Interprofessional simulation-based learning used to prepare perioperative nursing students for acute situations

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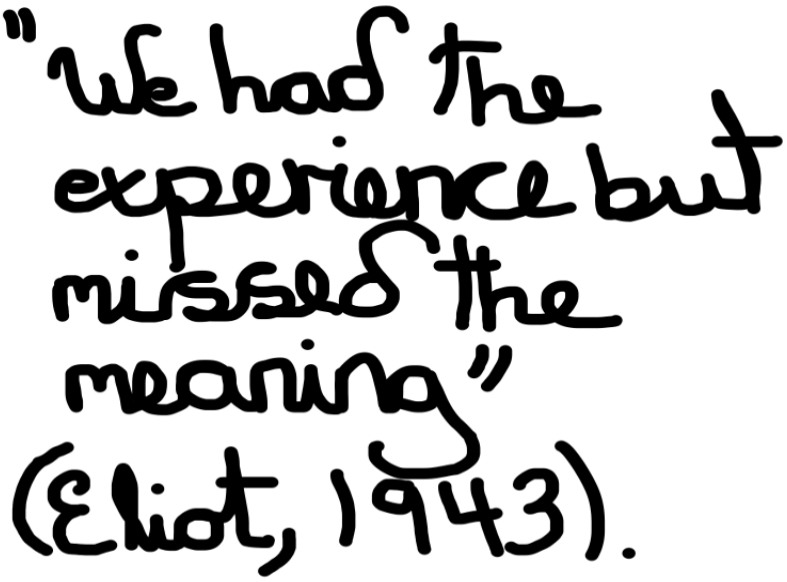

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SUMMARY

Background: Perioperative nursing focuses on care for patients with life-threatening crisis, illness or injury undergoing planned or acute surgery, treatment and/or examination. Performing care requires advanced knowledge and skills to ensure safe outcomes for surgical patients. Perioperative nurses work in interprofessional surgical teams and must develop team skills, such as communication and interprofessional collaboration, as teamwork is an essential component of patient safety. Therefore, perioperative nurses need a distinct form of higher education that builds a close relationship between higher education, science and the profession's occupational field. Interprofessional simulation-based learning is a pedagogical approach that integrates learning as a task performance, communication technique and collaboration. It involves higher-level learning, such as analysis and problem-solving in problematic scenarios or care settings. Although interprofessional simulation-based learning is an often-used pedagogical approach in nursing programmes, it still seems under-researched and under-theorised, especially in educating perioperative nurses. Therefore, there appears to be a need for explorative research on arranging interprofessional simulation-based learning to facilitate perioperative nursing students' learning, create good learning processes and obtain attended learning outcomes. Furthermore, there is a need for more in-depth knowledge about the learning processes in interprofessional simulation-based learning. There also seems to be scarce knowledge concerning students' transfer of professional competence to clinical practice and how interprofessional simulation-based learning influences future practice.

Aim: The overarching aim of this PhD thesis is to gain knowledge and insight into perioperative nursing students' learning and development of professional competence using interprofessional simulation-based learning as a pedagogical approach.

Design, methods and samples: An inductive explorative design and a phenomenological hermeneutical analysis inspired by Ricoeur's theory were applied in Studies 1 and 3. A descriptive abductive design was employed using directed content analysis in Study 2. The samples in Studies 1 and 2 were the

same students enrolled in a postgraduate (one-and-a-half years) or a master's degree programme (two years) in perioperative nursing. Their teachers informed and recruited perioperative nursing students between April and October 2019. Thirty-four perioperative nursing students from four educational institutions participated in six focus group interviews, with four–eight students in each focus group in 2019. The samples in Study 3 were newly graduated perioperative nurses recruited by their teacher as perioperative nursing students from five different educational institutions within a postgraduate programme (one-and-a-half years) and a master's degree programme (two-years). Sixteen semi-structured individual interviews were conducted with perioperative nurses three–five months after graduation between March 2019 and November 2020.
In Studies 1, 2 and 3, participants were eligible for inclusion if they had participated in interprofessional simulation-based learning with other students as anaesthetic nursing students during their education and if the interprofessional simulation-based learning scenario contained an acute situation.

Main results: The results revealed critical prerequisites to consider when using this pedagogical approach when planning, preparing and conducting interprofessional simulation-based learning to support participants' learning and achieve learning outcomes. The participants experienced that when being students in one professional nursing education with students from other professional nursing education programmes, there was a need to customise interprofessional simulation-based learning for each professional nursing educational programme—ensuring good learning processes and outcomes for all participating professions. Furthermore, the participants' experiences of reality were essential and influenced their learning processes and outcomes. The results showed that participants learned when they felt mentally prepared for the simulation session, felt safe, were in a social context and were in active and observing roles. Further, debriefing was important in their learning process, as it fostered reflection and strengthened the participants' learning experience of mastery. The participants experienced developing relevant and important professional competence in handling acute situations, competence in interprofessional teamwork and professional identity. Additionally, well-designed and prepared interprofessional simulation-based learning could develop self-efficacy in communication, interprofessional collaboration and prioritising tasks in acute situations. According to the participants, they could transfer their

competencies from interprofessional simulation-based learning to clinical practice as perioperative nursing students and recently graduated perioperative nurses. Through interprofessional simulation-based learning, the participants developed knowledge and skills for continuous learning and could further develop these skills when entering clinical practice as recently graduated perioperative nurses.

Conclusion: Interprofessional simulation-based learning is an essential pedagogical approach in perioperative nursing education, as it develops professional competence and self-efficacy in meeting acute clinical situations. It is vital to use effective pedagogical approaches to build competencies that are transferable to clinical practice and to improve perioperative nurses' performance as recent graduates. Therefore, it is crucial to implement interprofessional simulation-based learning in perioperative nursing education.

