> <li>- Did something positive or negative happen that made a special impression? What do you think about that now?</li> <li>- I heard you say: "xxx"- Can you explain what you meant?</li> <li>- I saw you did "xxx"- What do you think about this?</li> </ul>
<b>Questions for students</b> <b>How was it to relate to and use the manikin?</b>	<ul style="list-style-type: none"> <li>- How was the meeting with the manikin? How was it to use it?</li> <li>- What do you think about it now?</li> <li>- How would you describe your own and your group's attitude to the manikin?</li> <li>- Has it added something to use a manikin; what?</li> <li>- What would you say you have learned?</li> <li>- How did the manikin affect you during the session?</li> </ul>
<b>How did you experience the relation to peers and teachers?</b>	<ul style="list-style-type: none"> <li>- How did you feel in the group?</li> <li>- Do you know the other students? What significance does it have?</li> <li>- What do you think about your group's collaboration?</li> <li>- What significance does the collaboration have?</li> <li>- What do you think of your group's communication?</li> <li>- How did you experience the relation and communication with the teacher?</li> </ul>
<b>Questions for teachers</b> <b>How was it to relate to and use the manikin?</b>	<ul style="list-style-type: none"> <li>- How would you describe your attitude to the manikin and to using it the way you have done today?</li> <li>- How do you think it is for the student to meet and use the manikin?</li> <li>- How do you think they experienced it using the manikin?</li> <li>- Do you think it has added anything to use manikin the way you did? If so, what?</li> <li>- Have you thought of how your own way of talking about/relating to the manikin affect the students?</li> </ul>
<b>How did you experience the relation to the students?</b>	<ul style="list-style-type: none"> <li>- What do you think of the students' communication and cooperation?</li> <li>- How did you experience your contact and communication with the students?</li> </ul>

2.5. Ethics

The Norwegian Centre for Research Data approved this study (NSD, ref. no: 834499). Ethical approval was obtained from the ethical board of the University. Each participant signed a written consent form on the session day. They were informed that they could withdraw from the study at any time with no resulting consequences. Some students only consented to participate in the observations. The participants were assured that their participation was anonymous, and citations would be modified to secure their anonymity. We considered the participants to belong to no vulnerable groups, and the study and reporting were considered to involve no harm to the participants or field. The processed data required to reproduce the results cannot be shared due to ethical reasons.

3. Results

Through the interpretation of the 15 field descriptions, we found five analytic categories. In the first category: *manikin as an object*, manikins were used to teach and learn technical and procedural skills. In the second category: *manikin as a subject*, manikins were used to practise the same skills in a caring manner. The third category: *the interplay between the object and the subject*, describes how these two approaches were in play in parallel. Further, two learning spaces were permanently present. In category four: *the individual learning space*, students' experiences and explorative activities gave them the feeling of dealing with a patient. Category five: *the collective learning space*, involved opportunities for collaborative and reflexive learning. The results are illustrated in Fig. 2.

**Table 4**  
Overview of interviews.

Interview no.	Informant	Age	Gender	Student: Previous experience in patient work? Yes, No, Some	Student: Previous experience with simulation or manikins? Yes, No, Some
1	Teacher	55	F	-	-
2	Student	40	F	No	No
3	3 Students	22, 25, 23	F, M, M	No, Some, No	No, No, No
4	Teacher	34	F	-	-
5	Teacher	39	F	-	-
6	Student	21	F	No	No
7	Teacher	62	F	-	-
8	Student	28	F	Yes	No
9	Student	24	F	Yes	Yes
10	Student	20	M	No	No
11	Teacher	48	F	-	-
12	2 Students	19, 24	F, F	Some, Some	No, No
13	Student	49	F	No	No
14	Teacher	60	F	-	-
15	Student	20	M	No	No
16	Student	19	F	No	Some
17	Teacher	37	F	-	-
18	Student	33	F	No	No
19	Student	32	F	Yes	No
20	Teacher	33	F	-	-
21	Student	20	F	No	No
22	Student	19	F	No	No
23	Teacher	43	F	-	-
		Students' Mean: 25.7 years			
		Teachers' Mean: 39.5 years			

**Table 5**  
Examples of coding process and interpretation of data.

Coded data	Descriptive category	Analytic category	Interpreted patterns	Integrated into results
<i>During this situation, neither the students, nor the teacher pay any attention to the manikin, except the arm they use to take blood pressure. (Field note 6)</i>	Students' treatment of manikin	Students' treatment and descriptions of, and reactions to the manikin	Students focus on a body part and use manikin as a technical skill tool Students treat manikin as a patient with care in skill training Manikin gives feedback and confirmation	Manikin as object Manikin as subject Manikin as object
<i>Although most of them ignore the patient, there are exceptions; one student is to set an injection on the manikin's hip. Suddenly, she realises that it might lie uncomfortable and supports it with some pillows. (Field note 9)</i>				
<i>"I think if we had not had that doll, I would have been much more insecure. I got confirmation of what I was doing, that the technique I had was right, it helped me a lot". (Field note 4)</i>	Students' descriptions of using a manikin		The manikin's human body gives the feeling of doing procedures on a patient Spontaneous reactions, exploration of face, touching	The individual learning space The individual learning space The collective learning space
<i>"You get the feeling of how it is. Just knowing theoretically how a procedure works, you don't get the impression of how it feels, but you get that with the dolls, you feel resistance, you get those distances, for example to the catheter, it helped a lot, because you got the feeling of what it's actually like to do it, and you see that you are doing it right". (Field note 8)</i>				
<i>Immediately, some of them notice the manikins as they enter. I hear one exclaiming: "Cool!". Some walk over to it, look at it, touch it, put an ear to the mouth, put their hand on its chest. (Field note 1)</i>	Students' reactions to manikin		Reactions to sounds, signs of life and human-like features, Initiates discussions and reflection	
<i>When the manikin starts to breathe visibly and audibly, someone exclaims "Wow!". This triggers a little smile and laughter. One says: "he breathes heavily!" When the doll gets stridor, someone laugh and smile, someone start to discuss "could it be COPD?". (Field note 7)</i>				

3.1. Manikin as an object

Sometimes, the students and teachers approached the manikin as an object to teach and learn technical skills. This approach was most evident in the sessions with formal learning goals to learn such skills. Thereafter, the teachers primarily and explicitly introduced the manikins as dolls and not as patients. They had an instrumental approach to the manikin and used it to transfer and practice psychomotor skills, such as taking blood pressure or performing urinary catheterisation. When taking this approach, teachers emphasised that students should acquire such skills alone:

*Today, there was no exercise in communication and interaction or anything like that; it was more directly on the procedure and hearing blood pressure. (Interview 5: Teacher)*

They stated that students must become familiar with handling equipment correctly. They were aware that the students were inexperienced and acquiring new skills was challenging. A teacher who taught urinary catheterisation said:

*The first time you do a procedure, you focus on the equipment and the small spot where to insert the catheter, without thinking that the body is*

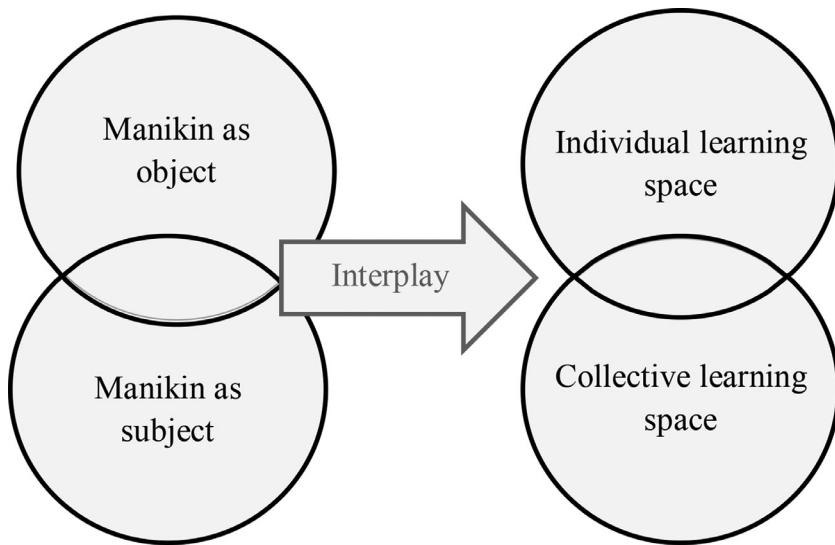


Fig. 2. Illustration of results, derived from the interpretation of the 15 field descriptions.

anything more than the urethral opening. The students must be allowed to start there. (Interview 14: Teacher)

Another teacher said that the students should first acquire and build a foundation of basic psychomotor skills before they could develop the communicative and caring skills required to deal with human beings:

*They must get good at something and get a foundation to build on. Students who had previously taken the course said that there were too many elements if we included all. So now, we only focus on the procedures to become good at those. That is why we train on dolls and not patients.*

(Interview 11: Teacher)

Consequently, the manikin's resemblance to humans added little meaning to how they were used. Only body parts were given attention. One teacher called the manikin a *spot to inject on*. The teachers drew little attention to the manikin's human features and did little to indicate that it should be anything more than a tool. Situations where teachers used manikins as a table for equipment or leaned on it visually represented this attitude. One teacher remarked:

*We use the mechanism to listen. It becomes an instrument in learning, not [as] a simulator, but as a patient. (Interview 11: Teacher)*

The teachers tended to emphasise the students' procedural performance and equipment handling. In this case, the manikin allowed them to ensure that the students mastered a procedure; for example, if a student obtained a particular blood pressure value, the teacher could verify this with the set value. Hence, the teachers were reassured that the students performed the procedure correctly:

*It is nice to have the doll as an opportunity to check and know that it matches the blood pressure value on the pad. It provides me with an opportunity to control that what they say they have heard is correct; an opportunity for me to say: 'I think it was wrong, you must try again'.* (Interview 4: Teacher)

In parallel, many students appreciated the feedback and confirmation they received from the manikin. It gave them a sense of security and confidence, and a feeling of mastery of technical skills. One student expressed:

*If we had not had that doll, I would have been much more insecure. I got confirmation that the technique I used was correct; it helped a lot! I like to be sure that what I do is right. (Interview 3: Students)*

### 3.2. Manikin as a subject

At other times, the students and teachers directed the manikins as subjects that the students could use to practice communicative and caring behaviour on, together with technical skills. This approach was slightly more significant in the scenario-sessions with a formal learning goal for applying skills to a patient. Moreover, in other sessions, the teachers explicitly expected the students to approach the manikins as persons. With this approach, it was significant that the manikin resembled a human:

*We could have injected in an orange, but no one had thought of asking the 'patient' how it feels. I think we are doing something more by having a patient-like object. (Interview 14: Teacher)*

Therefore, teachers encouraged students to communicate and interact with the manikin, as they would have with a patient. One teacher expected the students to show the same respect for the manikin as they would for each other:

*When we use dolls, I want it to be as realistic as possible, that they show respect for the doll as they would show respect for a peer student. They cover the doll as if it were a peer or another person lying there. (Interview 14: Teacher)*

In their effort to teach the students to show respect, some teachers sometimes reminded students to inform the 'patient' during their work or they pointed out that that the manikin was exposed:

*The teacher asked: 'How do you think the patient feels when lying like that?' After that, the student quickly covered the doll's genitals. (Field description 8)*

Many students recognised communication as a fundamental skill in nursing practice. Therefore, they agreed to the necessity of practising communicative skills, reminding themselves that the manikin was supposed to be a patient. As one of them remarked:

*I believe there is learning in getting that communication part, that we always remember that it is a patient and not only a doll; it is a patient we are training on. We must remember to treat it as a patient in the way we talk to it, that we explain what we are doing because we know that communication is the most important to practice in everything we do. (Interview 8: Student)*

Frequently, students were observed acting according to this idea. This also occurred in sessions where the formal learning goal was technical skills, and the teachers only expected them to approach the manikins

as objects. It became apparent in situations where some students spontaneously and without solicitation treated the manikin with care:

*Later, I noticed that the student carefully covered the manikin with the blanket. (Field description 4)*

Another student visualised this when she pretended to knock at an invisible door, entered the patient's room, and explained to the manikin what she was doing throughout the procedure, even though the manikin was non-technical and voiceless.

### 3.3. The interplay between the object and subject

In all sessions, the students and teachers shifted between approaches to the manikin as an object and a subject. This depended partly on the formal learning objectives and partly on the teachers' instructions. For example, the formal learning objective at campus A supported the object approach, but some teachers took the object approach, while others the subject approach. At campus C, both formal and informal expectations emphasised the object approach. However, for some students, the manikin's human resemblance was meaningful, and they felt that the teachers reduced this meaning if they did not support it through their behaviour:

*Even if we know that it was only a procedure we are going through, it is essential that they [the teachers] are role models in a way, that they say that this is a person and that we should not lean over the person, that we should not keep the arms on the person. We do not do that! (Interview 9: Student)*

Considering all the sessions, both approaches were continuous in play, in parallel. Generally, this interplay was harmonious and allowed the students to practice procedural, communicative, and caring skills together. Nevertheless, teachers sometimes behaved contradictorily. Once, a teacher referred to the manikin as a subject, asking a student what the patient would think while at the same time punching the manikin in the chest. In another situation, the teacher said that the main benefit of manikins was that the students did not have to reflect that a patient feels pain, even if they had, seconds before, told them to treat it like a patient.

Although the students knew that manikins did not feel pain, the thought of hurting them as patients almost hindered some of the procedures. A student who changed a stoma exclaimed that she feared that it would hurt. In similar situations and technically advanced procedures, the teachers sometimes referred to the manikin as a patient they did not need to pay attention to; the manikin does not scream if it hurts. She said:

*You do not have to think that it is a patient; we do not have to consider human considerations. (Field description 6)*

To enable the students to act as required, the teachers encouraged them to distance themselves from the manikins as subjects and treat them as objects.

Sometimes it seemed challenging for these first-year students to communicate with the manikin simultaneously as they struggled with the procedures. In one situation, the student looked confused when the teacher asked if she had informed the patient while sorting equipment and preparing for catheterisation. In this way, she was forced to shift her approach towards the manikin from that of an object to that of a subject.

### 3.4. The individual learning space

In this interplay, each student had individual experiences when using the manikin. During each session, the manikin often transformed from being an unfamiliar object they barely dared to touch into a source of practical experience and a feeling of dealing with patients. One teacher was convinced that students remember the experiences and emotions

they get from using manikins in a way different from the one they do with theoretical knowledge:

*I think emotions mean a lot; experiences mean a lot. It sticks. You get a hook to hang it on and associate with. I am sure that the students who were startled will remember it; they bring this feeling with them. (Interview 11: Teacher)*

Four underlying aspects contributed to this feeling. The first was the manikin's face. The students showed curiosity by exploring and picking at the manikin's face. Frequently, they looked at its eyes and examined its teeth and mouth. Even if some students found the face uncanny, it transformed the manikin into someone they could talk to. Some students who worked with a pelvic during catheterisation missed this opportunity:

*I think it was boring to have a pelvic for this procedure. It is bad not to have a face to talk to, even if the focus is on the genitals. Another student, who first used the pelvis, then the manikin, said: 'There is a difference, it is easier to talk to the doll: the face helps'. (Field description 8)*

The second aspect lay in talking to the manikin. Many students described how their talking to the manikins reinforced the feeling that they were dealing with a patient. Mostly, the students talked to the manikin when the teacher voiced it. However, it was surprising how some spoke to the manikin even when it was voiceless. Students sometimes created imaginary conversations with a patient envisioned in their mind, as exemplified by a student who was injecting the manikin in a session where the teachers did not expect the students to talk with it as a patient:

*She talked carefully to the manikin and informed it that: 'Now you will get some morphine so you can get rid of your pain; that will be good'. (Field description 9)*

The third aspect was the value of hearing sounds and listening to the manikin. This aspect separates the session in which they used non-technological manikins from more technologically advanced ones. Hearing pathological sounds had a different impact than hearing healthy sounds of peers. The sounds amplified and clarified their experiences:

*We heard normal respiration, which changed into wheezing sounds, such as in COPD patients. It sounded realistic, and it was stronger. At the same time, the sounds were clean; it sounds right, making it easier to know what to listen to. It is good learning 'this is how it should sound'. (Interview 8: Student)*

The fourth aspect of touching the manikin was complex. All students were familiar with touching their peers as patients during skill training. However, many experienced it as challenging and embarrassing to touch each other. A teacher believed this was because they must cross an intimate barrier. The manikin appeared to be neutral and removed this barrier.

*The doll makes it easier to practice procedures that can be challenging to do on each other because it feels too 'intimate', such as care... (Interview 8: Student)*

The manikin enabled students to touch in a more caring manner. Frequently, students were observed comforting the manikin by patting it on the back or arm or wiping invisible spittle or sweat.

Together, these four aspects provided students with a feeling of interacting with a patient. Many students described this feeling as the most crucial learning benefit:

*You get the feeling of how it is. Just knowing theoretically how a procedure works, you do not get the impression of how it feels. But you get that with the dolls; you feel resistance; you get those distances, for example, to the catheter. It helped a lot because you got the feeling of what it is like to do it. (Interview 12: Students)*

### 3.5. The collective learning space

In all the investigated sessions, the manikin became a meeting point for conversations and reflections. Frequently, two or three students, alone or together with a teacher, gathered around a manikin. They asked each other questions and explained what they were doing and how they did it, and introduced different perspectives:

*I get other people's views on things and see their ways of doing things; maybe someone has learned it. Everyone adds to what they have knowledge of. (Interview 10: Student)*

The students not only talked to the manikin as a patient, but they also talked about the manikin with each other. These conversations appeared to be of great importance because they were detached from the presence of an actual patient. They discussed in a way that would have been impossible in the presence of a living patient. A student said:

*Because we cannot talk with it, we communicate with each other. I think that then we communicate better because we cannot communicate with the doll. (Interview 12: Students)*

Teachers participated actively in these discussions and motivated students to describe and reflect on their experiences and impressions:

*The teacher and students stood together, reflecting on different sounds and conditions they may indicate. The teacher asked, 'What did you hear?' They talked and reflected on different respiratory patterns and what may have caused them. The teacher encouraged them to describe what they had heard. (Field description 6)*

A teacher described their role as someone who triggered and stimulated such reflections. Simultaneously, when the students began to interpret their impressions, professional reflections became apparent: *Is this normal?* The manikin gave them a concrete image of a patient. In this way, it became an aid for teachers to convey how clinical skills should be performed.

*The doll facilitates the teacher to show us how to do it. If we are sitting in a classroom, [they] explain things, but we do not always understand it. It is better to see this visually. Like, when you are to insert a catheter and have a urethral opening, [they] can show: 'Now you should put it here'. However, from a book or a picture, it is abstract. (Interview 12: Students)*

In this way, the manikin's body helped visualise things the students had only read about, such as the location of a stoma:

*By having a doll with an apparent stoma, something that looks like an intestine, they at least know where on the body they can find it. (Interview 7: Teacher)*

Often, the teachers visualised the theory and syllabus when they referred to the manikin. The students tied theoretical knowledge with what they were doing and seeing. This became especially clear when it came to physiology and anatomy:

*The teacher asked questions related to physiology and anatomy. I realised that the doll contributed to a tangible and shared focus. (Field description 5)*

Through these discussions and reflections around the manikin, the students expanded their understanding of things they might not have understood before.

## 4. Discussion

To answer the research question, we apply to the results CHAT's concepts: the object of activity, learning and learning culture, and expansive learning. These were the concepts for which we found support in the results. The discussion surrounds how the manikins worked as knowl-

edge mediators and introduced the students to the continuous balance between the technical and interpersonal aspects of nursing practice.

In our findings, students and teachers directed their attention to manikins essentially as objects or subjects. Consistent with Ireland (2017), they used manikins as physical objects or symbolical humans, reflecting the manikins' inherent, dual nature (Handeland, Prinz, Ekra, & Fossum, 2021). Both students and teachers used manikins to optimise students' learning on their way to becoming qualified, competent nurses. In other words, promoting students' learning directed their activities and constituted their object of activity (Engeström, 2001, 2011; Sannino & Engeström, 2018). This objective tied all the sessions together, regardless of formal learning outcomes, type of manikin, or learning activity. Students and teachers employed manikins in the way they perceived them as optimal from this shared object of activity.

Each approach relates to a distinct understanding of how knowledge should be distributed and what first-year nursing students should learn, leading to the emergence of two learning conceptions. When manikins were used as objects, learning appeared to be like a road that the students had to walk step by step, learning one thing at a time. This is consistent with Keskitalo et al.'s (2013) description of learning as acquiring knowledge and skills. This learning conception relates to the learning of technical and procedural competencies in nursing practice. Nevertheless, some studies point out that manikins make students emphasise technical and physical aspects of nursing (Dean et al., 2015; Lee et al., 2019). Therefore, this learning conception can be criticised for detaching communicative skills from technical ones (Anderson & Nelson, 2015).

When manikins were used as subjects, learning unfolded as a process that aims to connect the technical with interpersonal and caring skills, parallel with Keskitalo et al.'s (2013) description of learning as advancing and applying. From this conception, the symbolic human body becomes a subject in the students' imagination. The teachers assume that this provides students with an authentic experience of handling a patient. However, to what extent they learn and retain interpersonal and caring skills by approaching manikins as subjects remains unclear.

The two learning conceptions coexist. Agreeing with Claxton (2002) and Kumar (2019), we argue that they constitute a one-compound learning culture. This learning culture seems to create a stimulating, flexible learning environment that reflects the complexity of nursing practice. If students are supposed to learn a specific technique, such as urinary catheterisation, a relation to the patient can stand in the way and disturb their attempts. Hence, the object is relevant. On the contrary, if the students are expected to understand how to catheterise a patient, it is favourable to activate the notion of a patient: the subject. Since the face is a significant aspect, a symbolic action can be used to cover the manikin's face with a towel to mark when students relate to it as an object and remove it when they relate to it as a subject. In short, it is not the manikins themselves that are essential, but how the students and teachers activate the manikins' qualities. A manikin does not expect anything from anyone, but the participants communicate their expectations to each other through it.