SAMMENDRAG

Bakgrunn: Operasjonssykepleiere utøver pleie til pasienter med livstruende sykdom eller skade, og som gjennomgår planlagt eller akutt kirurgi, behandling eller undersøkelse. Operasjonssykepleie krever avanserte kunnskaper og ferdigheter for å sikre trygge resultater for kirurgiske pasienter. Operasjonssykepleiere jobber i interprofesjonelle kirurgiske team og må utvikle teamkompetanse slik som kommunikasjon og interprofesjonellt samarbeid fordi teamarbeid er en vesentlig del av pasientsikkerhet. Derfor trenger operasjonssykepleiere som profesjon en distinkt form for høyere utdanning som bygger et nært forhold mellom utdanning, forskning og profesjonens yrkesfelt. Interprofesjonell simuleringsbasert læring er en pedagogisk tilnærming som integrerer læring som oppgaveutførelse, kommunikasjonsteknikker og samarbeid. Det innebærer læring på høyere nivå, som analyse og problemløsning i problematiske scenarier eller omsorgsmiljøer. Selv om interprofesjonell simuleringsbasert læring er en ofte brukt pedagogisk tilnærming i sykepleieutdanninger, er den fortsatt lite undersøkt og teoretisk forankret, spesielt innenfor utdanning av operasjonssykepleiere. Derfor er det behov for kvalitativ forskning på hvordan man kan tilrettelegge interprofesjonell simulerings-basert læring for å muliggjøre operasjonssykepleierstudenters læring og skape gode læringsprosesser for å oppnå ønskede læringsutbytter. Videre er det behov for mer dybdekunnskap om læringsprosessene i interprofesjonell simulerings-basert læring. Det ser også ut til å være manglende kunnskap om hvordan studenter overfører faglig kompetanse til klinisk praksis og hvordan interprofesjonell simulerings-basert læring påvirker fremtidig praksis.

Hensikt: Det overordnede målet med doktorgraden var å få kunnskap og innsikt om operasjonssykepleiestudenters læring og utvikling av faglig kompetanse ved bruk av interprofesjonell simulerings-basert læring som en pedagogisk tilnærming.

Design, metoder og utvalg: I Studie 1 og 3 ble det brukt et induktivt utforskende design og en fenomenologisk hermeneutisk analyse, inspirert av Ricoeurs teori. I Studie 2 ble det brukt et beskrivende abduktivt design og direkte innholdsanalyse. Utvalg i Studie 1 og 2 utgjorde de samme studentene i en

videreutdanning (halvannet år) eller et masterprogram (på to år) i operasjonssykepleie. Studentene ble informert og rekruttert av sine lærere i operasjonssykepleie mellom april og oktober 2019. I 2019, deltok trettifire operasjonssykepleiestudenter fra fire utdanningsinstitusjoner i Norge, i seks fokus gruppe intervjuer (med fire til åtte studenter i hvert intervju). Utvalget i Studie 3 bestod av nylig uteksaminerte operasjonssykepleiere som var rekruttert av sine lærere fra fem forskjellige utdanningsinstitusjoner mens de ennå var operasjonssykepleierstudenter innenfor en videreutdanning (halvannet år) eller et masterprogram (av to års varighet). Seksten individuelle intervjuer ble gjennomført mellom mars 2019 og november 2020 med operasjonssykepleiere, tre til fem måneder etter endt utdanning. I studie 1, 2 og 3 var deltagere kvalifisert for inkludering dersom de hadde deltatt i interprofesjonell simulerings-basert læring sammen med andre studenter, som for eksempel anestesisykepleierstudenter, under utdanningen og at scenarioet inneholdt en akutt situasjon.

Resultater: Resultater avdekket viktige forutsetninger ved planlegging, forberedelse og gjennomføring av interprofesjonell simulerings-basert læring, som må vurderes for å kunne støtte deltakernes læring og oppnåelse av læringsutbytte. Deltakerne opplevde at når de medvirket sammen med studenter fra andre profesjoner var det behov for å tilpasse interprofesjonell simulerings-basert læring til hver enkelt profesjon som deltok. Videre var det viktig for deltakerne å oppleve den interprofesjonelle simulerings-basert læringen som realistisk og det påvirket deres læringsprosesser og resultater. Resultatene viste at deltakerne lærte gjennom interprofesjonell simulerings-basert læring når de: følte seg mentalt forberedt på simuleringsøkten, følte seg trygge, var i en sosial kontekst og var i både aktive og observerende roller. Videre var debrifing betydningsfull i deres læringsprosess, da det fremmet refleksjon og styrket deltakernes opplevelse av mestring. Deltakerne opplevde at de utviklet relevant og viktig faglig kompetanse gjennom interprofesjonell simulerings-basert læring som kompetanse i å håndtere akutte situasjoner, kompetanse i interprofesjonellt teamarbeid, og faglig identitetsutvikling. I tillegg viste resultatene at grunndig designet og forberedt interprofesjonell simulerings-basert læring kunne utvikle mestringstro når det gjelder kommunikasjon, interprofesjonellt samarbeid og prioritering av oppgaver i akutte situasjoner. Deltakerne opplevde at de kunne overføre sin kompetanse fra interprofesjonell simulerings-basert læring til klinisk

praksis som operasjonssykepleierstudenter og som nyutdannede operasjonssykepleiere. Gjennom interprofesjonell simulerings-basert læring utviklet deltakerne kunnskap og ferdigheter for kontinuerlig læring og kunne bygge videre på denne kompetansen i klinisk praksis som nyutdannede operasjonssykepleiere.

Konklusjoner: Interprofesjonell simulerings-basert læring er en viktig pedagogisk tilnærming i operasjonssykepleieutdanning ettersom den utvikler faglig kompetanse og mestringstro hos operasjonssykepleie studenter og nylig uteksaminerte operasjonssykepleiere i møte med akutte kliniske situasjoner. Videre er det betydningsfullt å bruke effektive læringsmetoder for å bygge kompetanse som kan overføres til klinisk praksis og forbedre ytelsen til operasjonssykepleiere som nyutdannede. Derfor er det viktig å implementere interprofesjonell simulerings-basert læring i utdanning av operasjonssykepleiere.

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https://doi.org/10.1111/jocn.15535

Paper 2

Kaldheim, H. K. A., Fossum, M., Munday, J., Creutzfeldt, J., & Slettebø, Å. (2021). Use of interprofessional simulation-based learning to develop perioperative nursing students' self-efficacy in responding to acute situations. *International Journal of Educational Research, 109,* 101801.
https://doi.org/10.1016/j.ijer.2021.101801

Paper 3

Kaldheim, H. K. A., Fossum, M., Munday, J., Creutzfeldt, J., & Slettebø, Å. Professional competence development through interprofessional simulation-based learning assists perioperative nurses in post-graduation acute clinical practice situations. A qualitative study. *Journal of Clinical Nursing*.
https://doi.org/10.1111/jocn.16377

ABBREVIATIONS

AT	Activity Theory
INACSL	International Nursing Association for Clinical Simulation and Learnings
ISBL	Interprofessional Simulation-Based Learning
NSD	Norwegian Centre for Research Data
NSFLOS	The Norwegian Nurses' Association's Group of Perioperative Nurses
PhD	Doctor of Philosophy
RN	Registered Nurse
SBL	Simulation-Based Learning
SSC	Surgical Safety Checklist
SDT	Self-Determination Theory
USA	United States of America
WHO	World Health Organisation
ZPD	Zone of Proximal Development

FIGURES AND TABLES

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1 INTRODUCTION

Traditionally, perioperative nursing has been regarded as a practical profession that emphasises practical skills as a prerequisite for becoming an excellent perioperative nurse. Today, perioperative nursing is viewed as a profession that provides advanced care for patients in high-dependency situations, and perioperative nursing care requires advanced knowledge and skills to ensure safe outcomes for surgical patients (Hamlin et al., 2009). Perioperative nurses work in an interprofessional surgical team, along with anaesthesia nurses, anaesthesiologists and surgeons. Therefore, perioperative nurses must develop team skills, such as communication and interprofessional collaboration, because teamwork is essential to patient safety (Kaldheim & Slettebø, 2016; Murphy, 2019). According to the Norwegian Perioperative Nurses' Responsibilities and Functions description (2016), perioperative nurses usually care for people in acute and life-threatening crises (The Norwegian Nurses' Association Group of Perioperative Nurses (NSFLOS), 2016). Perioperative nurses are required to have foresight, an overview of the patient situation and the ability to work quickly, rationally and creatively under stress (Smith, 2019). In addition, they must be able to improvise when the situation requires it, process their reactions to such events and assist employees and colleagues with their experiences and reactions (NSFLOS, 2016).

The perioperative clinical area is characterised by increasing complexity. Thus, it requires a distinct form of higher education that builds a close relationship between higher education and science and the profession's occupational field (Grimen, 2008). Teachers and educational institutions face challenges in making scientific and ethical knowledge relevant to practice, which is essential for developing students' professional skills (Smeby, 2008). The challenge is to find teaching and learning methods that focus on student's activity and task performance (Bidabadi et al., 2016).

Simulation-based learning (SBL) is an evidence-based teaching strategy that transfers knowledge between theory and practice (Booth et al., 2017; Ewertsson et al., 2015a). Currently, this pedagogical approach is used broadly in nursing education and clinical practice around the world (Hegland et al., 2017). Studies have evaluated the use of this pedagogical approach in the Bachelor of Nursing programme (Cant & Cooper, 2017; Jeppesen et al., 2017) and have shown that it is student-centred, interactive and constructive in preparing students

for real-world patient care experiences (Alinier et al., 2006; Bremner et al., 2006). It has also become an essential educational tool for developing competencies (Dahlgren et al., 2019b) as it can develop knowledge, skills, critical thinking and confidence (Cant & Cooper, 2017; Jeppesen et al., 2017).

Interprofessional collaboration and teamwork are essential for patient safety, as injuries are induced by mistakes and miscommunication between health professionals (Manser, 2009). Thus, interprofessional simulation-based learning (ISBL) has been promoted globally as essential for developing competencies within collaboration and teamwork in interprofessional teams (World Health Organisation (WHO), 2010). Research has shown that ISBL can enhance team performance (McGaghie et al., 2010), develop knowledge and improve the perception of effective teamwork (Cory et al., 2020). ISBL is also an effective pedagogical approach to developing collaborative competence (Marion-Martins & Pinho, 2020).

ISBL offers students the opportunity to become instrumental in their learning process as they actively participate and 'learn by doing', as referred to by John Dewey (1859–1952) (Landorf &Wadley, 2022). It incorporates a realistic experience, enables active engagement for the participants and combines 'the complexities of practical and theoretical learning with opportunity for repetition, feedback, evaluation and reflection' (Bland et al., 2011, p. 668). ISBL also provides students with this experience without compromising patients' safety (Kim et al., 2016). ISBL allows the participants to perform individual actions and read, anticipate and act on other participants' actions. 'Therefore, the development of the competencies necessary for teamwork involves a sensitivity to the talk and bodily conduct of others in the domain' (Rystedt et al., 2019, p. 15).

1.1 Terms used

In this PhD thesis, each nursing education specialisation is seen as one professional education. For example, anaesthesia nursing education is one professional education. ISBL include students from more than two professional education. Interprofessional and interdisciplinary teams are used and considered the same—as a team, with more than one professional participating. Moreover, the term 'perioperative nurse' is used. The reason for using this term is that, today, perioperative nurses deliver comprehensive patient care not only in the

operating room (before operating room nursing/nurses) but also in other areas that include invasive procedures (Cuming, 2019). In Chapter 5, the term ‘Doctor of Philosophy’ (PhD) project is used instead of the PhD thesis used in other chapters because design and methods are more related to a research process that includes a frame of conducting a PhD project rather than writing a PhD thesis, binding the three studies together. Moreover, the pronoun ‘I’ is used instead of the PhD student in some of the subsections in Chapters 5 and 7 (methodological considerations) because it seems more natural, for example, when writing about pre-understanding.

1.2 Disposition of the thesis

After the introduction, Chapter 2 presents background information about the role of perioperative nurses and perioperative nursing, knowledge regarding the SBL/ISBL context and previous research on SBL/ISBL. The background chapter includes information about professional competence. Chapter 3 provides the theoretical framework pertinent to the context of this PhD thesis. Chapter 4 presents the overarching aim and the aims of the three studies. Chapter 5 describes the design and methods, including the PhD project’s study philosophical perspective and study designs and the three studies’ design and methods. Chapter 6 presents the results of the three studies (also reported in the published articles (see Papers 1, 2 and 3 in the Appendix)) as well as the overall results of the PhD thesis. Chapter 7 discusses the results and methodological considerations. Finally, Chapter 8 presents the conclusion, implications for practice and perspectives for further research.

2 BACKGROUND

This chapter presents background information about perioperative nursing and SBL/ISBL used as a pedagogical approach in postgraduate nursing. At the end of the chapter, professional competence is explained.

2.1 Role of perioperative nurses and perioperative nursing

Perioperative nursing is one of the oldest specialisations in nursing, dating back to the late 19th century. Florence Nightingale (1820–1910) practised perioperative nursing in the 1800s, helping doctors with simple surgical operations in the English slum. She founded the first nursing school in 1860 at St. Thomas Hospital in London and taught general nursing and assistance in surgery. Since then, the primary role of perioperative nurses has been to take responsibility for surgical asepsis and ensure patient safety (Hamlin, 2020).

The title and role of perioperative nurses today vary between hospitals and countries. For example, they are called surgical nurses, theatre nurses, scrub nurses, circulating nurses and operating nurses (Challaghan, 2011; Rothrock et al., 2019). In this PhD thesis, perioperative nursing implies the delivery of patient care to patients during preoperative, intraoperative and postoperative phases by specialised trained registered nurses (RNs). Care is also given to patients in acute trauma situations.