Nevertheless, we sensed a struggle in the students' use of manikins caused by teachers often referring to manikins with ambivalence and inconsistency. Rarely did one clear, unison voice communicate what the manikins were supposed to be. For example, even if the learning outcome was to learn a specific skill (object), teachers sometimes communicated that the students should also learn communication and care (subject).

Reflecting on our findings, expecting first-year students to exhibit caring behaviour the first time they do a procedure seems unlikely. When they are developing their practical skills, students must first learn and master the psychomotor aspects of the procedure sequentially before performing the procedure with accuracy and fluency. They can, then, become flexible and perform the procedure while adapting their actions to the patient's needs. Caring behaviour is fundamental and permeates the other steps (Nielsen et al., 2013). One can argue that stu-

dents should acquire a base of psychomotor skills before developing communicative and caring skills. However, since caring behaviour pervades high-quality nursing, teachers who remind students to inform the manikin are likely to stimulate awareness of this component and invite students to develop caring skills gradually. To support the students' learning process, manikins could, at an early level, be used in simple scenarios to enhance the notion of a patient in skill training before gradually introducing more complex patient-scenarios at higher educational levels.

Learning in the individual learning space is related to experiential learning, as understood in Dewey's tradition (Dewey, 1938; Miettinen, 2000). Manikins stimulate curiosity and spontaneous exploration and engage students' sensory perceptions. Through this, the students train their senses, which is essential in professional nursing practice (Ihlebak, 2018). For example, Lavoie et al. (2020), who found that the impact of hearing realistic sounds when using manikins was significant, support our results. Students' sensory perceptions are processed and interpreted as one meaningful unit: the feeling of doing something with a patient. This feeling seems to evoke emotions and raise an awareness of care. Vygotsky argued that emotions and thoughts are related (Mahn & John-Steiner, 2002). Emotional experiences connect to brain structures that influence deep learning (Goleman, 1995), supporting the teacher who believed that the students remember their experiences with the manikins; they stick in their minds (Dunnington, 2014).

In the collective space, learning is related to collaborative and reflective skills. In this study, when students and teachers gathered around a manikin, they created an environment in which they could discuss in a manner that could not have been possible in the presence of a living patient. Because the manikin possesses human features without human dignity, it allows students and teachers to discuss about it without caring. In our results, these discussions were distinctly more invested with the character of an object than a subject. Through guided reflections (Schön, 1986), or situated coaching (Benner, 2015), teachers support students in becoming reflective professionals early in their education. This challenges the students to reason and argue for their thoughts and actions, which is necessary for professional discussions.

Together, the two learning spaces offer experiential learning and opportunities to train reflective and reasoning skills: what Benner (2015) calls thinking-in-action. However, these skills were not included in the formal learning goals. Additionally, these skills are more difficult to measure than, for instance, the setting of an injection. Only to a limited extent, curriculums in nursing education embrace these skills (Benner, 2015).

A final point to explore is whether manikins are used as a source for expansive learning, implying a change or development in the object of activity initiated by contradictions and opposing forces (Engeström, 2001, 2011; Sannino & Engeström, 2018). Tensions and inconsistencies related to the use of manikins as objects or subjects characterised our results. However, we were unable to derive a solid argument pertaining to these tensions initiating a change consistent with Engeström's (2001) description. The bearing object of activity remains in students' learning. So, where can the object of activity be directed towards developing the system? One solution may be that students and teachers constitute an objective that does not primarily direct students' learning but also that their learning, above all, shall serve the well-being of future patients. An objective of activity resting on patients' well-being may infuse students' learning with a deeper meaning, and it may connect the educational system with clinical practice, similar to what Berragan postulated (2013).

Nursing education can support this change in several ways. Tensions inherent in the manikins' dual nature may be a driving force for change and should not be eliminated. In this study, the students seemed to encounter the struggle or balance between the technical and procedural dimensions, on the one hand, and each patient's needs and well-being, on the other. Increased awareness of this balance may give students an insight into realistic professional practices. We believe that students can

become critical and inquire into existing practices through a shared exploration of this balance. If the students and teachers together become a community of learners (Cordeau, 2012), they may discover new knowledge and new ways of doing things: expansive learning. A redefined object of activity will influence students' and teachers' roles and relations, the organisation of learning methods, and, consequently, the use of manikins.

#### 4.1. Limitations

The purposive sampling strategy with engaged students being interviewed may have limited the findings' relevance (Etikan, 2016). Furthermore, specific cultural characteristics of each campus may have influenced the data. Nevertheless, we believe these limitations were equalised by the large number of sessions and participants and multiple sites. The study postulates findings that ran across the fifteen sessions. The validity depends partly on how we succeeded in elucidating differences in these sessions. From an ethnographic perspective, the study lasted a short period. Additionally, the sessions were time-limited, so only brief connections were made during the observations. Together, this may have provided a broad perspective at the cost of depth.

The researcher's presence and interventions during data collection may have influenced the participant's behaviour and data collected. Some interview questions may have guided the answers in the direction of the results. For example, the question *How was it to meet the manikin?* may have led them to describe the manikin as a subject, though, most participants talked freely and directed the interview to this topic before the questions were asked. Data may unintentionally have been interpreted in the light of the researcher's previous experiences. Nevertheless, the question, when it came to how manikins were used, bore similarity to the first author's practice at other nursing educations. This way, the researcher's presence and experiences may also have served to confirm the observations.

The transcribed interviews, coded material, and results were not verified by participants during the analysis process. For future studies, we recommend cross-checking data with participants before coding. In our case, a selection of participants could have read the transcribed interviews or field descriptions. However, we believe the extensive observations, together with the authors' individual readings and interpretations of the data, to some extent, outweigh this issue. Nevertheless, the authors are solely responsible for misunderstandings or misleading interpretations.

## 5. Conclusions

From this ethnographic study, we found that manikins were approached as objects or as subjects. This interplay reflects the manikins' dual nature, in which there lies the potential for learning both technical and interpersonal aspects of nursing. Additionally, two learning spaces appeared: the individual space, which provides the feeling of doing something with a patient, and the collective space, which provides collaborative and reflective learning opportunities. While both teachers and students directed their activities towards promoting students' learning, it was unclear what the use of manikins entailed because they were used with ambivalence and inconsistency over several sessions.

From the constructs of CHAT, this study enabled a deeper understanding of how students and teachers turn manikins into mediators of knowledge. It also becomes clear that the tensions inherent in the manikins' dual nature may be a driving force for change and expansive learning and should, therefore, not be eliminated. Regardless of the type of manikin and educational method, the use of manikins involves experiential learning and training in professional reflections and dialogue. Thus, the presence and use of manikins may introduce first-year nursing students to the continuous act of balancing the technical and interpersonal aspects of clinical nursing practice necessary for a competent nurse.



### 5.1. Implications for education and future research

Deploying manikins in different educational activities creates possibilities for nursing education. With an increased awareness of the features that influence the learning experience, such as the face, opportunities to explore and talk to and about the manikin, teachers can make targeted use of these features. Experience with manikins shows the potential to link theory and practice. This potential can unfold by facilitating students to work freely with manikins or implementing manikins in theoretical courses. However, a precondition for efficient and targeted use is a higher consciousness and more consistent ways of approaching manikins. We call for increased awareness among nursing teachers about what they want to achieve with manikins and treat them accordingly.

Empirical knowledge of the transferred value of practising caring behaviour with manikins is scarce. Little is known about how these experiences are recalled and activated in meetings with actual patients. This area should be explored further.

This study finds utmost relevance in nursing education. Nevertheless, presumed that the manikins' dual nature is inherent in the manikins being independent of field, culture, and setting, the results may have relevance in other educations where manikins are used. If the complexity and potentials of using full-body manikins are acknowledged, these results can support lower-grade students from various disciplines in their professional formation. This study may inspire different educational disciplines to investigate the implications of how educational tools, other than manikins, are used to mediate knowledge and learning. Here, CHAT represents a useful framework.

### Author contributions

The four authors have made substantial contributions to the manuscript and have given final approval for this version of the manuscript to be published. They have agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. This manuscript has not been published or presented elsewhere in part or its entirety and is not under consideration by any other journal.

### Declaration of Competing Interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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### Supplementary materials

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### References

Ackermann, A. D. (2009). Investigation of learning outcomes for the acquisition and retention of CPR knowledge and skills learned with the use of high-fidelity simulation. *Clinical Simulation in Nursing*, 5(6), e213–e222. [10.1016/j.ecns.2009.05.002](https://doi.org/10.1016/j.ecns.2009.05.002).

- Alvesson, M., & Skoldberg, K. (2018). *Reflexive methodology: New vistas for qualitative research* (3rd Ed.). SAGE.
- Anderson, J. K., & Nelson, K. (2015). Patterns of communication in high-fidelity simulation. *Journal of Nursing Education*, 54(1), 22–27. [10.3928/01484834-20141228-01](https://doi.org/10.3928/01484834-20141228-01).
- Ashley, J., & Stamp, K. (2014). Learning to think like a nurse: The development of clinical judgment in nursing students. *Journal of Nursing Education*, 53(9), 519–525. [10.3928/01484834-20140821-14](https://doi.org/10.3928/01484834-20140821-14).
- Benner, P. (2015). Curricular and pedagogical implications for the Carnegie Study, educating nurses: A call for radical transformation. *Asian Nursing Research*, 9(1), 1–6. [10.1016/j.anr.2015.02.001](https://doi.org/10.1016/j.anr.2015.02.001).
- Berragan, L. (2013). Conceptualising learning through simulation: An expansive approach for professional and personal learning. *Nurse Education in Practice*, 13(4), 250–255. [10.1016/j.nepr.2013.01.004](https://doi.org/10.1016/j.nepr.2013.01.004).
- Berragan, L. (2014). Learning nursing through simulation: A case study approach towards an expansive model of learning. *Nurse Education Today*, 34(8), 1143–1148. [10.1016/j.nedt.2014.03.005](https://doi.org/10.1016/j.nedt.2014.03.005).
- Bland, A. J., Topping, A., & Tobbell, J. (2014). Time to unravel the conceptual confusion of authenticity and fidelity and their contribution to learning within simulation-based nurse education. A discussion paper. *Nurse Education Today*, 34(7), 1112–1118. [10.1016/j.nedt.2014.03.009](https://doi.org/10.1016/j.nedt.2014.03.009).
- Cant, R. P., & Cooper, S. J. (2010). Simulation-based learning in nurse education: Systematic review. *Journal of Advanced Nursing*, 66(1), 3–15. [10.1111/j.1365-2648.2009.05240.x](https://doi.org/10.1111/j.1365-2648.2009.05240.x).
- Cant, R. P., & Cooper, S. J. (2017). Use of simulation-based learning in undergraduate nurse education: An umbrella systematic review. *Nurse Education Today*, 49, 63–71. [10.1016/j.nedt.2016.11.015](https://doi.org/10.1016/j.nedt.2016.11.015).
- Claxton, G. (2002). Education for the learning age: A sociocultural approach to learning to learn. In G. Wells, & G. Claxton (Eds.), *Learning for life in the 21st century: Sociocultural perspectives on the future of education* (pp. 21–33). Wiley-Blackwell.
- Cooper, J. B., & Taqueti, V. R. (2004). A brief history of the development of mannequin simulators for clinical education and training. *Quality and Safety in Health Care*, 13(1), i11–i18. [10.1136/qhc.13.suppl\\_1.i11](https://doi.org/10.1136/qhc.13.suppl_1.i11).
- Cordeau, M. A. (2012). Linking the transition: A substantive theory of high-stakes clinical simulation. *ANS. Advances in Nursing Science*, 35(3), E90–E102. [10.1097/ANS.0b013e318262614f](https://doi.org/10.1097/ANS.0b013e318262614f).
- Crang, M., & Cook, I. (2007). *Doing ethnographies*. Sage.
- Dean, S., Williams, C., & Balnaves, M. (2015). Practising on plastic people: Can I really care? *Contemporary Nurse*, 51(2–3), 257–271. [10.1080/10376178.2016.1163231](https://doi.org/10.1080/10376178.2016.1163231).
- Dewey, J. (1938). *Experience and education*. New York: Kappa Delta Pi/Touchstone.
- Dieckmann, P., Gaba, D., & Rall, M. (2007). Deepening the theoretical foundations of patient simulation as social practice. *Simulation in Healthcare*, 2(3), 183–193. [10.1097/SIH.0b013e3180f637f5](https://doi.org/10.1097/SIH.0b013e3180f637f5).
- Dunnington, R. M. (2014). The nature of reality represented in high fidelity human patient simulation: Philosophical perspectives and implications for nursing education. *Nursing Philosophy*, 15(1), 14–22. [10.1111/nup.12034](https://doi.org/10.1111/nup.12034).
- Engeström, Y. (2001). Expansive learning at work: Toward an activity theoretical reconceptualization. *Journal of Education and Work*, 14(1), 133–156. [10.1080/13639080020028747](https://doi.org/10.1080/13639080020028747).
- Engeström, Y. (2011). From design experiments to formative interventions. *Theory and Psychology*, 21(5), 598–628. [10.1177/0959354311419252](https://doi.org/10.1177/0959354311419252).
- Etikan, I. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, 5(1), 1. [10.11648/j.ajtas.20160501.11](https://doi.org/10.11648/j.ajtas.20160501.11).
- Fusco, L. A., Alfes, C. M., Weaver, A., & Zimmermann, E. (2021). Medication safety competence of undergraduate nursing students. *Clinical Simulation in Nursing*, 52, 1–7. [10.1016/j.ecns.2020.12.003](https://doi.org/10.1016/j.ecns.2020.12.003).
- Goleman, D. (1995). *Emotional intelligence: Why it can matter more than IQ*. London: Bloomsbury Publishing.
- Graham, C. L., & Atz, T. (2015). Baccalaureate minority nursing students' perceptions of high-fidelity simulation. *Clinical Simulation in Nursing*, 11(11), 482–488. [10.1016/j.ecns.2015.10.003](https://doi.org/10.1016/j.ecns.2015.10.003).
- Graham, C. L., Atz, T., Phillips, S., Newman, S., & Foronda, C. (2018). Exploration of a racially diverse sample of nursing students' satisfaction, self-efficacy, and perceptions of simulation using racially diverse manikins: A mixed methods pilot study. *Clinical Simulation in Nursing*, 15, 19–26. [10.1016/j.ecns.2017.08.007](https://doi.org/10.1016/j.ecns.2017.08.007).
- Handeland, J. A., Prinz, A., Ekra, E. M. R., & Fossum, M. (2021). The role of manikins in nursing students' learning: A systematic review and thematic metasynthesis. *Nurse Education Today*, 98. [10.1016/j.nedt.2020.104661](https://doi.org/10.1016/j.nedt.2020.104661).
- Hammersley, M., & Atkinson, P. (2019). *Ethnography: Principles in practice* (fourth edn.). London: Routledge.
- Helle, L., & Säljö, R. (2012). Collaborating with digital tools and peers in medical education: Cases and simulations as interventions in learning. *Instructional Science*, 40(5), 737–744. [10.1007/s11251-012-9216-7](https://doi.org/10.1007/s11251-012-9216-7).
- Hopwood, N., Rooney, D., Boud, D., & Kelly, M. (2016). Simulation in higher education: A sociomaterial view. *Educational Philosophy and Theory*, 48(2), 165–178. [10.1080/00131857.2014.971403](https://doi.org/10.1080/00131857.2014.971403).
- Ihlebaek, H. M. (2018). Blood, sweat, and tears: Making sense of senses in expert nursing. *Ethos*, 46(4), 477–497. [10.1111/etho.12220](https://doi.org/10.1111/etho.12220).
- Ireland, A. V. (2017). Simulated human patients and patient-centredness: The uncanny hybridity of nursing education, technology, and learning to care. *Nursing Philosophy*, 18(1), e12157. [10.1111/nup.12157](https://doi.org/10.1111/nup.12157).
- Keskitalo, T., Ruokamo, H., Väisänen, O., & Gaba, D. (2013). Healthcare facilitators' and students' conceptions of teaching and learning an international case study. *International Journal of Educational Research*, 62, 175–186. [10.1016/j.ijer.2013.09.001](https://doi.org/10.1016/j.ijer.2013.09.001).
- Kim, J., Park, J. H., & Shin, S. (2016). Effectiveness of simulation-based nursing education depending on fidelity: A meta-analysis. *BMC Medical Education*, 16(1), 152. [10.1186/s12909-016-0672-7](https://doi.org/10.1186/s12909-016-0672-7).

- Kumar, A. (2019). Cultures of learning in developing education systems: Government and NGO classrooms in India. *International Journal of Educational Research*, 95, 76–89. [10.1016/j.ijer.2019.02.009](https://doi.org/10.1016/j.ijer.2019.02.009).
- Kumpulainen, K., & Renshaw, P. (2007). Cultures of learning. *International Journal of Educational Research*, 46(3–4), 109–115. [10.1016/j.ijer.2007.09.009](https://doi.org/10.1016/j.ijer.2007.09.009).
- Labrague, L. J., McEnroe-Petite, D. M., Bowling, A. M., Nwafor, C. E., & Tsaras, K. (2019). High-fidelity simulation and nursing students' anxiety and self-confidence: A systematic review. *Nursing Forum*, 54(3), 358–368. [10.1111/nuf.12337](https://doi.org/10.1111/nuf.12337).
- Lapkin, S., Levett-Jones, T., Bellchambers, H., & Fernandez, R. (2010). Effectiveness of patient simulation manikins in teaching clinical reasoning skills to undergraduate nursing students: A systematic review. *Clinical Simulation in Nursing*, 6(6), e207–e222. [10.1016/j.ecns.2010.05.005](https://doi.org/10.1016/j.ecns.2010.05.005).
- Lavoie, P., & Clarke, S. P. (2017). Simulation in nursing education. *Nursing*, 47(7), 18–20. [10.1097/01.NURSE.0000520520.99696.9a](https://doi.org/10.1097/01.NURSE.0000520520.99696.9a).
- Lavoie, P., Deschênes, M.-F., Nolin, R., Bélisle, M., Blanchet Garneau, A., Boyer, L., & Fernandez, N. (2020). Beyond technology: A scoping review of features that promote fidelity and authenticity in simulation-based health professional education. *Clinical Simulation in Nursing*, 42, 22–41. [10.1016/j.ecns.2020.02.001](https://doi.org/10.1016/j.ecns.2020.02.001).
- Lee, J. J., Yeung, K. C. Y., Clarke, C. L., & Yoo, J. (2019). Nursing students' learning dynamics and perception of high-fidelity simulation-based learning. *Clinical Simulation in Nursing*, 33, 7–16. [10.1016/j.ecns.2019.04.008](https://doi.org/10.1016/j.ecns.2019.04.008).
- Levett-Jones, T., Cant, R., & Lapkin, S. (2019). A systematic review of the effectiveness of empathy education for undergraduate nursing students. *Nurse Education Today*, 75, 80–94. [10.1016/j.nedt.2019.01.006](https://doi.org/10.1016/j.nedt.2019.01.006).
- Lioce, L., Lopreato, J., Downing, D., Chang, T. P., Robertson, J. M., Anderson, M., & Spain, A. E. (2020). *Healthcare simulation dictionary* (2nd Ed.). Rockville, MD: Agency for Healthcare Research and Quality Retrieved 7/6/2021 <https://www.ahrq.gov/patient-safety/resources/simulation/terms.html>.
- Madden, R. (2017). *Being ethnographic: A guide to the theory and practice of ethnography* (second edn.). Sage Publications Ltd. [10.4135/9781529716689](https://doi.org/10.4135/9781529716689).
- Mahn, H., & John-Steiner, V. (2002). The gift of confidence: A Vygotskian view of emotions. In G. Wells, & G. Claxton (Eds.), *Learning for Life in the 21st Century: Sociocultural Perspectives on the Future of Education* (pp. 46–58). Wiley-Blackwell.
- McNiesh, S. G. (2015). Cultural norms of clinical simulation in undergraduate nursing education. *Global Qualitative Nursing Research*, 2, Article 2333393615571361. [10.1177/2333393615571361](https://doi.org/10.1177/2333393615571361).
- Miettinen, R. (2000). The concept of experiential learning and John Dewey's theory of reflective thought and action. *International Journal of Lifelong Education*, 19(1), 54–72. [10.1080/026013700293458](https://doi.org/10.1080/026013700293458).
- Nielsen, C., Sommer, L., Larsen, K., & Bjørk, I. T. (2013). Model of practical skill performance as an instrument for supervision and formative assessment. *Nurse Education in Practice*, 13(3), 176–180. [10.1016/j.nepr.2012.08.014](https://doi.org/10.1016/j.nepr.2012.08.014).
- Norwegian Nurses Organisation (NSF) (Where can I study nursing?). Retrieved November 21, 2021. <https://www.nsf.no/nsf-student/hvor-kan-jeg-studere-sykepleie>
- O'Brien, B. C., Harris, I. B., Beckman, T. J., Reed, D. A., & Cook, D. A. (2014). Standards for reporting qualitative research: A synthesis of recommendations. *Academic Medicine*, 89(9), 1245–1251. [10.1097/ACM.0000000000000388](https://doi.org/10.1097/ACM.0000000000000388).
- Pole, C., & Morrison, M. (2003). *Ethnography for education*. Berkshire: McGraw-Hill Education.
- Reeves, S., Peller, J., Goldman, J., & Kitto, S. (2013). Ethnography in qualitative educational research: AMEE Guide No. 80. *Medical Teacher*, 35(8), e1365–e1379. [10.3109/0142159X.2013.804977](https://doi.org/10.3109/0142159X.2013.804977).
- QSR International Pty. Ltd. (2018). NVivo qualitative data analysis software (Version 12).
- Roth, W.-M., & Lee, Y.-J. (2007). 'Vygotsky's neglected legacy': Cultural-historical activity theory. *Review of Educational Research*, 77(2), 186–232. [10.3102/0034654306298273](https://doi.org/10.3102/0034654306298273).
- Saldaña, J. (2015). *The coding manual for qualitative researchers* (third edn). Sage Publications Ltd.
- Säljö, R. (2010). Learning in a sociocultural perspective. In P. Peterson, E. Baker, & B. McGaw (Eds.), *International encyclopedia of education* (pp. 498–502). Elsevier Science. [10.1016/B978-0-08-044894-7.00471-1](https://doi.org/10.1016/B978-0-08-044894-7.00471-1).
- Sannino, A., & Engeström, Y. (2018). Cultural-historical activity theory: Founding insights and new challenges. *Cultural-Historical Psychology*, 14(3), 43–56. [10.17759/chp.2018140304](https://doi.org/10.17759/chp.2018140304).
- Schön, D. A., & DeSanctis, V. (1986). The reflective practitioner: How professionals think in action. *Journal of Continuing Higher Education*, 34(3), 29–30. [10.1080/07377366.1986.10401080](https://doi.org/10.1080/07377366.1986.10401080).
- Shin, S., Park, J. H., & Kim, J. H. (2015). Effectiveness of patient simulation in nursing education: Meta-analysis. *Nurse Education Today*, 35(1), 176–182. [10.1016/j.nedt.2014.09.009](https://doi.org/10.1016/j.nedt.2014.09.009).
- Wells, G., & Claxton, G. (2002). Sociocultural perspectives on the future of education. In G. Wells, & G. Claxton (Eds.), *Learning for Life in the 21st Century: Sociocultural Perspectives on the Future of Education* (pp. 1–17). Wiley-Blackwell.