Perioperative nurses' competence is important when patients are in acute situations and need surgery. Surgery is performed in complex situations in a high-tech environment by interprofessional surgical teams. Therefore, perioperative nurses must have action competence based on attitude, knowledge, skills and the ability to apply this competence together with professional judgment (Smith, 2019).

Perioperative nurses practice individual and professional nursing care based on evidence-based knowledge (Cuming, 2019; NSFLOS, 2016). Such care implies accepting the rationale for specific activities and interventions, knowledge of how and when to implement them and the expertise to evaluate the effectiveness and outcomes of the care delivered.

Another function of perioperative nurses is to be patient advocates during times of vulnerability. Vulnerability is when patients are unable to take care of themselves because of the situation, such as being under anaesthesia, unconscious or unable to talk about their case. Perioperative nurses must

anticipate the needs of patients and the interprofessional team and rapidly initiate safe and appropriate nursing interventions through the required competence. This complex function is explained as supporting patients emotionally and maintaining their dignity (Munday et al., 2015). This 'requires a broad knowledge base, instant recall of nursing science, an intuitive ability to be guided by nursing experience, diversity of thought in action, and great stamina and flexibility' (Cuming, 2019, p. 1).

2.1.1 Perioperative nurses' working environment

The design of a perioperative environment must support safe patient care and workplace safety. Perioperative nurses usually work and practice in surgical departments and operating rooms, which are also called operating theatres. Furthermore, they can be called into trauma situation in the acute room and must cooperate professionally within a trauma team. They also work in ambulatory surgery centres and other specialised areas where their competencies are needed, such as interventional radiology departments and mobile surgical units. With advances in surgical science and technology (Smith, 2019), their working environments also include complex fields with cutting-edge innovations, for example, remote surgery, virtual endoscopy, transplanted organs and tissue, computerised navigation systems, radiofrequency identification, replacing worn-out body parts with absorbed biological materials and robot surgery (Cuming, 2019).

2.1.2 Dual roles of perioperative nurses

Traditionally, perioperative nurses play two roles in the operating room. In international literature, these roles are called 'scrub nurse' and 'circulating nurse'. In Norway, we use the terms 'sterile executive role function (sterile role)' and 'circulating role function'. The difference lies in the work tasks. For example, in the United States of America (USA), scrub nurses perform the surgical scrub (disinfecting the area on the patient's body where the surgeon will operate). Conversely, in Norway, circulating nurses perform this task. Therefore, it would be wrong to call them scrub nurses.

Performing the sterile role, perioperative nurses in the operating room are responsible for preparing and maintaining the sterile field and the surgical instruments used during the surgical procedure. This role requires in-depth knowledge of all steps of the surgical procedure. It involves the ability to foresee

each instrument to be used and to prepare what will be needed. The instruments are positioned on the sterile table constructively so they can be used and quickly delivered to the surgeon, often without communication (Rothrock et al., 2019).

Circulating nurses are responsible for assessing patients, planning, coordinating and implementing an appropriate plan for the care of perioperative patients. They are also responsible for positioning patients for surgery. Therefore, perioperative nurses must understand the anatomic and physiologic changes associated with positioning patients. This includes knowledge about the type of surgical position, the length of time in that position, the type of operating table, the use of padding, the technical equipment used, the anaesthesia used and the surgical procedure. This can also affect the skin and underlying tissue, the nervous system, the musculoskeletal system, the cardiovascular system, the respiratory system and other vulnerable areas, such as the eyes, peritoneum, breast and fingers. Sterile perioperative nurses in the executive role function (sterile role) and the circulating role function work closely with other professionals in the interprofessional surgical team to ensure patient safety (Rothrock et al., 2019).

2.1.3 Working in an interprofessional surgical team

Perioperative nurses work independently and interdependently in an interprofessional surgical team. A team is defined as ‘a distinguishable set of two or more people who interact dynamically, interdependently and adaptively toward a common and valued goal, objective or mission, who have each been assigned specific roles or functions to perform, and who have limited life span of membership’ (Salas et al., 1992, p. 4). Professional roles can vary depending on the country and the working context. In Norway, an interprofessional surgical team consists of an anaesthesiologist, an anaesthesia nurse, a perioperative nurse in the sterile role, one in the circulating role and surgeons. These different professions must work together to ensure patient safety (Munday et al., 2015). Constructive interprofessional teamwork and communication in the operating room are essential for patient safety (Murphy, 2019). Team members have well-defined roles (Makary et al., 2006), but at the same time, they are interdependent and often work under time and pressure. Therefore, teamwork among the members is vital. Moreover, team members require more competencies other than technical skills, such as skills to participate in teamwork and non-technical

skills[1] (Mitchell & Flin, 2008). Interprofessional teams are usually ad hoc; therefore, team members differ daily. This can challenge a team's adaptive capacity and the cooperative dynamics between team members (Leach et al., 2009).

The World Health Organisation (WHO) (2010) has reported that 234 million surgical procedures are performed each year globally and that 50% of surgical care complications could have been avoided. Therefore, the WHO's Safe Surgery Saves Lives initiative and the Surgical Safety Checklist (SSC) are used worldwide to prevent surgical care complications and to improve interprofessional teamwork within the surgical team (Murphy, 2019). The SSC and its research show that a checklist by itself cannot improve all surgical care complications, but it does increase meaningful communication and teamwork (Lau & Chamberlain, 2016). Communication is rooted in social systems, human factors and cultures; therefore, interprofessional team cooperation and communication also rely on other factors (Murphy, 2019). For example, the factor of respect involves interactions in which team members understand each other (roles and tasks), communicate constructively and feel valued (Kaldheim & Slettebø, 2016). Professional communication in an interprofessional team is associated with professional values. It is suggested that professionals in the team receive systematic education that includes learning professional communication as part of their academic education (Yeganeh et al., 2022).

2.1.4 Perioperative nurses' role in acute situations

Acute situations are an area that lacks a clear definition. Nevertheless, they are 'perceived as situations that occur suddenly, that involve a shortage of time, or that generate a sense of insufficient personal competence' (Sterner et al., 2018, p. 23). In acute situations in perioperative nursing, patient care occurs in the operating room, the intensive care unit and the acute trauma room. Perioperative nursing includes evaluation, decision-making and action competence. Therefore, they need to have in-depth knowledge about traumatology, treatment and the role

[1] Flin et al. (2008) defined non-technical skills as the cognitive, social and personal resource skills that complement technical skills and contribute to safe and efficient task performance (Flin et al., 2008). Non-technical skills can also be defined as 'the cognitive (decision-making, situation-awareness) and interpersonal (communication, teamwork, leadership) skills that underpin technical proficiency' (Pires et al., 2017, p. 19).

of perioperative nurses in acute situations (Ministry of Education and Research, 2021a).

2.1.5 Educational system for becoming perioperative nurses in Norway

In Norway, a qualification requirement for perioperative nurses is to be an RN who has attended perioperative nursing education—either a master's degree education (two-year duration) or a postgraduate education (one-and-a-half-year duration) (Ministry of Education and Research, 2021a). Whether specialised trained nurses require a master's degree is still under debate. New National Curricula Regulations have been developed (Ministry of Education and Research, 2021a), and these include national guidelines for perioperative nursing education, which came into effect starting January 1, 2022. By 2023, all universities or university colleges that offer perioperative nursing education in Norway must follow this regulation. The regulation allows perioperative nursing students to follow a master's degree programme that provides 120 credits and quits after 90 credits. Both share the title of perioperative nurse, but only one includes a master's degree. This regulation outlines seven areas of competence together with related learning outcomes: 1) perioperative nursing as a subject and profession; 2) clinical perioperative nursing, evaluation, decision-making and action competence; 3) technology and digital competence; 4) professional management and collaboration; 5) quality work and patient safety; 6) theory of science, research and knowledge-based practice; and 7) research, quality work and dissemination (Ministry of Education and Research, 2021a). In clinical perioperative nursing, evaluation, decision-making and action competence include the following learning outcomes: 1) can analyse, assess and handle complex and critical situations following health legislation and professional ethics and 2) can apply knowledge and skills to handle emergencies safely and securely in collaboration with other professions and services (Ministry of Education and Research, 2021a). According to the regulations, education must include 30 weeks of clinical practice in which each week should have a minimum 30-hour duration. Two weeks of clinical practice can be replaced with simulation or skills training to achieve learning outcomes (Ministry of Education and Research, 2021a). Therefore, perioperative nursing students must learn to handle acute situations and communicate, collaborate and prioritise in acute situations. However, some clinical placements do not put perioperative nursing students in acute situations. Therefore, if they do not experience this in clinical placement,

they will not be able to learn to handle it during their education when they are not offered a simulation of acute situations in their educational institutions.

2.2 Simulation-based learning

As this PhD thesis focuses on nursing, we use the definitions in the International Nursing Association for Clinical Simulation and Learning's (INACSL) Standards of Best Practice in Simulation (2016). It 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, 2016c, p. S44). SBL is used in various areas, such as the military, pilots' training and nursing. SBL incorporates learning to perform tasks, communication and a higher-level absorption of knowledge and practice through analysis and problem solving (Pilcher et al., 2012). SBL provides cognitive, affective and psychomotor challenges and includes a trustworthy picture of reality. Moreover, it integrates practical and theoretical learning and its complexities and allows feedback, reflection, evaluation and repetition (Bland et al., 2011).

2.2.1 History of SBL

SBL, as a pedagogical approach in nursing education, has a long history. The earliest known reference dates back to the Handbook for Hospital Sisters written by Florence Lees and Henry Acland (1874), in which they describe the use of a 'jointed skeleton', 'mechanical dummies' and replicas of arms and legs to learn bandaging (Sanko, 2017). Florence Nightingale used SBL in her instruction to prevent infection (Stabler-Haas, 2012). Mrs. Chase, presented in 1910, was one of the most popular full-body simulators with realistic structures, such as elbows, hips and knees (Herrmann, 1981).

In the 1940s and 1950s, when nursing education went from a hospital-based apprenticeship to a professional programme, nursing skills laboratories were required to help nursing students learn the skills they would need in clinical practice, and SBL labs in nursing schools emerged (Sanko, 2017). In the 1960s, Resusci Anne, a cardiopulmonary resuscitation simulator, was developed when a Norwegian anaesthesiologist, Bjørn Lind, persuaded Asmund Laerdal to develop it (Olson et al., 2018). In 1966, Abrahamson and Denson developed SimOne as the first full-size, computer-controlled simulator to replicate aspects of human physiology and behaviour (Bradley, 2006). In the 1970s, leaders in nursing and SBL labs came together to share and discuss their knowledge, which led to the

development of INACSL. The SBL labs developed in educational nursing institutions today are often high-technology centres that include hospital rooms and a variety of low- and high-technology simulators (Sanko, 2017).

Full acceptance of SBL was a slow process. In 2004, it was still in its developmental phase (Nehring & Lashley, 2004). By 2008, SBL began to be included in nursing education and was considered a substitute for clinical hours (Nehring, 2008). SBL has been incorporated into nursing curricula worldwide, and the most specialised simulators today have a pulse, blood pressure and secretion of sweat and tears.

Perioperative nursing does not have a long tradition in SBL. Nevertheless, in the last five years, perioperative nursing education and educational institutions have developed an understanding of the need for SBL labs that represent an operating room, including technological equipment. Still it seems to be a shortage of simulators designed specifically for perioperative nursing, as the history of SBL in the operating room has focused on acute situations and intubations and is linked to the area of anaesthesiology (Kaldheim et al., 2019).

2.3 Interprofessional simulation-based learning

In this thesis, we refer to SBL and ISBL as perioperative nurses working in a complex environment as professionals in a collaborative surgical team. To ensure safe perioperative care, perioperative nursing students must learn to cooperate and communicate appropriately (Rossler et al., 2021). ISBL enables participants from different professions to engage in simulation-based experiences to achieve shared or linked objectives and outcomes (INACSL, 2021). The WHO defines interprofessional education as an environment in which students from two or more professional backgrounds learn together to facilitate effective collaboration and enhance health outcomes (WHO, 2010).

During professional education, students in different professions working in interprofessional teams need to learn how to collaborate to improve patient care. ISBL enables participants from other professions to learn together (INACSL, 2021). Today, professional organisations, educational institutions and hospitals understand and agree that it is important to improve interprofessional teamwork to ensure the quality of care. Therefore, interprofessional team training and simulation is a robust pedagogical approach to do this and to provide high-quality and safe surgical care (INACSL, 2021; Paige et al., 2020).

2.3.1 ISBL used to teach technical and non-technical skills

In perioperative nursing, safe care for patients requires technical and non-technical skills (Gillespie et al., 2012; Jaensson et al., 2018). Technical skills can be described as practical skills (Ewertsson et al., 2015b), but they are also defined to include knowledge, skill proficiency (Gillespie et al., 2012), technical knowledge and performance (Gillespie et al., 2009; Sevdalis et al., 2009), medical and surgical equipment (Gillespie et al., 2012; Gjeraa et al., 2016; Sevdalis et al., 2009) and procedures (Gillespie et al., 2012; Sevdalis et al., 2009). Technical skills can be trained through SBL (Higgins et al., 2021) to accomplish a specific task (Lioce et al., 2020).