### **Paper 3**

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# 'I realised it when we played with the doll!': nursing students' learning from participation in an action research project that included manikins

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## ABSTRACT

This qualitative educational action research study aimed to gain knowledge about nursing students' learning from participating in a developmental project that included human-like manikins. Twenty-three second-year Bachelor of Nursing students, one teacher, and one researcher participated in the study conducted at a Norwegian university. In collaboration, they planned and executed a developmental project with manikins in a nursing course. The project put manikins' reflective, explorative, and experiential potentials into play. Two Action Research cycles were carried out. Data were collected using audio recordings, observations, and written responses. The concepts of sayings, doings, and relatings guided the analysis to identify how the modified learning conditions influenced and changed the students' learning. The following four themes illustrate the students' learning in the project: ownership of the learning process, collaborative learning, understanding theory's significance for practice, and taking the patient's perspective. The student's participation in the project, including their independent use and exploration of the manikins, provided freedom and responsibility in decision-making, helped them experience problems, fostered creativity, and stimulated inner motivation. This moved their learning in a more practice-relevant direction.

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## KEYWORDS

Action research; manikins; nursing education; nursing students; qualitative study; simulation-based learning

## Introduction

Simulation represents a diversity of educational methods used in health professional education and interprofessional learning. The International Association for Clinical Simulation and Learning (INACSL) defines simulation as 'an educational strategy in which a particular set of conditions are created or replicated to resemble authentic situations that are possible in real life' (INACSL 2016, S44).

Human-like simulators, also called manikins, are commonly used learning tools in nursing education. These can be full-sized models of a human body with different

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technological levels (Lioce and Lopreato 2020). Generally, manikins seem to provide reflective, explorative, and experiential learning potentials (Handeland et al. 2022), which may stimulate students' learning. In addition, the active and targeted use of manikin-based simulated activities shows potential for integrating theory and praxis and connecting education and professional practice. Simulation as a learning modality may reduce the gap between theory and clinical practice (Berragan 2013; Lee et al. 2019; Mulyadi et al. 2021).

However, although manikins are commonly used, we have insufficient knowledge about how to develop educational strategies including manikins that actively involve students in their learning process. Such knowledge may help teachers in developing new and creative methods for integrating manikins into learning activities. In this study, we used Action Research (AR) to explore how nursing students' participation in a developmental project with manikins, might promote their learning.

## **Background**

### ***The relevance problem***

Nursing students should be supported in developing the knowledge and competencies they recognise as relevant when entering nursing practice. Nevertheless, nursing education faces challenges in preparing students to work as nurses (Lee and Sim 2020). When entering clinical practice, newly qualified nurses sometimes experience negative emotions, stress, and feelings of inadequacy (Jarden et al. 2021). This can partly be explained by a weak connection between the theoretical foundation students are equipped with from their education and the reality they experience in clinical patient care. Some refer to this gap between theory and praxis as the relevance problem (Hiim 2017; Schön 1987), which is recognisable in both nursing education and other professional education.

One could assume that theoretical knowledge is a precondition for practical performance and skillfulness in an educational context. However, this assumption underestimates the complexity and contextuality of practice. Theoretical concepts can rarely be directly transferred to and applied in practice. Theory and praxis do not always coincide, and theoretical concepts may have limited meaning in specific situations (Hiim 2017). Students' factual knowledge may be static, while the skills they must acquire are often relative and contextual (Kvernbekk 2018).

### ***Manikins' potentials***

Research leaves little doubt that manikin-based simulation benefits nursing students' learning. Learning outcomes include improved knowledge acquisition, development of psychomotor skills, and reflective and problem-solving skills (Cant and Cooper 2017; Kim, Park, and Shin 2016). Students' self-efficacy and self-confidence often increase through these activities (Cant and Cooper 2010; Labrague et al. 2019). Cant and Cooper (2017) found that self-efficacy is connected to experimental design. Self-confidence is essential because it stimulates engagement and motivation, which are fundamental for learning.

A motivational element in simulations can be related to the facilitators' behaviour and non-directive learning style (Díaz-Agea et al. 2021).

Given the widespread use of manikins in nursing education internationally, it is relevant to understand what this implies, looking beyond formal learning goals and how technologically advanced a manikin is. Whether students approach the manikins as a doll or a patient seems pivotal for their learning. Manikins may contribute to developing a professional identity if students allow themselves to step into the professional role. If students support each other in the experience of meeting a patient, relational realism may appear (Handeland et al. 2021). The manikin's presence as a patient substitute may facilitate interaction (Lavoie et al. 2020).

Handeland et al. (2022) indicate that manikins have reflective, explorative, and experiential learning opportunities. This can be explained by their ability to initiate curiosity and an urge to explore. Also essential is the manikin's potential to raise awareness of teamwork, experiences with professional reflections, and discussions. Experiences with full-body manikins may give students the feeling of working with a patient.

### ***Educational action research***

AR as a research tradition originates partly from Dewey's pragmatism and understanding of social experimentation (Miettinen 2000). When we experience situations where our automatic actions fall short, we mobilise previous experiences to find appropriate solutions (Frandsen 2018). AR also relates to Kurt Lewin's work, emphasising social experimentation to support democratic development and solve practical problems (Adelman 1993). AR aims to develop knowledge and improve professional practices through targeted changes in action with the people involved. Those affected by a developmental project should play an active part in it (Swantz 2008).

The Educational Action Research (EAR) tradition of Carr and Kemmis (1986) focuses on the educational field and teaching practice. Carr and Kemmis (1986) argue that traditional technical and linear research reduces the complexity of educational practice. Moreover, even if interpretive research enhances understanding and suggests solutions to educational problems, these solutions are not always compatible with educational practice. According to Carr and Kemmis (1986), the theory – practice gap cannot be closed through scientific theorising over practical problems. Instead, practical activities, such as education, need practical solutions. They suggest a change in perspective to produce credible and practice-relevant knowledge and encourage investigation from the practitioner's perspective. Then, new, adequate solutions can be developed by initialising and supporting changes in educational practices.

In AR, the researcher initialises and supports the study process, bringing experience, ideas, and reflections. The researcher identifies problems and investigates solutions with practitioners familiar with the practice in question. Action researchers are responsible for connecting knowledge and action and producing knowledge that benefits society (Adelman 1993; Hiim 2020; Kemmis and McTaggart 2008; McNiff 2013).

Through their contributions to designing learning activities and inclusion as participants in EAR studies, students can contribute to developing knowledge while learning (Magee, Bramble, and Stanley 2020; Mill and Morris 2000). However, Moch et al.'s (2016) review of AR in nursing education research showed that students' contributions were



weakly reported, making it difficult to determine the extent to which the students participated.

## **The study**

### ***Aim and research question***

This EAR study aimed to gain more extensive knowledge about nursing students' learning from participating in a developmental project that included manikins. The research question was: 'How may nursing students' independent and active use of human-like manikins promote learning?'

### ***Design***

To facilitate a context in which the manikins' potential could unfold, we planned a qualitative EAR study in Carr and Kemmis' tradition (Carr and Kemmis 1986).

The study was implemented into the course 'Nursing for different patient groups: work methods and technology' during the second year of a three-year Bachelor of Nursing degree at one Norwegian university. In this nine-week course, lasting from August to October 2021, the students were introduced to evidence-based methods, standardised communication, assessment tools, and terminology. The course consisted of three modules in which the students worked in groups with written patient case studies. No manikins were used in the ordinary course.

This specific EAR study lasted eight months, from June 2021, when the first planning meeting found place, until January 2022, when the collaborative analysis process was completed. In other words, the study period was longer than the course period. The study surrounded the three mentioned modules. In the first module, the student participants followed the ordinary course. In modules two and three, they planned and performed alternative activities using a medium-advanced manikin from Laerdal®.

Changes in human activities can be identified by detecting changes in our understanding reflected in our verbal utterances (sayings), our behaviour reflected in our actions (doings), and in how we organise our practices (relatings) (Kemmis and McTaggart 2008). Therefore, we selected Kemmis (2009) concepts of sayings, doings and relatings as standards for systematically identifying manifestations of change from the project.

### ***Participants***

We recruited student participants using a purposive sample strategy. All registered second-year students were invited to participate in a digital information meeting, at which they received oral information about the study. 129 students followed the course. They were informed that study participation was voluntary, that those who first volunteered could participate, and that only 25 students could participate. This limit was set to keep the study manageable and ensure good communication among the participants. This is also the standard group size. Participation required the students to agree to expend extra effort on the course. Those interested e-mailed the corresponding author to register.

Group-based work is challenging for many students. Some are stressed about working in groups with unfamiliar students, while others have experienced group conflicts. It may feel safer to work with familiar peers. Therefore, we invited the students to register in groups to facilitate recruitment. As a result, most registered 2–5 students together.

The first 25 registered students received written information and signed consent forms. Twenty-three students (including three men) participated because two withdrew from participation before the first meeting. We divided the students into six groups of 3–5 based on their preferences. Each group signed a contract to specify how they wanted to cooperate and solve potential conflicts. The students' mean age was 28.1 years (range 20–44 years). Everyone had used manikins during their first year. Seven had experiences of simulations with or without manikins from previous education or work.

The participating teacher was personally invited and agreed to participate before signing a consent form. She had worked as a nurse for seven years, as a licensed practical nurse teacher for eight years, and as a nursing teacher for two years. She had limited experience with manikin simulations, which was viewed as an advantage since it allowed her to explore the manikins together with the students.

The participating researcher, who is also the corresponding author, was responsible for the project organisation, recruitment, data collection, and coding.

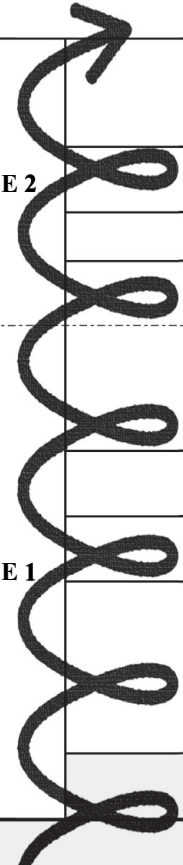
### ***The study process***

EAR is frequently performed as a cyclic, self-reflective process of planning, acting, observing, and reflecting (Kemmis and McTaggart 2008). Two AR cycles were carried out, including four planning and evaluation meetings and two seminars. The study process and how different data are related to the process are illustrated in Figure 1. The first module was not part of the project but formed the basis for the students' experiences of the other two modules. The learning goals for the two seminar modules are shown in Table 1.

### ***Cycle 1***

**Plan:** The first planning meeting was held digitally in mid-June 2021 upon students finishing their first year. The significance of their contribution was emphasised, and the students were introduced to AR principles. The planning was continued at a physical second meeting at the start of the students' second year in September. Both the students and the teacher received training in operating the manikins. Through group and plenary discussions, the participants decided how they would like to work with a patient case surrounding pre- and postoperative nursing of a patient undergoing ostomy surgery at the first seminar.

**Action:** The first seminar was held in the skills laboratory a week after the second planning meeting. After an introduction, the groups installed one manikin each in a bed. First, they familiarised themselves with the manikin, testing its settings and features. Then, they worked for three hours with the patient case from their plan, using the manikin in a way



<b>CYCLE 2</b>	<i>REFLECT</i>	Evaluation of seminar 2 and the project	<ul style="list-style-type: none"> <li>Individual written responses</li> <li>Recordings</li> </ul>
	<i>OBSERVE</i>	<b>Seminar 2</b> Module 3	<ul style="list-style-type: none"> <li>Observation</li> <li>Recordings</li> </ul>
	<i>ACT</i>		
	<i>PLAN</i>	Planning seminar 2	
<b>CYCLE 1</b>	<i>REFLECT</i>	Evaluation of seminar 1	<ul style="list-style-type: none"> <li>Recordings</li> </ul>
	<i>OBSERVE</i>	<b>Seminar 1</b> Module 2	<ul style="list-style-type: none"> <li>Observations</li> <li>Recordings</li> </ul>
	<i>ACT</i>		
	<i>PLAN</i>	Planning seminar 1 and training with manikins	<ul style="list-style-type: none"> <li>Recordings</li> </ul>
		Digital information and planning meeting	<ul style="list-style-type: none"> <li>Individual written responses</li> </ul>
	<b>PHASE</b>	<b>EVENT</b>	<b>DATA</b>
<b>MODULE 1: AS IN THE USUAL COURSE</b>			

**Figure 1.** Study process and data collection.

**Table 1.** Learning goals for Module 2 (Seminar 1) and Module 3 (Seminar 2).

Learning goals Module 2 (Seminar 1)	Learning goals Module 3 (Seminar 2)
<ul style="list-style-type: none"> <li>Has knowledge about nursing for people who are acutely, critically, or chronically ill</li> <li>Has knowledge about pre- and post-operative nursing</li> <li>Is familiar with standard terminology for care planning in nursing</li> </ul>	<ul style="list-style-type: none"> <li>Have knowledge about nursing for people who are acutely, critically, or chronically ill</li> <li>Have knowledge about the nurse's treating and rehabilitative functions</li> <li>Can apply knowledge about communication, learning, coping and change processes in guidance and teaching of patients and relatives</li> <li>Can communicate and interact with patients and relatives based on respect, co-determination, and integrity</li> <li>Is familiar with methods and tools for evidence-based nursing</li> <li>Can apply knowledge about assessment, treatment, and follow-up to support the patient's decision-making</li> <li>Is familiar with the importance of user participation in meeting with acutely, chronically, and critically ill patients</li> </ul>

they judged appropriate. Some produced videos, others performed role-plays, while others discussed their way through the case while demonstrating on the manikin. Afterwards, the groups gathered for a plenary session, organised and led by the teacher. Two groups presented their works in the form of films and role-plays before the other groups provided feedback to raise questions and initiate discussions.

**Table 2.** Questionnaire guiding discussions after Seminar 1.**Questions for the students:**

- How did your group work with the manikin?
- What do you think about this way of working?
- What did you learn when using the manikin? Did it add something?
- Was something problematic? What can be done to make this work?
- How did the teacher's presence and guidance function?
- How do you assess your learning in relation to the learning goals?
- Have you lost anything by not handing in a written case assignment?
- What do you want to bring to the next seminar?

**Questions for the teacher:**

- How did you experience the seminar?
- What do you think of your role?
- How do you want to guide the students in the next seminar?

**Observe:** During the seminar, the researcher observed how the students and the teacher worked, talked, cooperated, and interacted.

**Reflect:** Four days after the seminar, we held an evaluation meeting. The students shared their experiences from the seminar in their groups before we discussed our experiences collectively. The teacher and the researcher participated actively in these discussions. To guide the discussions, the researcher provided a questionnaire (See Table 2). This meeting connected the two cycles, as the reflection on the first seminar and the planning of the second overlapped.

## Cycle 2

**Plan:** The second seminar was planned based on the evaluations of the first seminar. Here, the students worked on a case of a patient with diabetes and kidney failure.

**Action:** Two weeks later, the second seminar was held and organised similarly to the first seminar. At the plenary session, two new groups presented their work. The first group showed a film with 'do's and don'ts' in a patient conversation, and the second group showed a film of the planning and performing of the conversation.

**Observe:** During the seminar, the researcher again observed how the students and the teacher worked, talked, cooperated, and interacted.

**Reflect:** The last meeting was held the day after the second seminar. We evaluated the seminar and the whole project. The students discussed their experiences with the project and their use of the manikins in their groups. A revised questionnaire guided these discussions (See Table 3). Finally, all the participants discussed and summarised their experiences and reflections on the project.

**Table 3.** Revised questionnaire guiding discussions after Seminar 2.**Questions for the students:**

- How did your group work with the manikin?
- Did you do anything differently from the first seminar?
- What did you learn when using the manikin? Did it add something?
- Was something problematic? What can be done to make this work?
- Have the teachers' presence and guidance contributed to learning? How?
- How do you assess your learning in relation to the learning goals?
- How was it to 'be' the patient through Nursing Anne?
- How was it to 'be' the nurse for Nursing Anne?
- What significance did the plenary session of the seminars have?

After the first seminar, some students were unsure whether they had received enough exam-relevant writing training:

- How did your group carry out the written work this time?
- Did you write more than the first time?

After these two seminars:

- Is there anything about this way of working that could be useful to bring to this or other courses? If so, what?
- Has participation in the project provided relevant experience or knowledge? If so, what?

**Questions for the teacher:**

- Did you notice any differences in how the students worked with the manikin from the first to the second seminar?
- Has it added anything to use the manikin this time? What?
- Was something problematic? What can be done to make this work?
- What do you think of your role?
- Did the students make a concrete plan for their work this time? If so, did it have anything to do with how the seminar worked?

After the first seminar, some students were unsure whether they had received enough exam-relevant writing training:

- Have the student groups submitted more written text this time?
  - Does it have anything to do with how they worked at the seminar?
- After these two seminars:
- Is there anything about this way of working that could be useful to bring to this or other courses? If so, what?
  - Has participation in the project provided the students with relevant experience or knowledge? If so, what?

**Data collection**

We used three qualitative data sources to capture and document the participants' sayings, doings and relatings along with the project. First, we retrieved data from the students' individual written responses to open-ended questions before and after the project. Table 4 shows these questions. The SurveyXact software was used to distribute the questions and collect the responses anonymously. The responses provided

**Table 4.** Questions to students before and after the study, distributed via SurveyXact.

Before	After
<ul style="list-style-type: none"> <li>● How old are you?*</li> <li>● How was it to work with manikins and have simulation in the first year? Write a few lines.*</li> <li>● What are your expectations before participating in this project?*</li> <li>● How do you think you can contribute? Write a few lines.*</li> <li>● Before starting nursing education, did you have any education beyond upper secondary school?               <ul style="list-style-type: none"> <li>○ If yes, how many years and what?</li> </ul> </li> <li>● Do you have experience with simulation or the use of manikins beyond what you have had in nursing education?               <ul style="list-style-type: none"> <li>○ If yes, write briefly what and in what context.</li> </ul> </li> <li>● Do you have any questions, or is there something you are wondering about?</li> </ul>	<ul style="list-style-type: none"> <li>● How has participating in the project and using the manikin contributed to your learning?</li> <li>● Can you briefly describe a situation that made an impression?</li> <li>● What can you bring from the project during your time as a student?</li> <li>● Have you learnt something you believe is relevant for you in your future nursing career?</li> <li>● What does it mean to be involved in the project process and to influence the work?</li> <li>● Has participating in the project inspired you to participate in developmental projects later?</li> <li>● Write 3 words that describe what you have experienced in participating in the project.</li> <li>● Do you have other comments or feedback?</li> </ul>

\* Compulsory question.

**Table 5.** Questions to the teacher before the study.

- 
- How have the students usually been sitting and organising themselves?
  - What tools have been used? (Books, computer, internet sources)
  - How have the students related to the patient case and the written assignment?
  - How did the discussions go?
  - How did the students collaborate?
  - How have the students used you as a teacher?
- 

**Table 6.** Observation guide.

- 
- How do the students organise themselves around the bed/in the room?
  - What tools are used? (Books, PC, internet sources) How do the students use them?
  - How do they talk about the patient in the case?
  - How do the students relate to the assignment?
  - How do students collaborate when the teacher is not around?
  - In what situations do students ask for guidance? What do they need help with?
  - In what situations does the teacher offer spontaneous guidance?
  - What characterises the guidance situations?
  - How does the teacher guide?
  - What characterises the use of the manikin? Are different uses being explored?
  - What manikin features do they use?
  - How do they talk about the manikin?
  - How do they talk to the manikin?
  - Does anyone take a role as a patient?
  - How do the participants communicate with each other?

**For the plenary session of the seminar:**

- How do the groups present their work?
  - How do peer students and the teacher assess this?
  - What feedback is given and how?
- 

information on the students' previous experiences and expectations of the project. The teacher answered questions about how she usually worked in the ordinary course (See [Table 5](#)). Second, we collected data by recording the planning and evaluation meetings and the plenary sessions. Third, the researcher collected data from observations and conversations during the seminars through handwritten notes. The observations were performed both out of the participants' sight and through direct observations and conversations. The researcher developed an observation guide to support the observations (See [Table 6](#)).