In the perioperative nursing context, non-technical skills, such as collaboration and communication, are closely connected to patient safety and create valuable interactions within the surgical team (Hanssen et al., 2020). Moreover, non-technical skills are important for avoiding errors (Pires et al., 2017). Since the beginning of 1990, non-technical skills have gained acceptance for being important to safe health care and are taught and trained at different levels in acute settings (Pierre et al., 2016). ISBL has been used as a fundamental pedagogical approach to teaching non-technical skills, such as team building, leadership, decision-making and communication (Eich et al., 2007).

2.4 Planning and developing ISBL

Planning ISBL begins with upper-level administration support (Charles & Koehn, 2020), which is defined as ‘upper-level administration as deans, associate deans for education, and/or their designee(s)’ (Charles & Koehn, 2020; Thibault, 2011, p. 136). ISBL can be costly. Deans and other decision makers (directors) can be central to providing the necessary resources to plan and implement ISBL in educational programmes/curricula and to evaluate ISBL (Charles & Koehn, 2020). Norway’s Ministry of Education and Research (2020–2021) stresses the importance of using SBL/ISBL in educating professional practitioners and educational institutions to obtain improved ISBL environment/facilities (Ministry of Education and Research, 2021b). Planning ISBL requires resources and developing effective ISBL requires a well-designed and planned framework that includes and promotes structure, process and outcomes. This strengthens the pedagogical approach and delivers value to ISBL experiences (INACSL, 2016b).

2.4.1 Learning objectives and outcomes

ISBL is derived from the development of learning objectives designed to reach expected behaviours and outcomes and should be delivered by the facilitator during a briefing (Paige et al., 2020). Learning objectives are directions for facilitating SBL outcomes and are the hallmark of a sound educational design (MacLean et al., 2019). They should be developed to facilitate the transfer of knowledge to prepare for the practice of safe patient care (Lioce et al., 2020; Pilcher et al., 2012). Learning objectives guide the creation and use of valid and reliable ISBL scenarios, influencing participants to achieve the intended outcomes (Cantrell et al., 2017a; Mirza et al., 2020). Furthermore, learning objectives must be built upon learners' foundational knowledge (Watts et al., 2021). Central to learning and outcomes are the results of the participants' progress in meeting the learning objectives, and outcomes are used to determine the effects of the SBL experience (Meakim et al., 2013). The outcomes resulting from SBL are the changes in knowledge, skills and attitudes (Billings & Halstead, 2019; Hoggan, 2016). The New World Kirkpatrick Model's four levels of evaluation in SBL are a commonly used ranking model that evaluates training programmes and the transfer of learning outcomes (Kirkpatrick & Kirkpatrick, 2016). This model comprises the following four levels of measurements: '1) Reaction: measures the degree to which participants find the training favourable, engaging and relevant to their jobs; 2) Learning: measures the degree to which participants acquire the intended knowledge, skills, attitude, confidence and commitment based on their participation in the training; 3) Behaviour: measures the degree to which participants apply what they learned during training when they are back on their job; and 4) Result: measures the degree to which targeted outcomes occur as a result of the training, support and accountability' (Miller et al., 2021, p. 41). Learning objectives are important in debriefing regarding feedback and reflection (Paige et al., 2020).

2.5 Fidelity

Discussions have been made about the concept of fidelity used in ISBL in terms of its definition. Hamstra et al. (2014) were critical of how the literature uses fidelity, as it often refers to the degree to which a simulator looks, feels and acts like a human patient and emphasises technological equipment (Hamstra et al., 2014). Fidelity describes the advancement of a simulator, and it is graded into high, medium and low. For example, high-fidelity ISBL uses an advanced

simulator. Currently, fidelity has a broader meaning, including environmental, technical and psychological aspects. It is not accomplished only by technology 'but is an emergent phenomenon that must be constantly worked at, socially and materially, to be produced and maintained' (Rooney et al., 2015, p. 8)

From the early 15c. Latin word fidelitatem (nominative fidelitas), fidelity is defined as 'faithfulness, adherence, and trustiness'. Originating from fidelis, it means 'faithful, true, trusty, and sincere'. In the 1530s, it came to mean 'faithful adherence to truth or reality; specifically of sound reproduction from 1878' (Lioce et al., 2020, p. 18). INACSL's Standards of Best Practice in Simulation (2016) defines fidelity as 'the ability to view or represent things as they are to enhance believability' (INACSL, 2016c, p. S42). The level of fidelity is not only determined by the advanced technology used but also by the environment, tools and resources used.

As there are many factors related to participants, INACSL describes the different dimensions of fidelity as follows:

A. Conceptual fidelity ensures that all elements of a scenario or case are realistically related to each other so that the case makes sense to learners (e.g., vital signs reflect diagnosis).
B. Physical/Environmental fidelity factors, such as environment, simulators, room, moulage, equipment, noise and/or props, are realistic.
C. Psychological fidelity involves factors such as participants' emotions, beliefs and self-awareness. It ensures that the simulated environment evokes the underlying psychological processes necessary in a real-world setting. (INACSL, 2016c, p. S42).

To perceive the realism of a simulation, it is important to understand how the scenario instructions are delivered (Escher et al., 2017). If we increase fidelity, we also increase realism (Meakim et al., 2013). As all of the simulation interventions in this PhD thesis are ISBL, fidelity is also considered a consequence of the participants' interactions with each other in the interprofessional team and the environment created (Rystedt et al., 2019).

2.5.1 Reality and realism as terms

Reality and realism are two terms often used synonymously but are actually dissimilar in meaning (Dieckmann, 2009). According to Dieckmann (2009, p. 60), 'realism addresses the question of how closely a replication of an entity resembles the entity itself'. Reality comprises the ontological question of a unit,

whereas realism includes a judgment, often comparing (Dieckmann, 2009). Examples are comparing the clinical practice environment and the environment in ISBL. Here, the ISBL context in which this judgement is made is also important—for example, how safe the person who is judging feels (Dieckmann, 2009).

Fidelity, reality and realism are used in this PhD thesis. Fidelity is defined as 'the degree to which the simulation replicates the real event/or workplace; this includes physical, psychological and environmental elements' (Lioce et al., 2020, p. 18). Reality replicates the real world, and realism is the participants' judgment of the real world represented in the ISBL. Fidelity and reality are absolute, while realism is a perception of ISBL, as participants can perceive ISBL and make judgments. Therefore, realism is relative.

2.6 The simulator in ISBL

A simulator is 'a life-size, human-like simulator representing a patient for health care simulation and education' (Lioce et al., 2020, p. 29; Palaganas et al., 2014). In ISBL, the use of a simulator can vary according to the field; therefore, its construction can differ in technological qualities (Dieckmann et al., 2019). Simulators are also called manikins. The literature defines a manikin as a 'full or partial body simulator that can have varying levels of physiologic function and fidelity' (Lioce et al., 2020, p. 29). This PhD thesis uses the term simulator to cover this phenomenon in ISBL. Advanced simulators include heart and lung sounds, palpable pulse, voice interaction and eye movement resembling a human capability that can be controlled using software and computers (Lioce et al., 2020). They have different parameters that need to be monitored. When participants interact with them, simulators have a wide range of reactions to which participants can respond. The simplest simulators do not have technological features and are commonly used for practicing procedures (Handeland et al., 2022).

ISBL is a social practice in which professionals and students interact. The simulator is part of this social interaction and is an essential part of this social practice (Dieckmann et al., 2019). How the simulator is perceived as a human being and a body can interfere with the participants' learning processes and outcomes. Therefore, it is crucial to consider the validity of a simulator's body when using it to teach students specific skills to evaluate how it can help them

achieve the attendant learning outcomes. The simulator should be ‘constructed in the context of activities’ (Dieckmann et al., 2019, p. 184).

2.7 Facilitators in ISBL

A facilitator is defined as ‘an individual who is involved in the implementation and/or delivery of simulation activities’ or ‘an individual that helps to bring about outcomes (such as learning, productivity or communication) by providing indirect or unobtrusive assistance, guidance or supervision’ (Lioce et al., 2020, p. 18). Facilitators manage the ISBL experience (briefing, simulation session and debriefing) (INACSL, 2016a). They must have the required education, skills and knowledge in simulation pedagogy to support participants in achieving the expected learning outcomes. Moreover, facilitators must be role models who exhibit professional and ethical behaviours (INACSL, 2016a). Facilitators need to create an open and safe culture for learning, and they must be polite and non-judgmental (Webster & Keebler, 2020). They must be able to link ISBL to clinical practice by including information from clinical practice, thus creating meaningful learning experiences (Johnson, 2007). The facilitators’ task becomes more complex when ISBL includes non-technical and technical skills. So, they need to teach both types of skills, identify what the participants do not know enough about and what differentiates ISBL in terms of realism and real clinical practice (Husebø et al., 2012). It is a demanding job to be facilitators in ISBL, especially when the participants are required to learn simulation techniques. It has been suggested that pre-simulation preparation is needed before a briefing to make the facilitators’ role easier to balance the participants’ needs and their need to experience realism and to deliver realistic ISBL (Solli et al., 2020).

2.8 Phases in ISBL

ISBL is divided into four phases (Dieckmann, 2009): preparation, briefing, simulation session and debriefing. Pre-briefing is also mentioned in the literature, and it refers to both preparation and briefing activities that include preparation and briefing (McDermott et al., 2021). These activities occur before the simulation scenario, and they intend to create a psychologically safe learning atmosphere. In this PhD thesis, pre-briefing is divided into preparation and briefing, as described by McDermott et al. (2021).

ISBL requires preparation and planning, similar to other pedagogical approaches. Preparing for ISBL is the time that educators, facilitators and staff

spend preparing ISBL. This includes preparing scenarios (learning objectives and patient situations), roles, equipment, environment, simulators and time allotment (Lioce et al., 2020, p. 37). Preparing an interprofessional simulation scenario in perioperative nursing includes perioperative nurses' technical and nontechnical skills. Furthermore, adapting a manikin in ISBL to perioperative nursing scenarios can be challenging, especially when 'surgery' is required to be performed (Kaldheim et al., 2019). Therefore, it is crucial to plan and prepare for this before the ISBL. Effective ISBL is complex, and the preparation of educators is important (Anderson et al., 2012; Cant & Cooper, 2010; Jeffries, 2008).

2.8.1 Briefing

Briefing is defined 'as an activity immediately preceding the start of a simulation activity where the participants receive essential information about the simulation scenario, such as background information, vital signs, instructions or guidelines' (Lioce et al., 2020, p. 10). Briefing serves to prepare participants before the simulation experience to understand 'what they are going to do and what they will be simulating, and it forms the basis for the debriefing' (Solli et al., 2020, p. 2). During briefing, participants are informed about the simulation scenario, patient situation, learning objectives, roles, simulation environment and available equipment. Participants also require specific instructions regarding their participation and role in ISBL (Hertel & Millis, 2002). It is important to clarify the interprofessional communication and teamwork competencies expected to be developed by participants in the scenario (Charles & Koehn, 2020). The participants need to be familiar with the simulation environment, the simulator and other technology that may be used (McDermott et al., 2021), and they need to be in an organised, psychologically safe learning environment (Rudolph et al., 2014). Briefing can also be the time for establishing a mutual contract with the participants, as it contributes to the responsibility between the educators and the participants. The educators' responsibility is to create a scenario as close to a real one as possible within the existing simulation environment. Moreover, they must disclose which equipment is not authentic or when the participants have to pretend to use fake equipment. This can help the participants become more engaged in the simulation session (Dieckmann et al., 2007; Rudolph et al., 2014).

2.8.2 Simulation session

In this phase, the participants act in a scenario, which is identified as a 'deliberately designed simulation experience (also known as a case) that provides participants with an opportunity to meet identified learning objectives. The scenario provides a context for the simulation and can vary in length and complexity, depending on the learning objectives' (INACSL, 2016c, p. S44). According to Kelly et al. (2019), it is important to design a scenario that enables participants to practice the defined and intended learning outcomes. To create constructive learning, educators must clarify the learning objectives and use them as guides for the planned activities when designing an ISBL and its scenario (Kelly et al., 2019).

2.8.3 Debriefing

Debriefing is an important phase of ISBL, offering learning and performance change (Husebø et al., 2019; Lee et al., 2020). It is defined as 'a formal, collaborative, reflective process within the simulation learning activity' and as 'an activity that follows a simulation experience and is led by a facilitator' (Lioce et al., 2020, p. 14). As a verb, debriefing means 'to conduct a session after a simulation event where educators/ instructors/facilitators and learners re-examine the simulation experience to move towards assimilation and accommodation of learning to future situations' (Lioce et al., 2020, p. 14).