## **Analysis**

In the initial data processing, the students' individual responses were retrieved from SurveyXact into a Word file. The teacher provided her reflections in a separate document. Except for minor revisions to improve readability, no changes were made to this text. The recordings were transcribed into text and adjusted to facilitate reading and understanding. Some passages irrelevant to the research question (e.g. practical information) were excluded. The handwritten observation notes were written up in a separate Word file. All the data were anonymised before being transferred into the NVivo software for coding.

McNiff's 2013 three steps for analysing qualitative AR data inspired the data processing. The first step involved the authors selecting the theoretical concepts of sayings, doings and relatings as standards to identify changes. In the second step, we analysed and interpreted the data in terms of these concepts. The researcher organised the data to follow the two project cycles and coded whether it related

**Table 7.** Analysis table with examples.

	<b>SAYINGS</b>	<b>DOINGS</b>	<b>RELATINGS</b>
<b>CYCLE 1</b>	<i>It was frustrating at first; we felt uncertainty in how to solve the tasks and feared missing parts of the syllabus. The fact that we were 'left' to ourselves was unusual and a little frustrating. (Student)</i>	<i>When we sit and write, it's been very clinical. (Student)</i> -- <i>Previously, the students often spent time getting started with the written work. They've dealt with the case on a theoretical level. (Teacher)</i>	<i>They've shared the written work between them in the group. They worked with one part each and put it together into one text at the end. (Teacher)</i> -- <i>Some needed a conversation with the teacher and guidance to get started and use the manikin, but then it seemed to work better for most of them. (Researcher's observation note)</i>
<b>CYCLE 2</b>	<i>To be allowed to choose how to work, I believe, can promote learning and motivation more than if there are strict rules for how the work should be performed. (Student)</i>	<i>But when you see it on film, it suddenly seems so natural. Problems and measures are connected. It's a great way to see how natural it can be, as opposed to writing. (Student)</i> -- <i>It's easier to understand the syllabus when you can use it practically. (Student)</i>	<i>The way we communicated with each other helped me to see different perspectives. You can probably practise this without the manikin, but it's been easier to have the manikin here; you manage to communicate more seriously or approximately more real than if it had been just us students there. (Student)</i>
	↓	↓	↓
	<b>Pattern for theme:</b> <i>Ownership of the learning process</i>	<b>Pattern for theme:</b> <i>Understanding theory's significance for practice</i>	<b>Pattern for theme:</b> <i>Taking the patient's perspective</i>

to sayings, doings or relatings. An analysis table was designed to facilitate the data organisation (See Table 7).

All student participants were invited to contribute to the analysis. Only three students volunteered. The reason for few students accepting the invitation is uncertain. One reason may be that they were in clinical practice at that time. Another reason may be that it was almost three months since they had participated in the project. In two meetings, these three students and the researcher discussed and validated the data. Additionally, the participating teacher was consulted to give her thoughts about the data. Together, the three students, the teacher and the researcher identified and agreed on four key patterns. After identifying these patterns, the researcher coded the data that related to these four patterns.

When entering McNiff's (2013) third step of moving from analysis to evaluation, the four authors reflected on the findings and formulated the four patterns into themes. Lastly, the three students and the teacher were consulted to verify these themes.

## ***Ethical considerations***

The Norwegian Centre for Research Data and the university's ethical board approved to perform the study. Written informed consent was obtained from all the participants before the start of the study. No sensitive information was collected. The participants were informed that they could withdraw from the study at any time without any explanation. The participants were served lunch at the two evaluation meetings. Initially, all the participants agreed that everything that was said or happened related to the study remained confidential. All data were anonymised to secure the participants' confidentiality before the three participating students read them. Because only one teacher participated, it would be possible to recognise her in this manuscript. She, therefore, read the manuscript and consented to submission.

The project was considered not to cause any harm to the participants. During the planning, the researcher was concerned about risking the participating students' learning outcomes. Afterwards, the concern was that the non-participating students might have received a poorer learning experience than the participants. Nevertheless, they received the same learning experience customarily offered. However, the study results impose a responsibility for the researchers to explore its implications further and ensure that its strengths are shared in nursing education.

## **Results**

In the project, the context changed from working theoretically in small rooms to a setting in the clinic, wearing uniforms and using manikins. These modified learning conditions contributed to changes in the students' activities. In other words, the developmental project changed their sayings, doings and relating. We identified four themes illustrating these changes: ownership of the learning process, collaborative learning, understanding theory's significance for practice, and taking the patient's perspective. The first two themes surround the students' participation in the project, while themes three and four relate to added learning outcomes. In the following section, we describe these themes.

### ***Ownership of the learning process***

When they were given the freedom to shape their work, the students said that they shifted from emphasising the written assignment to appreciating the work process. Previously, they focused considerably on the text they submitted. They stated that the stress in correctly formulating care plans almost diverted their attention from understanding the syllabus. Now, this stress seemed to decline.

Usually, the teacher spent significant time guiding the students in structuring their texts. Now, they received guidance during their work process because the teacher was always available. Without answering questions directly, the teacher supported the students in thinking and trying out solutions, as one student noted:

It was nice; there was a suitable amount of guidance. We had the opportunity to work alone; there was no one hanging over us all the time, but the teacher was always available if we had questions.



Gradually, the students became familiar with their opportunities. However, they reported that the freedom was both demanding and constructive. They found it was motivating to choose a work form based on how they prefer to learn, as one student stated:

Having the opportunity to influence the work was nice. We work differently and learn in different ways. To be allowed to choose how one wants to work, I believe, can promote learning and motivation more than if there are strict rules for how the work should be performed.

One student said, 'Being forced out of the comfort zone fostered creativity'. Another said that she had to 'twist her brain'. This became clear while observing the variety of activities that emerged. The students created new ways of working, such as playing out scenarios and testing different ways to inform the patient, as in the example below:

It was possible to practise different ways to present the information. For example, we could play a bad reaction and a good reaction. It will happen when you are in practice. It is ingenious to practise how to present information; you try and fail on the way.

Before the first seminar, the students wanted to write as little as possible. Therefore, they decided to hand in only a draft or plan to the teacher in preparation for the seminar. Paradoxically, their attitudes to writing changed during the project. Some feared that they would not get exam-relevant writing training, as expressed by one student:

It is important to have the written part before the exam. The manikin is great for practice and future work, but it is the exam on which we are graded.

Therefore, before the second seminar, all the groups decided to submit a complete case solution. Instead of being a product for evaluation, they turned the text into a tool for their learning. For example, one student noted:

We wrote the case completely this time, and we think we got more out of the curriculum from it. However, even though we only wrote keywords the first time, we had an equally good discussion.

Their project participation moved the students' attention from the written text to appreciating their learning process. They took control and gained ownership of both their learning process and the product, as exemplified by this quotation:

We feel more ownership of the project when we can take part in decisions.

### ***Collaborative learning***

The students' collaborative style changed from working individually in groups to a group collaboration characterised by mutual discussions. They said that receiving input from peers, reflecting on the literature, and discussing solutions was fruitful. Previously, the students had worked individually on one part before they put the parts together. As a result, they effectively completed the task, but they worked in a fragmented way, gaining a weak overall picture of the patient situation, as one student expressed:

Usually, we just share the task without discussion: 'You take that part, I take this', but now we did not do that since we did not have that pressure on us. I feel that I have learned a lot more

from these cases than we did in the other case assignments. [in the previous year and the first module]

Because of the seminars' open structure, the groups had to shape their work together, leading them to relate differently to each other. One group stated that they worked more closely together than usual. 'Play' and 'playing' were concepts that the students recurrently used to describe their collaboration, as one student aptly said:

I realised it when we played with the doll!

Initially, the students wanted all the groups to work approximately similarly. However, after the first seminar, they no longer wanted everyone to do the same. Instead, they appreciated and wanted to keep the flexible structure so that each group could fill it the way that suited them best. One student said:

It was harder last time to know how to work, but now that we have been here once, we have found a way to do it in our group.

In both seminars, it was striking how the students experimented with different roles. Some played the nurse role; others played the roles of relatives or the patient. They played out the scenario several times and shifted the roles so that everyone could try each role. They also shifted between the dialogue in these roles and mutual reflections, as reflected in the researcher's notes:

Repeatedly, after playing out the situation, I hear the groups start to discuss blood pressure, kidney failure, diabetes, and blood samples. One group alternates between patient–nurse dialogue and reflections on the situation.

The teacher played an essential role by initiating, taking part in, and guiding the group discussions. Throughout the project, she supported the students to work together in new ways where everyone engaged and shared responsibility.

### ***Understanding theory's significance for practice***

The results indicate that the project improved the students' understanding of professional concepts and theoretical knowledge. Several students reported that they had previously experienced that manikin simulation helped them understand the connection between practice and theory. Now, they expected that the project would make understanding the syllabus's implications for patient care more accessible.

What significantly contributed to this change was that the students did something practical and saw something concrete in the manikin. One said that being physically active created an understanding of the context. The fact that they had a patient replacement to relate to added meaning to the theory, as one student noted:

We learned more from this than just sitting and listening in a classroom. We played it out, and it opened up discussions, making linking the theory to the practical easier. We broke the pattern of sitting in the classroom by using the manikin.

Moreover, the different learning conditions provided opportunities to acquire theoretical knowledge practically, since it required the students to consult and understand the theory

to work appropriately. The theory became more understandable when they experienced the syllabus used in practice. As one student said:

We managed to turn the problem into something understandable. It does not seem so concrete on paper, but it seems so natural when you sit and talk to a doll—so professional.

Here, the teacher directed the conversations to the specific case. She included relevant theory in the conversations and supported them in acting out the situation, as reflected in the researcher's notes:

The teacher encouraged them to try to 'do' what they were talking about to be able to see the situation 'from within'. Then it looked like someone got an 'Aha!' experience. Then they started playing the scenario.

Initially, some students talked in ways that separated the upcoming exam from clinical practice. They appeared almost as two opposites. The theory seemed irrelevant in 'real life' and only relevant for the exam. Some read and worked to pass their exam; later, they could concentrate on patient work. After the first seminar, the students realised that this way of working could both support them in understanding theory and prepare them for the exam, as one student said:

Working with the manikin helped me imagine a patient when writing the exam. This made me answer the task better; it was easier to imagine what challenges the patient faced.

Although some students were probably stressed about the upcoming exam, the project enabled others to look past the exam. Immersing oneself in theory is not peripheral but relates to 'real life'. One student said:

From now on, I will try not to separate written and practical knowledge, and [I will] imagine the patient when I write assignments and exams.

### ***Taking the patient's perspective***

The students reported that they experienced a different perspective on the patient through the project. Their attention was directed to a specific patient situation and enhanced their understanding of how they could adapt previously acquired theoretical knowledge to patients. The manikins played the most central role in this theme.

The students said that they obtained a limited impression of what it meant to plan nursing with ordinary written case solutions. Therefore, they came up with general nursing interventions. In previous simulations, the students felt that the manikins had improved their understanding of patient care and made the patient situation more realistic. They also hoped that this would be the case in this study.

Initially, some students experienced stress and frustration that how to use the manikins was not planned in detail. One student said:

Our group likes guidelines. It was a bit difficult: 'What exactly are we going to do?' Our group was confused: 'Then we take some vital signs, we look a bit at the ostomy equipment, then we talk a bit with the manikin'. It was a little too loose.

The students did little to reinforce the impression of the manikin as a patient. Some put the manikin under a blanket to avoid exposure of its genitals; others did not. No groups put on clothes or gave them props. However, the manikin lying in bed provided a more accurate idea of a patient. One student said, 'It felt as if you had a patient there'. Although they did not use the voice or other functions, the manikin's presence made something happen, as expressed in the following:

When we got to see what the stoma looks like in real life, it changed my mindset about having a stoma. It was not as bad as I had imagined. I realised that it could be an incredible help for the patient.

Even if a student only sat beside the manikin, giving it a voice, it helped them take the patient's perspective. They understood what it was like to be a patient. For example, when acting as the patient, they experienced how overwhelming it was to receive too much or incomprehensible information, as expressed by one student:

I was the patient's voice, and when we filmed that 'don't scenario', I was left with an unpleasant feeling. I felt that this was going too fast. What happened? I got a feeling of being run over.

Each scenario turned out differently because the roles were played out differently. This provided varied patient perspectives, and the students advanced from talking about a patient in general terms to talking about a specific patient. Then, the nursing measures also became more definite, as the following quote shows:

We used the manikin to play pre- and postoperative scenarios and ostomy care. We used it as an actual patient. It was good because we got the patient in focus. We not only imagined that there was a patient there. We also got to practise the nurse role. We swapped between being the patient, relatives, and nurses, so everyone got to test and feel the difference.

The manikins provided opportunities to practise patient communication. One student stated that communication training was the most relevant experience for clinical practice, as follows:

We got much practice in communicating with the patient, getting to know the different roles of nurses, the patient and relatives, and bringing out different perspectives. When you give all the information, how does it feel to receive it? We had the patient more in focus.

By extension of this, it became more accessible for the students to enter, practise, and experience the nurse role. By being the patient, the manikin made it easier for the students to understand the patient's situation and what it takes to be a nurse.

## **Discussion**

### ***Discussion of the results***

When we considered the results, we recognised that they were about how the students' participation and use of manikins created conditions for increased motivation, actualising Díaz-Agea et al. (2021), who hold that motivation is crucial for learning. This notion directed us to the works of Ryan and Deci (2000) and Pink (2009), who together describe four prerequisites for stimulating inner motivation.

Both Ryan and Deci (2000) and Pink (2009) hold autonomy as the first prerequisite, implying that people need free space and opportunities to make their own choices to grow and engage. The second prerequisite is competence (Ryan and Deci 2000) or mastery (Pink 2009). The joy and satisfaction of mastery is a motivator, as it strengthens our desire for learning. Ryan and Deci (2000) describe the third prerequisite: relatedness. A sense of belonging in a social context is substantial for being motivated. Regarding the fourth prerequisite, purpose, Pink (2009) states that people seek an aim for where to direct their efforts. All four prerequisites were recognisable in the results. Therefore, we applied them to understand the four themes.

The first theme, ownership of the learning process, actualises autonomy, as it shows that freedom and responsibility supported the students to experience ownership of their work. Some students stated that they found it motivating to influence and choose a work form based on how they prefer to learn. Taking the initiative, self-direction, and clinical reasoning skills are essential for nurses to provide safe patient care (Levett-Jones 2017). We understand autonomy as being connected to these skills. Students will encounter situations without clear or defined answers when facing patients. They must then cope with variations and unpredictability; finding practical solutions is up to them. We perceive the students' project experiences as a taste of such situations. Consequently, being provided with freedom and responsibility may promote a connection between education and working life.

We draw a line from the second theme, collaborative learning, to the prerequisite of relatedness. When the students experienced less control and more flexibility, their ability to cooperate seemed supported. We did not design a traditional simulation. However, the students almost instantly started to simulate. They took different roles, pretended, and role-played, exemplifying relational realism (Handeland et al. 2021). Some students said it was easier to role-play with the manikin than with a peer student. Here, the manikins' potential for collaborative learning was activated. Nevertheless, the teacher's presence and guidance were essential for supporting the students' cooperation. The teacher was nearby and available if the students wanted to discuss issues. She stimulated reflections and critical thinking in a non-directive learning style, as in Díaz-Agea et al.'s study Díaz-Agea et al. (2021). Her role was to create a communicative space (Kemmis 2012) where the students could have free discussions. This communicative space influenced the students' interactions with each other and supported their collaboration.

The third theme, understanding theory's significance for practice, shows the relevance of the prerequisite of competence or mastery. Despite experiencing the project as challenging and sometimes unclear, the students put effort and creativity into inventing solutions. Frustration did not seem to obstruct their learning. Instead, it seemed to be a challenge they overcame. The students were encouraged to explore ideas and solutions with the manikins, which contributed to practical knowledge of, for example, how to customise information provided to a patient. These experiences contributed to self-confidence and engagement, which fostered motivation for learning (Cant and Cooper 2010; Labrague et al. 2019).

Theme four shows that the students seemed to understand the practical relevance of theoretical knowledge better. They said that their project participation broadened their understanding of patient care. We relate this to the prerequisite of purpose. The students realised that theoretical concepts have value for future patients and not only for their

exams. According to Schön (1987), practice research aims to bring up practice-relevant knowledge. Although the students paid little attention to the manikin's appearance and features, its presence was essential. Experiencing the patient perspective made it possible for them to consider what it takes from them as nurses to provide individual care. When they felt overwhelmed as patients, the students understood that nursing is not just about giving information but also about adapting information to the current patient. Instead of being taught problem-solving, they experienced what a problem entailed before finding practical solutions themselves.

Overall, the students were placed in a situation in which they did not specifically know how to act, and where they could not follow a familiar pathway. However, through experimentation and testing ideas, guided by the teacher, they found new possibilities for action together. This experimental process seemed to increase their self-efficacy and motivation for further learning (Frandsen 2018; Miettinen 2000).

Already today, and to an even greater extent in the future, health services demand that nurses show innovative skills and the ability to develop nursing practice (Norwegian Ministry of Education and Research 2019). Consequently, nursing education is responsible for inviting students to co-create in developmental projects and research. Our study shows that students have the potential to contribute if they are allowed to. Furthermore, manikins seem to be tools that could release this potential.

### ***Limitations and validity***

Most of the students were familiar with each other, which may have facilitated group processes and spared them from spending time establishing groups. Their familiarity might have motored the project in a way that would be unachievable if the project were to be conducted with a randomly selected student group. Some students had hoped to use the manikin's technical functions more actively. Unfortunately, the cases did not facilitate this, because they were not written with this study in mind. More suitable cases written explicitly for the project could have influenced the students' work and use of the manikins. The course's timeframe restricted us to carry out only two project cycles. It would have been preferable to follow the project through more cycles to explore how the students' learning developed further.

Despite these limitations, the three students' and the teacher's contributions to the analysis increase the trustworthiness of the results. They added a critical voice: for example, they had the impression that the project's open nature caused more frustration for some students than the data reflected. The study was conducted in Norwegian. All processed data were translated into English while preparing this manuscript. The participants did not validate these translations, entailing limitations on the accuracy of the statements and findings. Additionally, the three authors who were not directly involved in the project contributed an outside perspective. Together, these perspectives add credibility and relevance to the interpretations and conclusions.

We applied Bradbury et al. (2019) seven choice points to judge and report the quality of this paper. These points offer a framework for improving reliability, as in Lin et al. (2021) study.<sup>1</sup>

Transparency and validity are keywords to ensure quality in AR (Feldman 2007). Hopefully, transparency has been ensured through this study description. The validity

of AR knowledge can be assessed according to whether the actions it produces are suitable for solving the depicted problem, i.e. its usability, according to Kemmis (2009). Here lie some practical challenges. Working in the outlined way presupposes having access to a clinical lab and enough manikins. The clinic is often fully booked at the university where this study took place, and there are few manikins, constraining how similar projects could be implemented.

Besides the usability criteria, another criterion is whether there are possibilities for this knowledge to persist. Although future interventions or activities may not be carried out precisely as in this study, we provided experiences that may improve nursing education. We can state little about the results' long-term value or specific individual learning outcomes or changes. Nor can we compare the results to the experiences of the students who participated in the ordinary course. However, the experiences and learning of each student, the teacher and the researcher may persist and shape their future nursing practice, education, and research. Although the study was small and only took place in nursing education at one site, it may contribute suggestions relevant to other educational contexts.

### ***Researcher's reflexivity***

The participating researcher is an educator and a doctoral candidate at the university where the study took place. She is a trained simulation facilitator but has limited experience operating the manikins used in this project. Her role was to facilitate and coordinate the study process, engage in discussions, and share reflections. The study stands in a tradition where investigations of one's own educational practice may create relevant and credible knowledge (Gjølterud 2020). Familiarity with the context was viewed as a tool for understanding (Hiim 2020). However, this may have challenged the ability to bring up or contribute to new knowledge and perspectives. The researcher aimed to view the students as co-researchers, not research objects. In retrospect, establishing a balanced and symmetrical relationship between the researcher and the students was demanding. This challenge may arise from our unconscious tendency to assume traditional teacher and student roles, which inherently creates a power imbalance. This dynamic may have hindered the establishment of the desired balanced relationship. However, the students' participation benefitted in this aspect because they challenged and problematised the existing education.

### **Conclusions**

This EAR study aimed to gain knowledge about nursing students' learning from participating in a developmental project with human-like manikins. The students' participation in the project provided freedom and responsibility in developing and choosing learning activities. Additionally, their collaborative experimentation with the manikins helped them experience problems the way patients experience them and increased their understanding of theory's significance for practice. The students were placed in a practice-like work context that resulted in knowledge that they perceived as relevant to nursing practice.

The students' independent and active use of manikins fostered creativity, stimulated inner motivation, and moved their learning into a more practice-relevant direction. The study exemplifies the significance of letting students participate in project work as a source of learning, which may contribute to reducing the gap between theory and practice.

### ***Implications for practice and research***

This study offers suggestions for new and creative ways to include manikins. We believe that more varied use of manikins and facilitating students' free use of them would be beneficial. Including manikins in activities other than traditional scenario simulations can create knowledge and encourage learning.

This study may benefit resource-constrained contexts in designing less expensive yet effective methods to use manikins, as it seems possible to engage more students with less and simpler equipment. The study is especially relevant to nurse educators. However, we believe it is also relevant to educators in other health professional education by inspiring them to include students as participants in EAR projects.

AR should be explored as a research methodology to investigate and develop high-quality educational practices. Although AR seems suitable for nursing education, we have found that it is rarely used in educational nursing research. This study exemplifies how AR can be performed in nursing education and other health professional education. The authors encourage researchers to facilitate student engagement and participation in educational research. Students can be creative, and they can think outside the box – a resource we should make use of, both in education and research.

### **Note**

1. A table showing the results of this appraisal can be accessed via the 'Supplemental' tab on the article's homepage (see <https://www.tandfonline.com/toc/reac20/current>)

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## Author contributions

JAH conceived and designed the study and undertook the data collection and coding. All four authors contributed to the data analysis and interpretation. JAH drafted and revised the manuscript in line with the other three authors' comments and contributions. All the authors have made substantial contributions to the manuscript, given final approval for this version of the manuscript to be published and agreed to be accountable for all aspects of the work to ensure that questions related to the accuracy and integrity of any part of the work are appropriately investigated and resolved.

This manuscript has not been published or presented elsewhere in part or in its entirety and is not under consideration by another journal.

## Data availability statement

The data are not publicly available due to privacy or ethical restrictions.

## References

- Adelman, C. 1993. "Kurt Lewin and the Origins of Action Research." *Educational Action Research* 1 (1): 7–24. <https://doi.org/10.1080/0965079930010102>.
- Berragan, L. 2013. "Conceptualising Learning Through Simulation: An Expansive Approach for Professional and Personal Learning." *Nurse Education in Practice* 13 (4): 250–255. <https://doi.org/10.1016/j.nepr.2013.01.004>.
- Bradbury, H., K. Glenzer, B. Ku, D. Columbia, S. Kjellström, A. O. Aragón, R. Warwick, et al. 2019. "What is Good Action Research: Quality Choice Points with a Refreshed Urgency." *Action Research* 17 (1): 14–18. <https://doi.org/10.1177/1476750319835607>.
- Cant, R. P., and S. J. Cooper. 2010. "Simulation-Based Learning in Nurse Education: Systematic Review." *Journal of Advanced Nursing* 66 (1): 3–15. <https://doi.org/10.1111/j.1365-2648.2009.05240.x>.
- Cant, R. P., and S. J. Cooper. 2017. "Use of Simulation-Based Learning in Undergraduate Nurse Education: An Umbrella Systematic Review." *Nurse Education Today* 49:63–71. <https://doi.org/10.1016/j.nedt.2016.11.015>.
- Carr, W., and S. Kemmis. 1986. *Becoming Critical: Education, Knowledge, and Action Research*. London: Falmer Press.
- Díaz-Agea, J. L., M. J. Pujalte-Jesús, C. Leal-Costa, J. A. García-Méndez, M. G. Adánez-Martínez, and D. Jiménez-Rodríguez. 2021. "Motivation: Bringing Up the Rear in Nursing Education. Motivational Elements in Simulation. The Participants' Perspective." *Nurse Education Today*, Vol. 103, 104925. <https://doi.org/10.1016/j.nedt.2021.104925>.
- Feldman, A. 2007. "Validity and Quality in Action Research." *Educational Action Research* 15 (1): 21–32. <https://doi.org/10.1080/09650790601150766>.
- Frandsen, M. S. 2018. "Sociale Læreprocesser - John Deweys Pragmatisme Som Udgangspunkt for Aktionsforskning" [Social Learning Processes - John Dewey's Pragmatism as a Starting Point for Action Research]." In *Den ufærdige fremtid - Aktionsforskningens potentialer og udfordringer*, edited by Annette Bilfeldt, Michael Søgaard Jørgensen, John Andersen, and Kevin Perry, 69–99. Aalborg, Denmark: Aalborg Universitet.
- Gjøtterud, S. 2020. "Forskning I Egen Undervisningspraksis I Høyere Utdanning" [Research into Own Teaching Practice in Higher Education]." In *Aksjonsforskning i Norge, Volum 2: Grunnlagstenkning, Forskerroller og Bidrag til Endring i Ulike kontekster*, edited by Sigrid Gjøtterud, Hilde Hiim, Dag Husebø, and Liv Helene Jensen, 225–251. Oslo: Cappelen Damm Akademisk. <https://doi.org/10.23865/noasp.121.ch8>.

- Handeland, J., A. Prinz, E. M. Ekra, and M. Fossum. 2021. "The Role of Manikins in Nursing students' Learning: A Systematic Review and Thematic Metasynthesis." *Nurse Education Today*, Vol. 98. <https://doi.org/10.1016/j.nedt.2020.104661>.
- Handeland, J., A. Prinz, E. M. Ekra, and M. Fossum. 2022. "The Sense of a Patient: An Ethnographic Multi-Site Field Study Exploring the Influence of Manikins on Nursing students' Learning." *International Journal of Educational Research Open* 3. <https://doi.org/10.1016/j.ijedro.2021.100110>.
- Hiim, H. 2017. "Relevant Lærerutdanning og Aksjonsforskning" [Relevant Teacher Education and Action Research]." In *Aksjonsforskning i Norge; Teoretisk og Empirisk mangfold*, edited by Sigrid Gjøtterud, Hilde Hiim, Dag Husebø, Liv Helene Jensen, Tove H Steen-Olsen, and Else Stjernstrøm, 45–70. Oslo: Cappelen Damm Akademisk. <https://press.nordicopenaccess.no/index.php/noasp/catalog/book/17>.
- Hiim, H. 2020. "Likheter og Forskjeller Mellom Tilnærminger til Aksjonsforskning" [Similarities and Differences Between Approaches to Action Research]." In *Aksjonsforskning i Norge, Volum 2: Grunnlagstenkning, Forskerroller og Bidrag til Endring i Ulike Kontekster* edited by 25–54. Oslo: Cappelen Damm Akademisk. <https://doi.org/10.23865/noasp.121.ch1>.
- INACSL (International Association for Clinical Simulation and Learning) Standards Committee. 2016. "INACSL Standards of Best Practice: Simulation<sup>SM</sup> Simulation Glossary." *Clinical Simulation in Nursing* 12:39–47. <https://doi.org/10.1016/j.ecns.2016.09.012>.
- Jarden, R.J., A. Jarden, T. J. Weiland, G. Taylor, N. Brockenshire, and M. Gerdtz. 2021. "Registered Nurses' Experiences of Psychological Well-Being and Ill-Being in Their First Year of Practice: A Qualitative Meta-Synthesis." *Journal of Advanced Nursing* 77 (3): 1172–1187. <https://doi.org/10.1111/jan.14667>.
- Kemmis, S. 2009. "Action Research as a Practice-Based Practice." *Educational Action Research* 17 (3): 463–474. <https://doi.org/10.1080/09650790903093284>.
- Kemmis, S. 2012. "Researching Educational Praxis: Spectator and Participant Perspectives." *British Educational Research Journal* 38 (6): 885–905. <https://doi.org/10.1080/01411926.2011.588316>.
- Kemmis, S., and R. McTaggart. 2008. "Participatory Action Research: Communicative Actions and the Public Sphere." In *Strategies of Qualitative Inquiry*, edited by Norman K. Denzin and Yvonna S. Lincoln, 271–330. California: Thousand Oaks: Sage Publications.
- Kim, J., J. H. Park, and S. Shin. 2016. "Effectiveness of Simulation-Based Nursing Education Depending on Fidelity: A Meta-Analysis." *BMC Medical Education* 16. (1). <https://doi.org/10.1186/s12909-016-0672-7>.
- Kvernbekk, T. 2018. "'Evidensbasert Pedagogisk Praksis: Utvalgte kontroverser" [Evidence-Based Practice: A Selection of Controversies]." *Nordisk Tidsskrift for Pedagogikk & Kritik* 4:136–153. <https://doi.org/10.23865/ntpk.v4.1153>.
- Labrague, L. J., D. M. McEnroe-Petite, A.M. Bowling, C. E. Nwafor, and K. Tsaras. 2019. "High-Fidelity Simulation and Nursing Students' Anxiety and Self-Confidence: A Systematic Review." *Nursing Forum* 54 (3): 358–368. <https://doi.org/10.1111/nuf.12337>.
- Lavoie, P., M. Deschênes, R. Nolin, M. Bélisle, A. B. Garneau, L. Boyer, A. Lapierre, and N. Fernandez. 2020. "Beyond Technology: A Scoping Review of Features That Promote Fidelity and Authenticity in Simulation-Based Health Professional Education." *Clinical Simulation in Nursing* 42:22–41. <https://doi.org/10.1016/j.ecns.2020.02.001>.
- Lee, B.O., H. F. Liang, T. P. Chu, and C. C. Hung. 2019. "Effects of Simulation-Based Learning on Nursing Student Competences and Clinical Performance." *Nurse Education in Practice* 41:41. <https://doi.org/10.1016/j.nepr.2019.102646>.
- Lee, J. E., and I. O. Sim. 2020. "Gap Between College Education and Clinical Practice: Experience of Newly Graduated Nurses." *Nursing Open* 7 (1): 449–456. <https://doi.org/10.1002/nop2.409>.
- Levett-Jones, T. 2017. "Clinical Reasoning: What It is and Why It Matters." In *Clinical Reasoning-Learning to Think Like a Nurse*, edited by Tracy Levett-Jones, 2–13. Melbourne: Pearson.
- Lin, C. C., C. Y. Han, M. L. Wu, P. R. Hsiao, L. H. Wang, and L. C. Chen. 2021. "Enhancing Reflection on Medical and Surgical Nursing Among Nursing Students: A Participatory Action Research Study." *Nurse Education Today* 102:104935. <https://doi.org/10.1016/j.nedt.2021.104935>.
- Lioce, L., and J. Lopreato Founding, Ed 2020. *Healthcare Simulation Dictionary*. Second ed. Rockville, MD: Agency for Healthcare Research and Quality. <https://doi.org/10.23970/simulationv2>.

- Magee, D., M. Bramble, and D. Stanley. 2020. "Expanding an Action Research Framework for an Evidence Based Mentoring Programme in Nursing: An Exploration of Cooperative Enquiry." *Educational Action Research* 28 (4): 597–608. <https://doi.org/10.1080/09650792.2019.1636695>.
- McNiff, J. 2013. *Action Research: Principles and Practice*. 3rd ed. Abingdon, England: Routledge. <https://doi.org/10.4324/9780203112755>.
- Miettinen, R. 2000. "The Concept of Experiential Learning and John Dewey's Theory of Reflective Thought and Action." *International Journal of Lifelong Education* 19 (1): 54–72. <https://doi.org/10.1080/026013700293458>.
- Mill, J. E., and H. M. Morris. 2000. "The Ambivalence of Ownership: Nursing Graduate Students as Collaborators in Action Research." *Educational Action Research* 8 (1): 137–149. <https://doi.org/10.1080/09650790000200110>.
- Moch, S. D., R. Todd Vandenbark, S. Pehler, and A. Stombaugh. 2016. "Use of Action Research in Nursing Education." *Nursing Research and Practice* 2016:8749167. <https://doi.org/10.1155/2016/8749167>.
- Mulyadi, M., S. I. Tonapa, S. S. J. Rompas, R. H. Wang, and B. O. Lee. 2021. "Effects of Simulation Technology-Based Learning on Nursing Students' Learning Outcomes: A Systematic Review and Meta-Analysis of Experimental Studies." *Nurse Education Today* 107:105127. <https://doi.org/10.1016/j.nedt.2021.105127>.
- Norwegian Ministry of Education and Research. 2019. *Forskrift om Nasjonal Retningslinje for Sykepleierutdanning*. Regulations on National Guidelines for Nursing Education. <https://lovdata.no/dokument/SF/forskrift/2019-03-15-412>.
- Pink, D. H. 2009. *Drive: The Surprising Truth About What Motivates Us*. Edinburgh, Scotland: Canongate.
- Ryan, R. M., and E. L. Deci. 2000. "Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being." *American Psychologist* 55 (1): 68–78. <https://doi.org/10.1037/0003-066X.55.1.68>.
- Schön, D. A. 1987. *Educating the Reflective Practitioner*. San Francisco: Jossey-Bass.
- Swantz, M. L. 2008. "Participatory Action Research as Practice." In *The SAGE Handbook of Action Research*, edited by Peter Reason and Hilary Bradbury, 31–48. London: SAGE Publications. <https://doi.org/10.4135/9781848607934.n8>.



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## **Appendix 1**

Approval, Faculty's Ethical Committee, FEK







**Søknad om etisk godkjenning av forskningsprosjekt:  
Et sosiokulturelt blikk på simulering i sykepleierutdannelsen**

Godkjenner: Anne Valen-Sendstad Skisland

Tidspunkt for godkjenning: 05/04/2019 10:15:14

Vi informerer om at din søknad er ferdig behandlet og godkjent.

Kommentar fra godkjenner:

05/04/2019 10:15:03 - Anne Valen-Sendstad Skisland (Comments)

FEK godkjenner prosjektet under forutsetning av gjennomføring som beskrevet i søknaden.



## **Appendices 2 and 3**

Approval, The Norwegian Centre for Research Data (NSD)

Updated approval, The Norwegian Centre for Research Data (NSD/SIKT)



## NSD sin vurdering

### Prosjekttittel

Et sosiokulturelt blikk på simulering i sykepleierutdannelsen.

### Referansenummer

834499

### Registrert

21.01.2019 av Jorunn Aas Handeland - jorunn.a.handeland@uia.no

### Behandlingsansvarlig institusjon

Universitetet i Agder / Fakultet for helse- og idrettsvitenskap / Institutt for folkehelse, idrett og ernæring

### Prosjektansvarlig (vitenskapelig ansatt/veileder eller stipendiat)

Jorunn Aas Handeland, jorunn.a.handeland@uia.no, tlf: 92834333

### Type prosjekt

Forskerprosjekt

### Prosjektperiode

15.10.2018 - 01.04.2023

### Status

27.02.2019 - Vurdert

## Vurdering (1)

---

### 27.02.2019 - Vurdert

Det er vår vurdering at behandlingen av personopplysninger i prosjektet vil være i samsvar med personvernlovgivningen så fremt den gjennomføres i tråd med det som er dokumentert i meldeskjemaet med vedlegg den 27.02.2019. Behandlingen kan starte.

### MELD ENDRINGER

Dersom behandlingen av personopplysninger endrer seg, kan det være nødvendig å melde dette til NSD ved å oppdatere meldeskjemaet. På våre nettsider informerer vi om hvilke endringer som må meldes. Vent på svar før endringer gjennomføres.

### TYPE OPPLYSNINGER OG VARIGHET

Prosjektet vil behandle alminnelige kategorier av personopplysninger frem til 01.04.2023.

### OBSERVASJON

Vi minner om at det bare skal samles inn personopplysninger under observasjonen om de som har samtykket

til deltakelse.

## LOVLIG GRUNNLAG

Prosjektet vil innhente samtykke fra de registrerte til behandlingen av personopplysninger. Vår vurdering er at prosjektet legger opp til et samtykke i samsvar med kravene i art. 4 og 7, ved at det er en frivillig, spesifikk, informert og utvetydig bekreftelse som kan dokumenteres, og som den registrerte kan trekke tilbake. Lovlig grunnlag for behandlingen vil dermed være den registrertes samtykke, jf. personvernforordningen art. 6 nr. 1 bokstav a.

## PERSONVERNPRINSIPPER

NSD vurderer at den planlagte behandlingen av personopplysninger vil følge prinsippene i personvernforordningen om:

- lovlighet, rettferdighet og åpenhet (art. 5.1 a), ved at de registrerte får tilfredsstillende informasjon om og samtykker til behandlingen
- formålsbegrensning (art. 5.1 b), ved at personopplysninger samles inn for spesifikke, uttrykkelig angitte og berettigede formål, og ikke behandles til nye, uforenlige formål
- dataminimering (art. 5.1 c), ved at det kun behandles opplysninger som er adekvate, relevante og nødvendige for formålet med prosjektet
- lagringsbegrensning (art. 5.1 e), ved at personopplysningene ikke lagres lengre enn nødvendig for å oppfylle formålet

## DE REGISTRERTES RETTIGHETER

Så lenge de registrerte kan identifiseres i datamaterialet vil de ha følgende rettigheter: åpenhet (art. 12), informasjon (art. 13), innsyn (art. 15), retting (art. 16), sletting (art. 17), begrensning (art. 18), underretning (art. 19), dataportabilitet (art. 20).

NSD vurderer at informasjonen om behandlingen som de registrerte vil motta oppfyller lovens krav til form og innhold, jf. art. 12.1 og art. 13.

Vi minner om at hvis en registrert tar kontakt om sine rettigheter, har behandlingsansvarlig institusjon plikt til å svare innen en måned.

## FØLG DIN INSTITUSJONS RETNINGSLINJER

NSD legger til grunn at behandlingen oppfyller kravene i personvernforordningen om riktighet (art. 5.1 d), integritet og konfidensialitet (art. 5.1. f) og sikkerhet (art. 32).

Dersom du benytter en databehandler i prosjektet må behandlingen oppfylle kravene til bruk av databehandler, jf. art 28 og 29.

For å forsikre dere om at kravene oppfylles, må dere følge interne retningslinjer og/eller rådføre dere med behandlingsansvarlig institusjon.

## OPPFØLGING AV PROSJEKTET

NSD vil følge opp underveis og ved planlagt avslutning for å avklare om behandlingen av personopplysningene er avsluttet.

Lykke til med prosjektet!

Kontaktperson: Belinda G. Helle  
Tlf. Personverntjenester: 55 58 21 17 (tast 1)

# Vurdering av behandling av personopplysninger

**Referansenummer**

834499

**Vurderingstype**

Standard

**Dato**

06.04.2021

**Prosjekttittel**

Et sosiokulturelt blikk på simulering i sykepleierutdannelsen.

**Behandlingsansvarlig institusjon**

Universitetet i Agder / Fakultet for helse- og idrettsvitenskap / Institutt for ernæring og folkehelse

**Prosjektansvarlig**

Jorunn Aas Handeland

**Prosjektperiode**

15.10.2018 - 01.04.2023

**Kategorier personopplysninger**

Alminnelige

**Lovlig grunnlag**

Samtykke (Personvernforordningen art. 6 nr. 1 bokstav a)

Behandlingen av personopplysningene er lovlig så fremt den gjennomføres som oppgitt i meldeskjemaet. Det lovlige grunnlaget gjelder til 01.04.2023.

[Meldeskjema](#) **Kommentar**

Vi viser til endring registrert 04.03.2021. Vi kan ikke se at det er gjort noen oppdateringer i meldeskjemaet eller vedlegg som har innvirkning på NSD sin vurdering av hvordan personopplysninger behandles i prosjektet.

**OPPFØLGING AV PROSJEKTET**

NSD vil følge ved planlagt avslutning for å avklare om behandlingen av personopplysningene er avsluttet.

Lykke til videre med prosjektet!

Tlf. Personverntjenester: 55 58 21 17 (tast 1)





## **Appendix 4**

PROSPERO, Study Protocol - Study 1



## Systematic review

Fields that have an **asterisk (\*)** next to them means that they **must be answered**. **Word limits** are provided for each section. You will be unable to submit the form if the word limits are exceeded for any section. *Registrant* means the person filling out the form.

This record cannot be edited because it has been marked as out of scope

### 1. \* Review title.

Give the title of the review in English

Nursing students' experiences with the social learning environment when human-like simulators are used as educational methods/ tools – a systematic review and qualitative thematic meta-synthesis

### 2. Original language title.

For reviews in languages other than English, give the title in the original language. This will be displayed with the English language title.

### 3. \* Anticipated or actual start date.

Give the date the systematic review started or is expected to start.

30/01/2019

### 4. \* Anticipated completion date.

Give the date by which the review is expected to be completed.

15/08/2019

### 5. \* Stage of review at time of this submission.

**This field uses answers to initial screening questions. It cannot be edited until after registration.**

Tick the boxes to show which review tasks have been started and which have been completed.

Update this field each time any amendments are made to a published record.

The review has not yet started: No

<b>Review stage</b>	<b>Started</b>	<b>Completed</b>
Preliminary searches	Yes	Yes
Piloting of the study selection process	Yes	Yes
Formal screening of search results against eligibility criteria	Yes	Yes
Data extraction	Yes	Yes
Risk of bias (quality) assessment	Yes	Yes
Data analysis	Yes	Yes

Provide any other relevant information about the stage of the review here.

#### 6. \* Named contact.

The named contact is the guarantor for the accuracy of the information in the register record. This may be any member of the review team.

Jorunn Aas Handeland

**Email salutation (e.g. "Dr Smith" or "Joanne") for correspondence:**

Mrs Handeland

#### 7. \* Named contact email.

Give the electronic email address of the named contact.

jorunn.a.handeland@uia.no

#### 8. Named contact address

Give the full institutional/organisational postal address for the named contact.

#### 9. Named contact phone number.

Give the telephone number for the named contact, including international dialling code.

#### 10. \* Organisational affiliation of the review.

Full title of the organisational affiliations for this review and website address if available. This field may be completed as 'None' if the review is not affiliated to any organisation.

University of Adger, Faculty of Health and Sport Sciences, Department of Health and Nursing Science.

**Organisation web address:**

<http://www.uia.no/en>

### 11. \* Review team members and their organisational affiliations.

Give the personal details and the organisational affiliations of each member of the review team. Affiliation refers to groups or organisations to which review team members belong. **NOTE: email and country now MUST be entered for each person, unless you are amending a published record.**

Mrs Jorunn Aas Handeland. University of Adger, Faculty of Health and Sport Sciences, Department of Health and Nursing Science.

Professor Mariann Fossum. University of Adger, Faculty of Health and Sport Sciences, Department of Health and Nursing Science.

Professor Andreas Prinz. University of Agder, Faculty of Engineering and Science, Department of ICT Assistant/Associate Professor Else Mari Ruberg Ekra. University of Adger, Faculty of Health and Sport Sciences, Department of Health and Nursing Science.

### 12. \* Funding sources/sponsors.

Details of the individuals, organizations, groups, companies or other legal entities who have funded or sponsored the review.

University of Adger.

#### Grant number(s)

State the funder, grant or award number and the date of award

### 13. \* Conflicts of interest.

List actual or perceived conflicts of interest (financial or academic).

None

### 14. Collaborators.

Give the name and affiliation of any individuals or organisations who are working on the review but who are not listed as review team members. **NOTE: email and country must be completed for each person, unless you are amending a published record.**

### 15. \* Review question.

State the review question(s) clearly and precisely. It may be appropriate to break very broad questions down into a series of related more specific questions. Questions may be framed or refined using PI(E)COS or similar where relevant.

How do nursing students perceive the social learning context and the learning environment when human-like simulators are used as educational methods/tools?

### 16. \* Searches.

State the sources that will be searched (e.g. Medline). Give the search dates, and any restrictions (e.g. language or publication date). Do NOT enter the full search strategy (it may be provided as a link or attachment below.)



## PROSPERO

### International prospective register of systematic reviews

#### 19. \* Participants/population.

Specify the participants or populations being studied in the review. The preferred format includes details of both inclusion and exclusion criteria.

**Exclusion:** Nursing students at Bachelor level (graduate, continuing, midwife) are excluded. Students from other health educational programmes, and interdisciplinary or clinical practice are excluded.

#### 20. \* Intervention(s), exposure(s).

Give full and clear descriptions or definitions of the interventions or the exposures to be reviewed. The preferred format includes details of both inclusion and exclusion criteria.

All qualitative studies where a human-like simulator is used in education, regardless of fidelity level or

**Exclusion:** Studies of other simulation methods including: Media/simulated patients, virtual patients/games, e-learning or computer-based simulation will be excluded.

#### 21. \* Comparator(s)/control.

Where relevant, give details of the alternatives against which the intervention/exposure will be compared (e.g. another intervention or a non-exposed control group). The preferred format includes details of both inclusion and exclusion criteria.

Not applicable

#### 22. \* Types of study to be included.

Give details of the study designs (e.g. RCT) that are eligible for inclusion in the review. The preferred format includes both inclusion and exclusion criteria. If there are no restrictions on the types of study, this should be stated.

**Inclusion:** Qualitative primary research studies, published in full-text, peer reviewed, and published in English

**Exclusion:** All quantitative studies, 2008 and the grey literature.

#### 23. Context.

Give summary details of the setting or other relevant characteristics, which help define the inclusion or exclusion criteria.

Nursing students experiences and perceptions of the social interaction and learning environment when human-like simulators are used as educational tool. All qualitative studies where a human-like simulator is used in education, regardless of fidelity level or learning goals/ outcomes will be included. We

**Exclusion:** Studies of other simulation methods, e-learning or computer-based simulation will be excluded.

#### 24. \* [Stage] outcome(s).

## PROSPERO

### International prospective register of systematic reviews

Give the pre-specified main (most important) outcomes of the review, including details of how the outcome is defined and measured and when these measurement are made, if these are part of the review inclusion criteria.

Students' experiences, perceptions, feelings, views or opinions.

#### Measures of effect

Please specify the effect measure(s) for you main outcome(s) e.g. relative risks, odds ratios, risk difference, and/or 'number needed to treat.

Students experiences, learning

#### 25. \* Additional outcome(s).

List the pre-specified additional outcomes of the review, with a similar level of detail to that required for main outcomes. Where there are no additional outcomes please state 'None' or 'Not applicable' as appropriate to the review

Not applicable

#### Measures of effect

Please specify the effect measure(s) for you additional outcome(s) e.g. relative risks, odds ratios, risk difference, and/or 'number needed to treat.

Not applicable

#### 26. \* Data extraction (selection and coding).

Describe how studies will be selected for inclusion. State what data will be extracted or obtained. State how this will be done and recorded.

When the systematic search is performed and duplicates are excluded, papers will be transferred to Covidence. Two authors will independently screen titles, abstracts and full-text documents based on the inclusion and exclusion criteria. Disagreements will be discussed with a third author until consensus is reached.

Data will be extracted from the included papers by four authors reading and re-reading the papers. The data includes the characteristics of the papers: (author(s), year, aim and design of study, participants, what kind of data is collected and how it is analysed, and key findings/ results). From the key findings, the authors independently extract and define relevant themes from every paper.

#### 27. \* Risk of bias (quality) assessment.

State which characteristics of the studies will be assessed and/or any formal risk of bias/quality assessment tools that will be used.

The quality of the included papers will be assessed by using the questions from a CASP (Critical Appraisal Skills Programme) checklist: <https://casp-uk.net/wp-content/uploads/2018/01/CASP-Qualitative-Checklist.pdf>.



## PROSPERO

### International prospective register of systematic reviews

We will focus on the credibility, clarity and possible bias of the studies. From this, a thorough evaluation of the quality of each paper will be carried out by the four authors.

#### 28. \* Strategy for data synthesis.

Describe the methods you plan to use to synthesise data. This **must not be generic text** but should be **specific to your review** and describe how the proposed approach will be applied to your data. If meta-analysis is planned, describe the models to be used, methods to explore statistical heterogeneity, and software package to be used.

The authors will together conduct a thematic synthesis based on the relevant themes extracted. The themes will be synthesised into central categories/ concepts about how nursing students experience the social learning environment in simulation education. These results will be discussed according to the review question.

#### 29. \* Analysis of subgroups or subsets.

State any planned investigation of 'subgroups'. Be clear and specific about which type of study or participant will be included in each group or covariate investigated. State the planned analytic approach.

None.

#### 30. \* Type and method of review.

Select the type of review, review method and health area from the lists below.

##### Type of review

Cost effectiveness

No

Diagnostic

No

Epidemiologic

No

Individual patient data (IPD) meta-analysis

No

Intervention

No

Living systematic review

No

Meta-analysis

No

Methodology

No

Narrative synthesis

No

Network meta-analysis

No

Pre-clinical

No

Prevention

No

Prognostic

No

Prospective meta-analysis (PMA)

No

Review of reviews

No

Service delivery

No

Synthesis of qualitative studies

Yes

Systematic review

Yes

Other

No

### Health area of the review

Alcohol/substance misuse/abuse

No

Blood and immune system

No

Cancer

No

Cardiovascular

No

Care of the elderly

No

Child health

No

Complementary therapies

No

COVID-19

No

Crime and justice

No

Dental

No

Digestive system

No

Ear, nose and throat

No

Education

Yes

Endocrine and metabolic disorders

No

Eye disorders

No

General interest

No

Genetics

No

Health inequalities/health equity

No

Infections and infestations

No

International development

No

Mental health and behavioural conditions

No

Musculoskeletal

No

Neurological

No

Nursing

Yes

Obstetrics and gynaecology

No

Oral health

No

Palliative care

No

Perioperative care

No

Physiotherapy

No

Pregnancy and childbirth

No

Public health (including social determinants of health)

No

Rehabilitation

No

Respiratory disorders

No

Service delivery

No

Skin disorders

No

Social care

No

Surgery

No

Tropical Medicine

No

Urological

No

Wounds, injuries and accidents

No

Violence and abuse

No

### 31. Language.

Select each language individually to add it to the list below, use the bin icon to remove any added in error.

## PROSPERO

### International prospective register of systematic reviews

English

There is not an English language summary

#### 32. \* Country.

Select the country in which the review is being carried out. For multi-national collaborations select all the countries involved.

Norway

#### 33. Other registration details.

Name any other organisation where the systematic review title or protocol is registered (e.g. Campbell, or The Joanna Briggs Institute) together with any unique identification number assigned by them. If extracted data will be stored and made available through a repository such as the Systematic Review Data Repository (SRDR), details and a link should be included here. If none, leave blank.

#### 34. Reference and/or URL for published protocol.

If the protocol for this review is published provide details (authors, title and journal details, preferably in Vancouver format)

Add web link to the published protocol.

Or, upload your published protocol here in pdf format. Note that the upload will be publicly accessible.

**No I do not make this file publicly available until the review is complete**

Please note that the information required in the PROSPERO registration form must be completed in full even if access to a protocol is given.

#### 35. Dissemination plans.

Do you intend to publish the review on completion?

Yes

Give brief details of plans for communicating review findings.?

#### 36. Keywords.

Give words or phrases that best describe the review. Separate keywords with a semicolon or new line. Keywords help PROSPERO users find your review (keywords do not appear in the public record but are included in searches). Be as specific and precise as possible. Avoid acronyms and abbreviations unless these are in wide use.

Qualitative studies; meta-synthesis; nursing students; nursing education; patient simulation; simulator; mannequin; manikin; interaction; learning environment; experience; perception;

### 37. Details of any existing review of the same topic by the same authors.

If you are registering an update of an existing review give details of the earlier versions and include a full bibliographic reference, if available.

### 38. ~~Change~~ review status.

Update review status when the review is completed and when it is published. New registrations must be ongoing so this field is not editable for initial submission.

Please provide anticipated publication date

Review\_Completed\_published

### 39. ~~Any~~ additional information.

Provide any other information relevant to the registration of this review.

Manuscript has been accepted for publication in Nurse Education Today, 03.11.2020

### 40. ~~Details~~ of final report/publication(s) or preprints if available.

Leave empty until publication details are available OR you have a link to a preprint (NOTE: this field is not editable for initial submission). List authors, title and journal details preferably in Vancouver format.

Give the link to the published review or preprint.

[https://authors.elsevier.com/sd/article/S0260-6917\(20\)31511-2](https://authors.elsevier.com/sd/article/S0260-6917(20)31511-2)

## **Appendix 5**

Search strategy and history - Study 1





## Searching: CINAHL Plus with Full Text

Wednesday, January 30, 2019 5:30:07 AM

#	Query	Results
S1	(MH "Education, Nursing+") OR (MH "Students, Nursing+")	94,743
S2	nurs* N3 (educat* OR student* OR undergraduat* OR baccalaur* OR bachelor*)	130,315
<b>S3</b>	(MH "Patient Simulation") OR (MH "Vignettes") OR (MH "Simulations") OR (MH "Models, Anatomic+")	26,844
S4	simulat* OR mannequin* OR manikin* OR "standardized patient*"	56,672
S5	(MH "Qualitative Studies+")	123,895
S6	(MH "Focus Groups") OR (MH "Interviews+") OR (MH "Narratives+") OR (MH "Observational Methods+") OR (MH "Videorecording") OR (MH "Audiorecording") OR (MH "Thematic Analysis) OR (MH "Life Experiences") OR (MH "Student Experiences")	257,878
S7	qualitative W1 (stud* OR design* OR research* OR method* OR interview*)	110,675
S8	experience* OR attitude* OR perception* OR opinion*	654,089
S9	theme* OR thematic	88,236
S10	interview*	269,383
S11	view* OR viewpoint*	103,848
S12	S1 OR S2	130,911
S13	S3 OR S4	66,971
S14	S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11	930,515
<b>S15</b>	<b>S12 AND S13 AND S14 Limiters - Published Date: 20080101-20191231</b>	<b>2,471</b>



**ERIC**

Wednesday, January 30, 2019 7:37:55 AM

#	Query	Results
S1	(DE "Nursing Education") OR (DE "Nursing Students")	5,437
S2	nurs* N3 (educat* OR student* OR undergraduat* OR baccalaur* or bachelor*)	7,422
S3	DE "Simulation" OR DE "Vignettes"	13,891
S4	simulat* OR mannequin* OR manikin* OR "standardized patient**"	27,071
S5	DE "Qualitative research" OR DE "Case Studies+" OR DE "Ethnography" OR DE "Focus Groups" OR DE "Interviews" OR DE "Semi Structured Interviews" OR DE "Structured Interviews" OR DE "Transcripts (Written Records)" OR DE "Experience" OR DE "Student Experience" OR Grounded theory"	116,991
S6	qualitative W1 (stud* OR design* OR research* OR method* OR interview*)	45,077
S7	experience* OR attitude* OR perception* OR opinion	502,506
S8	theme* OR thematic	52,304
S9	interview*	129,329
S10	view* OR viewpoint*	103,484
S11	S1 OR S2	7,422
S12	S3 OR S4	29,312
S13	S5 OR S6 OR S7 OR S8 OR S9 OR S10	646,675
<b>S14</b>	<b>S11 AND S12 AND S13</b> <b>Limiters - Published Date: 20080101-20191231</b>	<b>175</b>



Ovid MEDLINE(R) and Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Daily and Versions(R) 1946 to January 28, 2019

Search Strategy: 30.01.2019

#	Searches	Results
1	exp Education, Nursing/ or exp Students, Nursing/	89849
2	(nurs* adj3 (educat* or student* or undergraduat* or baccalaur* or bachelor*)).ti,ab.	45223
3	exp Simulation Training/	7043
4	(simulat* or mannequin* or manikin* or "standardized patient*").ti,ab.	473108
5	exp Models, Anatomic/	30798
6	exp qualitative research/ or grounded theory/	44370
7	(Qualitative adj3 (stud* or design* or research* or method* or interview*)).ti,ab.	82555
8	focus groups/ or interviews as topic/ or interview/ or narration/	113572
9	(theme* or thematic*).ti,ab.	93498
10	(experience* or perception* or opinion* or attitude*).ti,ab.	1325812
11	Interview*.ti,ab.	322488
12	(view* or viewpoint*).ti,ab.	437269
13	1 or 2	104991
14	3 or 4 or 5	496185
15	6 or 7 or 8 or 9 or 10 or 11 or 12	1981731
16	13 and 14 and 15	1560
17	limit 16 to yr="2008 -Current"	1327



Database(s): **Embase** 1980 to 2019 Week 04

Search Strategy: 30.01.2019

#	Searches	Results
1	exp nursing education/ or exp nursing student/	79827
2	(nurs* adj3 (educat* or student* or undergraduat* or baccalaur* or bachelor*)).ti,ab.	43507
3	(simulat* or mannequin* or manikin* or "standardized patient*").ti,ab.	472443
4	exp anatomic model/	3566
5	exp simulation/ or exp simulation training/	264428
6	exp qualitative research/	60605
7	grounded theory/ or exp phenomenology/	15186
8	exp interview/	243694
9	(experience* or opinion* or perception* or attitude*).ti,ab.	1688110
10	(theme* or thematic*).ti,ab.	116104
11	(qualitative adj3 (stud* or research* or design* or method* or interview*)).ti,ab.	97243
12	Interview*.ti,ab.	396612
13	(view* or viewpoint*).ti,ab.	506253
14	1 or 2	94139
15	3 or 4 or 5	549693
16	6 or 7 or 8 or 9 or 10 or 11 or 12 or 13	2468728
17	14 and 15 and 16	1625
18	limit 17 to yr="2008 -Current"	1422
19	limit 18 to embase → for å utelukke overlapp med Medline	126





## **Appendix 6**

Request to collect data - Study 2



[Mottaker]  
[Adresse]

Dato:  
Deres ref.:  
Vår ref.:

Besøksadresse: Universitetsveien 25, Kristiansand  
Direkte tlf:

Saksbehandler:

[E-post]

## ***Forespørsel om å få samle data til doktorgradsprosjekt høsten 2019.***

Jeg henvender meg til deg som instituttleder ved bachelorutdanningen i sykepleie ved X, med en forespørsel om å få tillatelse til å samle data hos dere til mitt doktorgradsprosjekt: *Et sosiokulturelt blikk på simulering i sykepleierutdannelsen.*

Hensikten med prosjektet er å bidra til ny kunnskap om hvilken betydning studenters og læreres interaksjon og det sosiale læringsmiljøet i simuleringsundervisning med menneskelignende simulatorer har for studentenes læring. Prosjektet er tilknyttet Universitetet i Agder og hadde oppstart oktober 2018. Prosjektet er godkjent av NSD (Ref. nr. 834499) og av Fakultetets forskningsetiske komité (ved UiA).

Simulering med bruk av menneskelignende simulatorer i sykepleierutdannelsen er en anerkjent og vanlig undervisningsmetode. Vi har etter hvert mye empirisk kunnskap om de effektene simulering kan ha og om at simulering kan fremme praktiske ferdigheter, teoretisk kunnskap, kritisk tenkning og kommunikasjonsferdigheter. Samtidig har vi mindre kunnskap om hvordan kommunikasjon, samspill og læringsfellesskapet mellom deltakerne i undervisningen kan virke inn på læring og overføring av kunnskap til klinisk praksis. Det er et ønske at vi gjennom prosjektet kan bidra til å videreutvikle simulering som læringsmetode, samt å oppdage og utforske mulighetene som ligger i simulatorene.

Prosjektet har som helhet et kvalitativt og utforskende design, og består av tre delstudier. Delstudie 1 er en systematisk metasyntese (pågående). Delstudie 2 er en feltstudie der vi skal studere førsteårs sykepleierstudenter sitt første møte med simulering og simulatorene. Det er i forbindelse med denne studien jeg henvender meg til dere. Delstudie 3 vil bygge på kunnskap fra de to foregående delstudiene og blir en pilotstudie som innebærer utvikling og gjennomføring av et undervisningsopplegg for og sammen med sykepleierstudenter i andre studieår.

Mer om delstudie 2: Datasamling skal gjennomføres høsten 2019 og eventuelt januar 2020 ved tre norske studiesteder, og vi spør nå om dere ønsker å være et av disse. Studiens sentrale datainnsamlingsmetode vil være deltakende observasjon. I tillegg skal det gjøres individuelle intervjuer med lærere og enkelte studenter. Datainnsamling vil foregå i forbindelse med ordinær undervisning. Undervisningen kan være organisert som simulering med bruk av enkle scenarier, caseløsninger, eller at studentene bruker simulatorene for å trene på ferdigheter eller prosedyrer. Det trenger ikke være snakk om høyteknologiske simulatorer. Forutsetningen er at det brukes fullstendig menneskelignende simulator, og ikke bare en enkel kroppsdel (torso/arm etc.).

Jeg søker om å få tillatelse til å få være tilstede i og observere undervisning der førsteårsstudentene for første gang møter simulering og simulatorer ved deres utdanningsinstitusjon. Jeg ønsker å delta i så mange undervisningssesjoner som mulig, både ved å følge flere studentgrupper, og gjerne de samme gruppene flere ganger gjennom semesteret. Studenter og lærere/instruktører skal gjøre det de vanligvis ville gjort i

undervisningen. Individuelle intervjuer vil finne sted rett etter ordinær undervisning, og gjennomføres som en samtale mellom undertegnede og deltaker.

Dersom tillatelse til å gjennomføre datasamling hos dere blir gitt, avtaler vi nærmere hvordan jeg best kan informere studenter og lærere om studien og hvordan jeg kan innhente samtykke fra dem. Jeg kan besøke dere for direkte informasjon, alternativt sende dere en informasjonsfilm som kan distribueres til lærere og studenter.

Hovedveileder for prosjektet er Professor Mariann Fossum: [mariann.fossum@uia.no](mailto:mariann.fossum@uia.no), tlf. 91854845.

Biveiledere er professor Andreas Prinz og førsteamanuensis Else- Mari Ekra.

Vedlagt er utkast til informasjonsskriv og samtykkeskjema til studenter og lærere, samt skisse for datasamling.

Hensyn til anonymitet og konfidensialitet vil bli ivaretatt gjennom hele prosjektet.

Ta gjerne kontakt for nærmere informasjon.

Ser frem til å høre fra dere.

Vennlig hilsen

Jorunn Aas Handeland

Stipendiat ved Universitetet i Agder,

Fakultet for helse- og idrettsvitenskap,

Institutt for helse- og sykepleievitenskap.

[Jorunn.a.handeland@uia.no](mailto:Jorunn.a.handeland@uia.no)

Mob.: 92 83 43 33

## **Appendix 7**

Request to collect data - Study 3



Instituttleder xxx  
Institutt for Helse- og sykepleievitenskap  
Fakultet for Helse- og idrettsvitenskap

Dato: 15.01.20  
Deres ref.:

## **Forespørsel om å få samle data til doktorgradsprosjekt høsten 2020.**

Jeg henvender meg til deg som instituttleder ved bachelorutdanningen i sykepleie ved xxx, med denne forespørselen om å få tillatelse til å samle data hos dere til mitt doktorgradsprosjekt: *Et sosiokulturelt blikk på simulering i sykepleierutdannelsen.*

Hensikten med prosjektet er å bidra til ny kunnskap om hvilken betydning studenters og læreres interaksjon og det sosiale læringsmiljøet i simuleringsundervisning med menneskeliknende simulatorer har for studentenes læring. Prosjektet er tilknyttet Universitetet i Agder og hadde oppstart oktober 2018. Prosjektet er godkjent av NSD (Ref. nr. 834499) og av Fakultetets forskningsetiske komité (ved UiA).

Simulering med bruk av menneskeliknende simulatorer i sykepleierutdannelsen er en anerkjent og vanlig undervisningsmetode. Det finnes etter hvert mye empirisk kunnskap om at simulering kan fremme praktiske ferdigheter, teoretisk kunnskap, kritisk tenkning og kommunikasjonsferdigheter. Samtidig har vi mindre kunnskap om hvordan interaksjon og læringsfellesskapet mellom deltakerne i undervisningen virker inn på hvordan studentene lærer. Gjennom prosjektet ønsker vi å bidra til å videreutvikle simulering som læringsmetode, samt å oppdage og utforske mulighetene som kan ligge i simulatorene.

Prosjektet har et kvalitativt, utforskende design og består av tre delstudier. Delstudie 1 er en systematisk litteraturstudie. Delstudie 2 er en feltstudie utfra førsteårsstudenters tidlige møte med simulatorene. Delstudie 3, som denne henvendelsen gjelder, vil innebære utvikling og gjennomføring av et undervisningsopplegg for og sammen med sykepleierstudenter i andre studieår.

Mer om delstudie 3: Datasamling skal gjennomføres høsten 2020 ved ett norsk universitet. Vi spør med dette om studien kan foregå ved xxx. Studien vil bygge på prinsipper fra aksjonsforskning/deltakende forskning, ved at studenter og lærere vil bli involvert i planlegging og gjennomføring av undervisningsopplegg og datasamling. Hensikten vil være todelt: én hensikt er å undersøke hvordan selve opplegget innvirker på studentenes faglige læring, en annen hensikt er å undersøke betydningen av medvirkning i planlegging og gjennomføring av prosjektet.

Design er ikke endelige bestemt, men ønsket er å velge ut 4 studentgrupper á ca 12 studenter fra andre studieår fra hver av de to campusene (totalt 8 grupper) og disse gruppene lærere (4 lærere, da hver lærer trolig har to grupper). Prosjektet vil for disse studentene inngå i emnet *SY 210 Sykepleie ved ulike helsetilstander*. Dette er primært et teoretisk emne, der studentene blant annet gjennom casebaserte gruppesamlinger jobber med ulike sykdomstilstander. Vi vil utvide opplegget for de inkluderte studentgruppene til at de jobber med casene ved å bruke simulatorer. Undervisningen vil foregå på klinikklaboratoriet og ikke i klasse/grupperom. Hvor mange sesjoner de skal jobbe på denne måten er fastsatt, men en mulighet er at hver gruppe har 2 samlinger som inngår i prosjektet.

Dersom tillatelse til å gjennomføre studien hos dere blir gitt, avtaler vi nærmere hvordan jeg best kan informere studenter og lærere, og hvordan jeg kan innhente samtykke. Videre vil studien kreve en del praktisk planlegging.

Hovedveileder for prosjektet er Professor Mariann Fossum: [mariann.fossum@uia.no](mailto:mariann.fossum@uia.no), tlf. 91854845. Biveiledere er professor Andreas Prinz og førsteamanuensis Else Mari Ekra.

Alle resultatene fra prosjektet vil bli delt gjennom vitenskapelige publikasjoner.

Hensyn til anonymitet og konfidensialitet vil bli ivaretatt gjennom hele prosjektet.

Ta gjerne kontakt for nærmere informasjon.

Jeg ser frem til å høre fra dere.

Vennlig hilsen

**Jorunn Aas Handeland**

Stipendiat og universitetslektor ved Universitetet i Agder,  
Fakultet for Helse- og idrettsvitenskap,  
Institutt for Helse- og sykepleievitenskap.

[Jorunn.a.handeland@uia.no](mailto:Jorunn.a.handeland@uia.no)

Mob.: 92 83 43 33



## **Appendix 8**

Information letter with written consent form, students - Study 2



**Vil du delta i forskningsprosjektet:**  
**«Et sosiokulturelt blikk på simulering i sykepleierutdannelsen»?**

Dette er et spørsmål til deg om du er villig til å delta i et forskningsprosjekt der vi skal undersøke det sosiale læringsmiljøet i undervisning der det brukes menneskeliknende simulatorer. I skrivet gis informasjon om målene med prosjektet og hva deltakelse vil innebære for deg.

**Formål**

Gjennom studien ønsker vi å få kunnskap om hvordan sykepleierstudenter og lærere kommuniserer og samhandler i simuleringsundervisningen. Vi søker også kunnskap om hvordan studenter «kommuniserer» med og om simulatoren - «dukken». Dette vil kunne bidra til å si noe om læringsmiljøet i undervisningen og hvordan læringsmiljøet påvirker sykepleiestudenters læring.

Undersøkelsen vil foregå høsten 2019 ved 2-4 norske universiteter/høgskoler. Vi skal følge grupper av førsteårsstudenter i ordinær undervisning det første semesteret av sykepleierutdanningen. Avhengig av hvordan undervisningen ved ditt studiested er organisert, kan det være snakk om én eller flere ganger.

**Hvem er ansvarlig for forskningsprosjektet?**

Forskningsprosjektet er en del av et doktorgradstudie ved Universitetet i Agder, tilknyttet Fakultet for helse- og idrettsvitenskap, Institutt for helse- og sykepleievitenskap.

**Hvorfor får du spørsmål om å delta?**

Du får denne forespørselen fordi du er sykepleierstudent på første studieår ved bachelorutdanningen ved xxx. Vi har fått tillatelse fra studieledelsen ved til å sende forespørselen til ditt kull. Selv om du samtykker i å delta er det ikke sikkert at du kommer til å delta i studien. Dette avhenger av endelig gruppesammensetning og organisering av undervisningen.

**Hva innebærer det for deg å delta?**

For din del innebærer ikke deltakelsen noe annet enn at du skal gjøre det du vanligvis ville gjort i undervisningen. Du skal være deg selv og forholde deg til medstudenter og lærere på vanlig måte. En forsker vil være til stede i undervisningen, se hva som skjer og gjøre notater.

Vi skal også gjøre individuelle intervjuer med noen studenter. Du kan bli spurt om å bli intervjuet etter undervisningen, eventuelt sammen med en medstudent. Intervjuet vil være en samtale mellom deg og forsker, og handle om din opplevelse av undervisningen. Intervjuet vil ta ca. 30 minutter. Intervjuet tas opp ved hjelp av opptaker som ikke kan kobles til internett. Denne forespørselen inkluderer altså både deltakelse i observasjon og i ett individuelt intervju.

All informasjon som samles gjennom observasjon og intervju vil bli anonymisert. Ditt navn og kontaktinformasjon i form av mailadresse vil kun bli samlet og oppbevart slik det kommer frem i dette skrivet. Informasjonen vil kun brukes dersom det skulle bli nødvendig å kontakte deg hvis vi har spørsmål som gjelder bruk av opplysninger du har gitt eller liknende.

**Det er frivillig å delta**

Det er frivillig å delta. Hvis du velger å delta, kan du når som helst trekke samtykket tilbake uten å oppgi noen grunn. Alle opplysninger om deg vil da bli slettet. Det skal ikke ha noen negative konsekvenser for deg eller ditt forhold til din arbeidsplass eller studentene hvis du ikke vil delta eller senere velger å trekke deg.

### **Ditt personvern – hvordan vi oppbevarer og bruker dine opplysninger**

Vi vil bare bruke opplysningene fra deg til formålene vi har fortalt om i dette skrivet. Vi behandler opplysningene konfidensielt og i samsvar med personvernregelverket. Det er bare prosjektansvarlig som har tilgang til personopplysninger, i form av signert samtykke og deltakerlister. Utover dette er det bare prosjektgruppen som har tilgang til anonymisert datamateriale, i form av notater og nedskrevne intervjuer. Prosjektgruppen består av Jorunn Aas Handeland (stipendiat), Mariann Fossum (professor), Andreas Prinz (professor) og Else Mari Ruberg Ekra (førsteamanuensis).

Det skal ikke være mulig å gjenkjenne eller identifisere deltakerne i publikasjoner utfra undersøkelsen. Sitater vil formuleres slik at de ikke kan spores tilbake til deg. Samtykkeskjemaer, deltakerlister og lydopptak skal oppbevares innelåst.

### **Hva skjer med opplysningene dine når vi avslutter forskningsprosjektet?**

Prosjektet skal etter planen avsluttes ca. 01.04.2023. Ved avslutning vil samtykke, deltakerlister og lydopptak slettes/makuleres. Bare anonymisert materiale fra observasjoner og intervjuer vil beholdes.

### **Dine rettigheter**

Så lenge du kan identifiseres i datamaterialet, har du rett til:

- innsyn i hvilke personopplysninger som er registrert om deg
- å få rettet personopplysninger om deg
- få slettet personopplysninger om deg
- få utlevert en kopi av dine personopplysninger (dataportabilitet)
- å sende klage til personvernombudet eller Datatilsynet om behandlingen av dine personopplysninger.

Dersom du ønsker å benytte deg av dine rettigheter kontakter du prosjektansvarlig.

### **Hva gir oss rett til å behandle personopplysninger om deg?**

Vi behandler opplysninger om deg basert på ditt samtykke. På oppdrag fra Universitetet i Agder har NSD – Norsk senter for forskningsdata AS vurdert at behandlingen av personopplysninger i dette prosjektet er i samsvar med personvernregelverket.

### **Hvor kan jeg finne ut mer?**

Har du spørsmål, eller ønsker å benytte deg av dine rettigheter kan du kontakte: Universitetet i Agder, Fakultet for Helse- og Idrettsvitenskap, Institutt for helse- og sykepleievitenskap ved:

- Prosjektansvarlig, stipendiat: Jorunn Aas Handeland, [jorunn.a.handeland@uia.no](mailto:jorunn.a.handeland@uia.no), tlf. 92834333
- Hovedveileder, professor: Mariann Fossum, [mariann.fossum@uia.no](mailto:mariann.fossum@uia.no), tlf. 91854845
- Vårt personvernombud: Ina Danielsen, [personvernombud@uia.no](mailto:personvernombud@uia.no)
- NSD – Norsk senter for forskningsdata AS: ([personverntjenester@nsd.no](mailto:personverntjenester@nsd.no)) / telefon: 55 58 21 17.

Med vennlig hilsen

Prosjektansvarlig

**Jorunn Aas Handeland**

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## Samtykkeerklæring

Jeg har mottatt og forstått informasjon om prosjektet «*Et sosiokulturelt blikk på simulering i sykepleierutdannelsen.*». Jeg har fått anledning til å stille spørsmål.

Jeg samtykker til:

- At forsker fra Universitetet i Agder, Jorunn Handeland kan observere og ta notater i forbindelse med undervisning der det brukes simulator.
- At forsker fra Universitetet i Agder, Jorunn Handeland, kan intervjuer i forbindelse med undervisning der det brukes simulator og ta samtalen opp på lydbånd.

Jeg samtykker til at mine opplysninger behandles frem til prosjektet er avsluttet, ca. *01.04.2023*.

-----  
(Signert av prosjektdeltaker, dato)

Jeg er:

- Lærer
- Student

Mailadresse:  
-----



## **Appendix 9**

Information letter with written consent form, teachers - Study 2





## **Vil du delta i forskningsprosjektet: «Et sosiokulturelt blikk på simulering i sykepleierutdannelsen»?**

Dette er et spørsmål til deg om du er villig til å delta i et forskningsprosjekt der vi skal undersøke det sosiale læringsmiljøet i undervisning der det brukes menneskeliknende simulatorer.

I skrivet gis informasjon om målene med prosjektet og hva deltakelse vil innebære for deg.

### **Formål**

Gjennom studien ønsker vi å få kunnskap om hvordan sykepleierstudenter og lærere kommuniserer og samhandler i simuleringsundervisningen. Vi søker også kunnskap om hvordan dere «kommuniserer» med og om simulatoren - «dukken». Dette vil kunne bidra til å si noe om læringsmiljøet i undervisningen og hvordan læringsmiljøet påvirker sykepleiestudenters læring.

Undersøkelsen vil foregå høsten 2019 ved 4 norske studiesteder. Vi skal følge grupper av førsteårsstudenter i ordinær undervisning det første semesteret av sykepleierutdanningen. Avhengig av hvordan undervisningen ved ditt studiested er organisert, kan det være snakk om én eller flere ganger.

### **Hvem er ansvarlig for forskningsprosjektet?**

Forskningsprosjektet er en del av et doktorgradstudie ved Universitetet i Agder, tilknyttet Fakultet for helse- og idrettsvitenskap, Institutt for helse- og sykepleievitenskap.

### **Hvorfor får du spørsmål om å delta?**

Du får denne forespørselen fordi du er lærer eller instruktør for førsteårsstudenter i undervisning der det brukes menneskeliknende simulator. Vi har fått tillatelse fra studieledelsen ved xxx til å sende forespørselen til aktuelle lærere og studenter.

### **Hva innebærer det for deg å delta?**

For din del innebærer ikke deltakelsen noe annet enn at du skal gjøre det du vanligvis ville gjort i undervisningen. Du skal forholde deg til studentene på vanlig måte. En forsker vil være tilstede i undervisningen, observere, gjøre notater og kanskje noen ganger stille spørsmål og snakke med dere. Vi skal også gjøre individuelle intervjuer med lærerne og noen av studentene. Intervjuet vil være en samtale mellom deg og forsker, og handle om din opplevelse av undervisningen. Intervjuet vil ta maksimalt en time. Intervjuet tas opp ved hjelp av egen opptaker som ikke kan kobles til internett. Denne forespørselen inkluderer altså både deltakelse i observasjon og i ett individuelt intervju.

All informasjon som samles gjennom observasjon og intervju vil bli anonymisert. Ditt navn og kontaktinformasjon i form av mailadresse vil kun bli samlet og oppbevart slik det fremkommer i dette skrivet. Kontaktinformasjonen vil kun brukes dersom det skulle bli nødvendig å kontakte deg hvis vi har spørsmål vedrørende bruk av opplysninger du har gitt, eller liknende.

### **Det er frivillig å delta**

Det er frivillig å delta. Hvis du velger å delta, kan du når som helst trekke samtykket tilbake uten å oppgi noen grunn. Alle opplysninger om deg vil da bli slettet. Det skal ikke ha noen negative konsekvenser for deg eller ditt forhold til din arbeidsplass eller studentene hvis du ikke vil delta eller senere velger å trekke deg.

### **Ditt personvern – hvordan vi oppbevarer og bruker dine opplysninger**

Vi vil bare bruke opplysningene fra deg til formålene vi har fortalt om i dette skrivet. Vi behandler opplysningene konfidensielt og i samsvar med personvernregelverket. Det er bare prosjektansvarlig som har

tilgang til personopplysninger, i form av signert samtykke og deltakerlister. Utover dette er det bare prosjektgruppen som har tilgang til anonymisert datamateriale, i form av notater og nedskrevne intervjuer. Prosjektgruppen består av Jorunn Aas Handeland (stipendiat), Mariann Fossum (professor), Andreas Prinz (professor) og Else Mari Ruberg Ekra (førstemanuensis).

Det skal ikke være mulig å gjenkjenne eller identifisere deltakerne i publikasjoner utfra undersøkelsen. Sitater vil formuleres slik at de ikke kan spores tilbake til deg. Samtykkeskjemaer, deltakerlister og lydopptak skal oppbevares innelåst.

### **Hva skjer med opplysningene dine når vi avslutter forskningsprosjektet?**

Prosjektet skal etter planen avsluttes ca. 01.04.2023. Ved avslutning vil samtykke, deltakerlister og lydopptak slettes/makuleres. Bare anonymisert materiale fra observasjoner og intervjuer vil beholdes.

### **Dine rettigheter**

Så lenge du kan identifiseres i datamaterialet, har du rett til:

- innsyn i hvilke personopplysninger som er registrert om deg
- å få rettet personopplysninger om deg
- få slettet personopplysninger om deg
- få utlevert en kopi av dine personopplysninger (dataportabilitet)
- å sende klage til personvernombudet eller Datatilsynet om behandlingen av dine personopplysninger.

Dersom du ønsker å benytte deg av dine rettigheter kontakter du prosjektansvarlig.

### **Hva gir oss rett til å behandle personopplysninger om deg?**

Vi behandler opplysninger om deg basert på ditt samtykke.

På oppdrag fra Universitetet i Agder har NSD – Norsk senter for forskningsdata AS vurdert at behandlingen av personopplysninger i dette prosjektet er i samsvar med personvernregelverket.

### **Hvor kan jeg finne ut mer?**

Har du spørsmål, eller ønsker å benytte deg av dine rettigheter kan du kontakte:

Universitetet i Agder, Fakultet for Helse- og Idrettsvitenskap, Institutt for helse- og sykepleievitenskap ved:

- Prosjektansvarlig, stipendiat: Jorunn Aas Handeland, [jorunn.a.handeland@uia.no](mailto:jorunn.a.handeland@uia.no), tlf. 92834333
- Hovedveileder, professor: Mariann Fossum, [mariann.fossum@uia.no](mailto:mariann.fossum@uia.no), tlf. 91854845
- Vårt personvernombud: Ina Danielsen, [personvernombud@uia.no](mailto:personvernombud@uia.no)
- NSD - Norsk senter for forskningsdata AS, på epost ([personverntjenester@nsd.no](mailto:personverntjenester@nsd.no)) eller telefon: 55 58 21 17.

Med vennlig hilsen

Prosjektansvarlig

Jorunn Aas Handeland

## Samtykkeerklæring

Jeg har mottatt og forstått informasjon om prosjektet «*Et sosiokulturelt blikk på simulering i sykepleierutdannelsen.*», og har fått anledning til å stille spørsmål.

Jeg samtykker til:

- At forsker fra Universitetet i Agder, Jorunn Handeland kan observere og ta notater i forbindelse med undervisning der det brukes simulator.
- At forsker fra Universitetet i Agder, Jorunn Handeland, kan intervjuer i forbindelse med undervisning der det brukes simulator og ta samtalen opp på lydbånd.

Jeg samtykker til at mine opplysninger behandles frem til prosjektet er avsluttet, ca. *01.04.2023*.

-----  
(Signert av prosjektdeltaker, dato)

Jeg er:

- Lærer
- Student

Mailadresse:  
-----



## **Appendix 10**

Information letter with written consent form, students - Study 3



## **Vil du delta i en forskningsstudie i forbindelse med prosjektet: «Et sosiokulturelt blikk på simulering i sykepleierutdannelsen.»?**

Dette er et spørsmål til deg om du er villig til å delta i et forskningsprosjekt der vi undersøker læringsmiljø og studentdeltakelse i undervisning der det brukes menneskeliknende simulatorer. Prosjektet vi foregår høsten 2021 ved Universitetet i Agder. I dette skrivet gir vi deg informasjon om hensikten med prosjektet og hva deltakelse vil innebære for deg.

### **Formål:**

Gjennom studien ønsker vi å få kunnskap om hvilken betydning studenters deltakelse i planlegging og gjennomføring av undervisning, og hvordan de bruker simulatoren kan ha for deres læring.

### **Hvem er ansvarlig for forskningsprosjektet?**

Forskningsprosjektet er en del av et doktorgradstudie ved Universitetet i Agder, tilknyttet Fakultet for helse- og idrettsvitenskap, Institutt for helse- og sykepleievitenskap. Prosjektansvarlig er stipendiat Jorunn Aas Handeland.

### **Hvorfor får du spørsmål om å delta?**

Du får denne forespørselen fordi du blir registrert som andreårs sykepleierstudent ved bachelorutdanningen ved xxx høsten 2021, da du skal ha emnet: *SY-220 Sykepleie ved ulike sykdomstilstander- Arbeidsmetoder og teknologi*. Vi har fått tillatelse fra studieledelsen ved UiA til å sende denne forespørselen til studentene i ditt kull.

### **Hva innebærer det for deg å delta?**

I studien skal vi sammen planlegge og gjennomføre et undervisningsopplegg der det brukes menneskeliknende simulator. Dette er samme dukken som dere brukte i ferdighetstrening og simulering i første studieår. Undervisningsopplegget inngår i ordinær undervisning for de studentene som deltar. Opplegget vil kunne innebære at studentgruppene får innføring i bruk av simulator, skriver pasientcaser og arbeider selvstendig ved å bruke simulator, mens lærer er tilgjengelig for veiledning. Studentene som deltar i prosjektet lager et eget arbeidskrav i stedet for den ordinære, skriftlige casebesvarelsen. Dette kan f.eks. være et filmet scenarie.

Hensikten med studien er å samle deltakernes erfaringer og refleksjoner både fra prosessen og undervisningsopplegget. Datasamling vil foregå gjennom i planleggings- og evalueringsmøter med lærer og studenter, og gjennom observasjon og notater i forbindelse med undervisningen. Det brukes separat lydopptaker som ikke kan kobles til internett.

All informasjon som samles, vil bli anonymisert. Ditt navn og kontaktinformasjon i form av mailadresse vil kun bli samlet og oppbevart slik de fremkommer i dette skrivet.

Kontaktinformasjonen vil kun brukes dersom det skulle bli nødvendig å kontakte deg hvis vi har spørsmål vedrørende bruk av opplysninger du har gitt, eller liknende.

### **Det er frivillig å delta**

Det er frivillig å delta. Hvis du velger å delta, kan du når som helst trekke samtykket uten å oppgi noen grunn. Alle opplysninger om deg vil da bli slettet. Det skal ikke ha noen negative konsekvenser for deg eller ditt forhold til studiesituasjon hvis du ikke vil delta eller velger å trekke deg.

### **Ditt personvern – hvordan vi oppbevarer og bruker dine opplysninger**

Vi vil bare bruke opplysningene fra deg til formålene vi har fortalt om her. Vi behandler opplysningene konfidensielt og i samsvar med personvernregelverket. Det er bare prosjektansvarlig som har tilgang til personopplysninger, i form av signert samtykke og deltakerlister. Utover dette er det bare prosjektgruppen som har tilgang til anonymisert materiale, i form av notater og nedskrevne intervjuer. Prosjektgruppen består av Jorunn Aas Handeland (stipendiat), Mariann Fossum (professor), Andreas Prinz (professor) og Else Mari Ruberg Ekra (førsteamanuensis).

Det skal ikke være mulig å gjenkjenne eller identifisere deltakerne i publikasjoner utfra undersøkelsen. Sitater vil formuleres slik at de ikke kan spores tilbake til deg. Samtykkeskjemaer, deltakerlister og lydopptak skal oppbevares innelåst.

### **Hva skjer med opplysningene dine når vi avslutter forskningsprosjektet?**

Prosjektet skal etter planen avsluttes ca. 01.04.2023. Ved avslutning vil samtykke, deltakerlister og lydopptak slettes/makuleres. Bare anonymisert materiale fra observasjoner og intervjuer vil beholdes.

### **Dine rettigheter**

Så lenge du kan identifiseres i datamaterialet, har du rett til:

- innsyn i hvilke personopplysninger som er registrert om deg
- å få rettet personopplysninger om deg
- få slettet personopplysninger om deg
- få utlevert en kopi av dine personopplysninger (dataportabilitet)
- å sende klage til personvernombudet eller Datatilsynet om behandlingen av dine personopplysninger.

Dersom du ønsker å benytte deg av dine rettigheter kontakter du prosjektansvarlig.

### **Hva gir oss rett til å behandle personopplysninger om deg?**

Vi behandler opplysninger om deg basert på ditt samtykke. På oppdrag fra Universitetet i Agder har NSD – Norsk senter for forskningsdata AS vurdert at behandlingen av personopplysninger i dette prosjektet er i samsvar med personvernregelverket.

### **Hvor kan jeg finne ut mer?**

Har du spørsmål, eller ønsker å benytte deg av dine rettigheter kan du kontakte: Universitetet i Agder, Fakultet for Helse- og Idrettsvitenskap, Institutt for helse- og sykepleievitenskap ved:

- Prosjektansvarlig, stipendiat: Jorunn Aas Handeland, [jorunn.a.handeland@uia.no](mailto:jorunn.a.handeland@uia.no), tlf. 92834333
- Hovedveileder, professor: Mariann Fossum, [mariann.fossum@uia.no](mailto:mariann.fossum@uia.no), tlf. 91854845
- Vårt personvernombud: Ina Danielsen, [personvernombud@uia.no](mailto:personvernombud@uia.no)
- NSD – Norsk senter for forskningsdata AS, på epost ([personvertjenester@nsd.no](mailto:personvertjenester@nsd.no)) eller telefon: 55 58 21 17.

Med vennlig hilsen

Prosjektansvarlig  
Jorunn Aas Handeland



## Samtykkeerklæring

Jeg har mottatt og forstått informasjon om prosjektet «*Et sosiokulturelt blikk på simulering i sykepleierutdannelsen.*», og har fått anledning til å stille spørsmål.

Jeg samtykker til:

- At forsker fra Universitetet i Agder, Jorunn Aas Handeland, kan observere og ta notater under møter og undervisning i forbindelse med prosjektet.
- At forsker fra Universitetet i Agder, Jorunn Aas Handeland, kan gjøre opptak av samtaler forbindelse med planlegging og evalueringsmøter i forbindelse med prosjektet.

Jeg samtykker til at mine opplysninger behandles frem til prosjektet er avsluttet, ca. *01.04.2023*.

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(Signert av prosjektdeltaker, dato)

Mailadresse:

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## **Appendix 11**

Information letter with written consent form, teacher - Study 3



## **Vil du delta i en forskningsstudie i forbindelse med prosjektet: «Et sosiokulturelt blikk på simulering i sykepleierutdannelsen»?**

Dette er et spørsmål til deg om du er villig til å delta i et forskningsprosjekt der vi undersøker læringsmiljø og studentdeltakelse i undervisning der det brukes menneskeliknende simulatorer. Prosjektet vi foregår høsten 2021 ved xxx. I skrivet gir vi deg informasjon om hensikten med prosjektet og hva deltakelse vil innebære for deg.

### **Formål**

Gjennom studien ønsker vi å få kunnskap om hvilken betydning studentenes deltakelse i planlegging og gjennomføring av læringsaktiviteter med simulator kan ha for deres læring.

### **Hvem er ansvarlig for forskningsprosjektet?**

Forskningsprosjektet er en del av et doktorgradstudie ved Universitetet i Agder, tilknyttet Fakultet for helse- og idrettsvitenskap, Institutt for helse- og sykepleievitenskap. Prosjektansvarlig er stipendiat Jorunn Aas Handeland.

### **Hvorfor får du spørsmål om å delta?**

Du får denne forespørselen fordi du er lærer for sykepleierstudenter på andre studieår ved xxx, i emnet: *SY-220 Sykepleie ved ulike sykdomstilstander- Arbeidsmetoder og teknologi*. Vi har fått tillatelse fra studieledelsen ved Institutt for helse- og sykepleievitenskap til å sende forespørselen til aktuelle lærere og studenter.

### **Hva innebærer det for deg å delta?**

I studien skal vi sammen planlegge og gjennomføre et undervisningsopplegg der det brukes menneskeliknende simulator. Undervisningsopplegget inngår i ordinær undervisning. Opplegget vil kunne innebære at studentgruppene får innføring i bruk av simulator, de skriver pasientcaser og arbeider selvstendig ved å bruke simulatoren, mens lærer er tilgjengelig for veiledning. Studentene som deltar i prosjektet skal lage et eget arbeidskrav i stedet for den ordinære, skriftlige casebesvarelsen, f.eks. et filmet scenarie.

Hensikten med studien er å samle deltakernes erfaringer og refleksjoner både rundt prosessen og undervisningsopplegget. Datasamling vil foregå gjennom i planleggings- og evalueringsmøter med lærer og studenter, og gjennom observasjon og notater i forbindelse med undervisningen. Det brukes separat lydopptaker som ikke kan kobles til internett.

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### **Det er frivillig å delta**

Det er frivillig å delta. Hvis du velger å delta, kan du når som helst trekke samtykket tilbake uten å oppgi noen grunn. Alle opplysninger om deg vil da bli slettet. Det skal ikke ha noen negative konsekvenser for deg eller ditt forhold til din arbeidsplass eller studentene hvis du ikke vil delta eller senere velger å trekke deg.

### **Ditt personvern – hvordan vi oppbevarer og bruker dine opplysninger**

Vi vil bare bruke opplysningene fra deg til formålene vi har fortalt om i dette skrevet. Vi behandler opplysningene konfidensielt og i samsvar med personvernregelverket. Det er bare prosjektansvarlig som har tilgang til personopplysninger, i form av signert samtykke og deltakerlister. Utover dette er det bare prosjektgruppen som har tilgang til anonymisert datamateriale, i form av notater og nedskrevne samtaler. Prosjektgruppen består av Jorunn Aas Handeland (stipendiat), Mariann Fossum (professor), Andreas Prinz (professor) og Else Mari Ruberg Ekra (førsteamanuensis).

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- Hovedveileder, professor: Mariann Fossum, [mariann.fossum@uia.no](mailto:mariann.fossum@uia.no), tlf. 91854845
- Vårt personvernombud: Ina Danielsen, [personvernombud@uia.no](mailto:personvernombud@uia.no)
- NSD – Norsk senter for forskningsdata AS, på epost ([personvertjenester@nsd.no](mailto:personvertjenester@nsd.no)) eller telefon: 55 58 21 17.

Med vennlig hilsen

Prosjektansvarlig  
Jorunn Aas Handeland

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## Samtykkeerklæring

Jeg har mottatt og forstått informasjon om prosjektet «*Et sosiokulturelt blikk på simulering i sykepleierutdannelsen.*», og har fått anledning til å stille spørsmål.

Jeg samtykker til:

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- At forsker fra Universitetet i Agder, Jorunn Aas Handeland, kan gjøre opptak av samtaler forbindelse med planlegging og evalueringsmøter i forbindelse med prosjektet.

Jeg samtykker til at mine opplysninger behandles frem til prosjektet er avsluttet, ca. *01.04.2023*.

-----

(Signert av prosjektdeltaker, dato)

Mailadresse:

-----





## **Appendix 12**

Observation guide - Study 2



**OBSERVASJONSLOGG, DELSTUDIE 2:**

<b>Dato:</b>	<b>Sted:</b>	<b>Start kl:</b>	<b>Slutt kl:</b>	<b>Tid:</b>
<b>Antall lærere:</b>	<b>Antall studenter:</b>	<b>Kvinner:</b>	<b>Menn:</b>	<b>Kull:</b>
<b>Emne/ Tema:</b>	<b>Læringsmål:</b>	<b>Type simulator:</b>		

**Læringssituasjon, organisering og opplegg:****Deltakernes handlinger:**

- Hvordan nærmer deltakerne seg simulatoren?
- Hvordan tar de på simulatoren?
- Hva gjør studentene og lærerne i de forskjellige delene av undervisningen?

**Språk, samtale, kommentarer**

- Hva sier deltakerne? / til hverandre?
- Hvordan snakker/ henvender deltakerne seg til hverandre?
- Hvordan snakker deltakerne om/til simulatoren?
- Spontane uttrykk og ytringer?
- interne begreper eller uttrykk?
- Uttrykk for følelser?

**Ikke-verbal kommunikasjon.**

- Hvordan står og plasserer deltakerne seg i rommet?
- Hvilke nonverbale uttrykk brukes: ansiktsuttrykk, blikk/ øyekontakt, kroppsholdninger, gester.
- Skjer det noe som kan fortelle noe om hva som *ikke* sies eller gjøres?

**Sosial stemning.**

- Hvordan oppleves det sosiale «klimaet»?
- Hvordan organiserer deltakerne seg?
- Oppstår det grupper, ledelse, konstellasjoner?

**Gjenstander og omgivelser:**

- Gjenstander som vises spesiell oppmerksomhet? Hvilke og hvordan?
- Hvordan forholder deltakerne seg til fysiske gjenstander i rommet?

<b>Beskrivelser:</b>	<b>Egne refleksjoner</b>

## **Appendix 13**

Interview guide - Study 2



## INTERVJUGUIDE, DELSTUDIE 2:

### Student

Dato:	Sted:	Start kl:	Slutt kl:	Tid:
Kjønn	Alder	Tidligere erfaring med simulering:		

#### Opplevelse av undervisningen og egen deltakelse:

- Kan du fortelle litt om hva du har opplevd og hvordan du har hatt det?
- Kan du fortelle litt om hva du har gjort?
- Kan du **beskrive** din opplevelse med noen få ord?

#### Å forholde seg til og å bruke simulatoren.

- Hvordan opplevde du det å «møte», ta på og snakke med og bruke dukken i dag?
- Hva tenker du om den nå?
- Hvordan vil du beskrive din og din gruppes holdning til og bruk av dukken?
- Synes du det har tilført noe å bruke dukke – og hva?
- Hva synes du at du har lært?
- Hvordan påvirker simulatoren din læring?

#### Hvordan du hadde det med medstudenter og lærer:

- Kan du si litt om hvordan du hadde det i gruppen?
- Kjenner du de andre studentene? Hvilken betydning har det?
- Hva tenker du om samarbeidet i gruppen?
- Hvilken betydning har samarbeidet for din egen læring?
- Hva tenker du om kommunikasjonen i gruppen?
- Hvordan opplevde du kontakten og kommunikasjonen med lærer?

#### Hendelser eller momenter som gjorde inntrykk.

- Skjedde det noe som gjorde spesielt inntrykk eller som du tenker på nå?
- Positivt eller negativt?
- Kan du fortelle litt om dette?

#### Konkrete hendelser eller momenter å ta opp med informanten:

- Jeg hørte du sa «...» - kan du si litt om hva du mente med det?
- Jeg så at du / dere gjorde «...» - hva tenker du om dette?

**INTERVJUGUIDE, DELSTUDIE 2:****Lærer**

<b>Dato:</b>	<b>Sted:</b>	<b>Start kl:</b>	<b>Slutt kl:</b>	<b>Tid:</b>
<b>Kjønn</b>	<b>Alder</b>	<b>Kjennskap til og erfaring med simulering i eget arbeid?</b>		
		<b>Fasilitatorkurs?</b>		
<b>Opplevelse av undervisningen og egen deltakelse:</b>				
<ul style="list-style-type: none"><li>- <i>Kan du fortelle litt om hvordan du har hatt det og hvordan du opplevde undervisningen?</i></li><li>- <i>Hvilken innstilling og hvilke forventninger hadde du før undervisningen?</i></li><li>- <i>Kan du fortelle litt om hva du har gjort?</i></li><li>- <i>Kan du beskrive din opplevelse med noen få ord?</i></li></ul>				
<b>Å forholde seg til og å bruke simulatoren.</b>				
<ul style="list-style-type: none"><li>- <i>Hvordan vil du beskrive din egen holdning til og bruk av dukken slik dere har gjort i dag?</i></li><li>- <i>Hvordan tror du det er for studenten å «møte», ta på og snakke med dukken?</i></li><li>- <i>Hvordan tror du de opplevde det å bruke dukken?</i></li><li>- <i>Synes du det har tilført noe å bruke simulator? I så fall hva?</i></li><li>- <i>Har du tenkt noe på hvordan din egen måte å snakke om/ med eller forholde deg til dukken påvirker studentene og deres holdning til den?</i></li></ul>				
<b>Hvordan du hadde det med medstudenter og lærer:</b>				
<ul style="list-style-type: none"><li>- <i>Hva tenker du om kommunikasjonen og samarbeidet i gruppen?</i></li><li>- <i>Hvordan opplevde du kontakten og kommunikasjonen med studentene?</i></li></ul>				
<b>Hendelser eller momenter som gjorde inntrykk.</b>				
<ul style="list-style-type: none"><li>- <i>Skjedde det noe som gjorde spesielt inntrykk eller som du tenker på nå?</i></li><li>- <i>Kan du fortelle litt om dette?</i></li></ul>				
<b>Hendelser eller momenter å ta opp.</b>				
<ul style="list-style-type: none"><li>- <i>Jeg hørte du sa «...» - kan du si litt om hva du mente med det?</i></li><li>- <i>Jeg så at du / dere gjorde «...» - hva tenker du om dette?</i></li></ul>				



## **Appendix 14**

Questions to students, ahead - Study 3



Hvordan synes du det var å jobbe med simulator og ha simulering i første studieår?

(må besvares)

Skriv kort et par linjer.

Hvilke forventninger har du til å delta i prosjektet?

Hva tenker du at du kan bidra med?

(må besvares)

Skriv kort et par linjer.

Har du noen spørsmål eller er det noe du lurer på?

Hvor gammel er du?

(må besvares)

Har du utdanning utover videregående før du begynte på sykepleien?

Hvis ja: hvor mange år og hva?

Har erfaring med simulering eller bruk av simulator utover det du har hatt i sykepleiestudiet?

Hvis ja: skriv kort hva og i hvilken sammenheng.



## **Appendix 15**

Questions to students, after - Study 3



## **Spørsmål til studentene, etter eksamen 14.10.21**

### Læringsutbytte

- 1) Hvordan har deltakelse i prosjektet og bruk av Nursing Anne bidratt til din læring?
- 2) Kan du kort beskrive en situasjon fra prosjektet som gjorde inntrykk?
- 3) Hva kan du ta med deg videre fra prosjektet i tiden som student?
- 4) Hva har du lært som er relevant for deg som kommende sykepleier?

### Forskningsprosessen, fagutvikling, deltakelse i prosjekt

Hva har det betydd å få være med å påvirke prosjektprosessen og arbeidsform?

Har deltakelse i prosjektet gitt deg inspirasjon til å være med i fagutviklingsprosjekter senere?

Skriv 3 ord som beskriver det du sitter igjen med etter å ha deltatt i prosjektet.

Her kan du skrive andre kommentarer eller tilbakemeldinger:





## **Appendix 16**

Observation guide, last version, second seminar - Study 3



## **Datasamlings- og observasjonsguide for seminar 2. 22. september 2021**

Denne observasjonsdelen tar utgangspunkt i hvordan studentene jobbet forrige gang og deres erfaringer med det. Det er det viktigste nå: å observere hvordan endringer fungerer og om det har noe å si at NA er kjent for dem.

**Ingen betydelige endringer i planen ble gjort etter evalueringsmøtet 10/9 men må fokusere på hvordan de har forberedt seg og planlagt.**

<b>Hvordan organiserer studentene seg i rommet og rundt sengene?</b>	
<b>Hvilke hjelpemidler brukes: bøker, pc? Hvordan bruker de dem?</b>	
<b>Hvordan snakker de om og med simulatoren?</b>	
<b>Hvordan snakker stud og lærer om pasienten i caset?</b>  <b><u>Dette er viktig i dag – med tanke på at caset er annerledes.</u></b> <b><u>Er det noe forskjell fra sist?</u></b>	
<b>Tar noen rolle som pasienten?</b>  <b><u>Snakker de gjennom mikrofon? Eller stemme ved siden av?</u></b>	
<b>Hvordan forholder studentene seg til oppgaven i dag?</b>  <b><u>Har gruppene forberedt mer skriftlig?</u></b>  <b><u>Har de laget en tydeligere plan?</u></b>  <b><u>Var det lettere eller vanskeligere å ha plan i dag?</u></b>	
<b>Hvordan samarbeider studentene i gruppene?</b>	
<b>I hvilke situasjoner ber studentene om veiledning? Hva trenger de hjelp med?</b>	

<p><b>I hvilke situasjoner tilbyr lærer veiledning?</b></p>	
<p><b>Hva kjennetegner veiledningssituasjonene?</b></p>	
<p><b>Opplever lærer at studentene er mer forberedt og har en tydeligere plan i dag?</b></p>	
<p><b>Hva kjennetegner bruken av simulatoren i dag?</b></p> <p><b>Utforskes ulike bruksmåter?</b></p> <p><b>Hvilke funksjoner brukes?</b></p> <p><b><u>Har det noe å si at dette er andre gang?</u></b> <b><u>At de kjenner simulatoren?</u></b></p>	
<p><b>Diverse fra samtale med gruppene underveis</b></p>	

<p><b>Til plenumsdel av seminaret:</b></p> <p>Hvordan vurderes oppgaven gruppens innsats av medstudenter og lærer?</p> <p>Hvilke tilbakemeldinger gis - og hvordan?</p>	
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## **Appendix 17**

Guide for discussions and evaluation, version for last meeting - Study 3



## **Evaluering etter andre seminar og sammenfatning av prosjektet 23.09.21**

### **Refleksjoner og innspill fra gruppene etter seminar 22/9 fra Gruppe:**

**Hvordan jobbet gruppa med Nursing Anne i går? Gjorde dere noe annerledes fra første gang?**

**Var det noe som ikke fungerte eller som var utfordrende? Hva skal til for at dette kan fungere?**

**Har det å bruke Nursing Anne tilført noe denne gangen? Hva?**

**Hvordan har det vært å «være» pasient gjennom Nursing Anne?**

**Hvordan har det vært «være» sykepleier for Nursing Anne?**

**Har læreres tilstedeværelse og veiledning bidratt til læring?  
Hva ved læreres tilstedeværelse og veiledning har hatt betydning?**

**Hvordan vurderer dere egen læring med tanke på læringsmålene? Er dere der dere skal være?**

**Sist evaluering var mange usikre på om dere fikk nok eksamensrelevant skrivetrening  
Hvordan valgte dere å gjennomføre det skriftlige arbeidet i denne modulen?  
Skrev dere mer enn første gang? Hadde det noe å si?**

**Har dere mistet noe ved å velge bort hverandrevurdering? Hva?**

**Hvilken betydning har plenumsdelen av seminarene hatt (presentasjon og tilbakemeldinger)?  
Hvilken betydning har arbeidet med Nursing Anne hatt for dette?**

**Etter å ha brukt Nursing Anne i to seminarer: er det noe ved denne måten å jobbe på som kan være nyttig å ta med til SY220 neste år, eller som undervisningsform i andre emner?**

**Har deltakelse i prosjektet gitt noe relevante erfaringer eller kunnskap?**



**LÆRER:**

**Ser du forskjell i hvordan studentene jobbet med Nursing Anne fra første til andre gang?**

**Har det tilført noe å bruke Nursing Anne denne gangen? I så fall: hva?**

**Var det noe som ikke fungerte? Hva skal til for at dette kan fungere?**

**Hvordan har du opplevd din egen rolle?**

**Sist evaluering var flere usikre på om de fikk nok eksamensrelevant skrivetrening  
Har studentgruppene levert noe mer skriftlig denne gangen? Har det hatt noe å si for  
hvordan de arbeidet på seminaret?**

**Hadde studentene laget en mer konkret plan for eget arbeid denne gangen?  
I så fall: hadde det noe å si for hvordan de arbeidet på seminaret?**

**Opplever du at deltakelse i prosjektet gitt studentene relevante erfaringer eller  
kunnskap?**

**Er det noe ved denne måten å jobbe på du tenker kan være nyttig å ta med til SY220  
neste år, eller som undervisningsform i andre emner? Hva?**



## **Appendix 18**

Questions to teacher ahead study 3



**Tenk gjennom:**

- hvordan har studentene sittet/ organisert seg i grupperom?
- hvilke hjelpemidler har vært brukt?
- hvordan har studentene forholdt seg til pasientcase og den skriftlige oppgaven de skal gjøre?
- hvordan har diskusjoner forløpt?
- hvordan har studentene samarbeidet?
- hvordan har studentene brukt deg som lærer/veileder?



## **Appendix 19**

Permission for publication of figures





## Jorunn Aas Handeland

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**Fra:** Engeström, Yrjö H M <yrjo.engestrom@helsinki.fi>  
**Sendt:** mandag 14. august 2023 16:12  
**Til:** Jorunn Aas Handeland  
**Kopi:** Mariann Fossum  
**Emne:** Re: Permission to use The activity system and The expansive learning cycle models

**Oppfølgingsflagg:** Følg opp  
**Status for flagg:** Flagget

Dear Jorunn, I am happy to give you permission to use my models in your PhD thesis, as specified in your request.

With best regards,

Yrjö Engeström

On 7. Aug 2023, at 19.51, Jorunn Aas Handeland <jorunn.a.handeland@uia.no> wrote:

Dear Dr. Engeström,

I am a PhD-student in Norway working on a doctoral project aiming to develop new knowledge and understanding of how the use of human-like manikins (simulators) influences nursing students' learning process. In my thesis I make use of cultural-historical activity theory and employ your models of The activity system and The expansive learning cycle. I write to you to ask for permission to use these models in my PhD-thesis.

I would also like to know which of your works that it is preferable to refer to: the version from 1987 or the second edition from 2015. (*Learning by expanding : an activity-theoretical approach to developmental research.*)

I believe that it would be of great interest to use these models to explore how nursing education can develop learning strategies to support nursing students' professional and practice-relevant learning process.

I hope to hear from you!

*Kind regards,*

***Jorunn Aas Handeland***

PhD-candidate, Lecturer in Nursing education, RN, MSc

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