The purpose of debriefing is to develop clinical judgment and critical thinking skills among the participants (Johnson-Russell & Bailey, 2010) through reflective thinking and feedback on their performance in ISBL (Husebø et al., 2019). It allows the participants to give and take feedback, resolve feelings and learn from successes or failures (Dreifuerst, 2009; McGaghie et al., 2010). The use of debriefing is grounded in the idea of both experiential learning and reflective practice, which lead to learning, not just experience alone (Loughran, 2002; Cochran-Smith & Lytle, 1999).

Research has analysed different debriefing models (Lerman & Borstel, 2003; Tosterud et al., 2020). One study identified similar elements in debriefings, such as ensuring psychological safety, clearing up basic assumptions, mental models and debriefing rules, directed learning objectives and open-ended questions (Sawyer et al., 2016). Debriefing models have a joint structure comprising description, analysis and application phases (Rudolph et al., 2006; Steinwachs, 1992).

2.9 Previous research on SBL/ISBL

Systematic reviews have shown that using SBL as a pedagogical approach positively affects nursing students' knowledge and critical thinking (Cant & Cooper, 2017; Jeppesen et al., 2017). In their review, Fisher and King (2013) emphasised students' ability to transfer advanced competencies from SBL to clinical practice and to link practice to theory. Haddeland et al.'s (2018) systematic review and meta-analysis found that knowledge, performance and self-confidence increased after SBL. In a randomised experimental pre-and post-test research design, a significantly greater proportion of students in the intervention group than in the control group had an increased number of correct responses in knowledge and levels of self-confidence post-intervention (Haddeland et al., 2021). Shin et al. (2015) revealed that, compared to traditional pedagogical approaches, SBL is more effective and can improve learning outcomes.

ISBL uses the same approaches as SBL but diverges in the composition of the participants who have to represent two or more professional roles. Moreover, the activity is the goal, as ISBL often focuses on teamwork in an interprofessional team. In education, this is considered a complex setting that is under-theorised and under-researched (Fox & Reeves, 2015). Research has supported the idea that using ISBL can enhance team performance (McGaghie et al., 2010). ISBL can increase participants' knowledge and skills to improve patient safety (Bergh et al., 2015; Lewis et al., 2019), and it offers participants the opportunity to learn and practice technical and non-technical skills. Non-technical skills, such as teamwork, communication and decision-making, are important in improving patient safety through successful team performance. Studies on ISBL have shown improvements in teamwork and communication (Cory et al., 2020; Raurell-Torredà et al., 2021). Burns et al. (2021) evaluated students' experiences of ISBL using acute scenarios and found that learning to work together in a safe environment allowed students to develop an appreciation for each other's scope of practice and responsibilities in an acute situation (Burns et al., 2021). A systematic review and meta-analysis revealed the positive effects and effectiveness of ISBL. ISBL offered the participants a powerful tool for improving team communication and performance (Marion-Martins & Pinho, 2020).

Research on ISBL has mainly focused on the effects of the intervention, and the results show that ISBL is very well received and has promising outcomes (Dahlgren et al., 2019b). Knowing that ISBL is an effective pedagogical approach is constructive, but we need to learn more about the practice and understand how to deliver ISBL and how its arrangements enable students' learning (Dahlgren et al., 2019b). Therefore, there is a need for more in-depth knowledge about the learning processes in ISBL (Rystedt et al., 2019) through explorative research (Dahlgren et al., 2019b). This provides us with the knowledge to understand learning processes and the conditions for students to develop their knowledge and competencies in their professions and interprofessional teamwork (Dahlgren et al., 2019b).

Studies are lacking on how students transfer the professional competence they developed through ISBL to clinical practice after graduation and how ISBL influences future practice (Seaton et al., 2019).

2.9.1 Previous research on SBL/ISBL in the perioperative nursing context

Only a few studies have investigated SBL/ISBL in perioperative nursing (Kaldheim et al., 2019). Ball et al. (2015) developed a perioperative nursing course with SBL in an undergraduate nursing programme to recruit nursing students to the perioperative nursing speciality. They found that nursing students could develop and demonstrate clinical judgment without endangering actual patients. The perioperative skills simulations appeared to contribute to the students' improved self-efficacy and confidence levels. Granger et al. (2011) described the development of an ISBL and evaluated this simulation through debriefing with group discussion. They found that team training was an effective teaching method for developing teamwork and communication skills among perioperative nursing learners. Clendinneng (2011) explored simulation as an educational strategy for perioperative nursing students and found that learning was transferred from the SBL/ISBL setting to the clinical environment through post-simulation debriefing. These findings suggest that SBL/ISBL and debriefing are effective learning strategies for perioperative training, including psychomotor skills, procedural skills, process-centred patient care and working within an interprofessional team. A scoping review found that studies on SBL/ISBL in perioperative nursing are characterised by weak scientific evidence and poor methodological quality. These studies lacked outcomes, and the methods for evaluating the simulation outcomes were described as qualitative evaluations of

the participants' learning experiences through open-ended questions and group discussions. The analysis in these studies was not described or was weak, and different goals of the simulation used were reported. The lack of analysis and conclusion made it challenging to confirm the achieved goals. Therefore, we have sparse knowledge regarding perioperative nursing students' experiences and involvement in participating in SBL/ISBL (Kaldheim et al., 2019). The results of the studies on SBL/ISBL in the baccalaureate nursing programme and other nursing specialities' may, to some extent, be transferred to the education of perioperative nurses. Perioperative nursing today is considered a profession, and perioperative nursing students need to practice their specific tasks and skills to develop their professional competence (Beitz, 2019; Chernikova et al., 2020; Smith, 2019).

Therefore, the overarching aim of this PhD thesis is to gain knowledge and insights into perioperative nursing students' learning and development of professional competence using ISBL as a pedagogical approach.

2.10 Professional competence

Competence has been an important word in education in the last 15–20 years, and it has replaced knowledge and skills as critical categories for rewarding effort (Illeris, 2009). Professional competence includes a knowledge aspect (knowing what) and an action aspect (knowing how) (Ryle, 2009), and it is important in professional qualifications (Smeby & Mausethagen, 2017). It is not enough to know, as professional practitioners also have to use theoretical and practical knowledge and skills well within practical challenges in the practice of the profession. Theoretical knowledge is crucial to developing professional competence (Young, 2007) and is a more expansive description of what a professional is expected to deliver in clinical practice. According to Illeris (2009),

> The concept competences attempt to include different types of qualifications in an understanding which spans a person's potential and practical abilities at one and the same time, that is a holistic concept integrating all that is necessary to manage a given situation or challenge: the concrete qualifications are integrated into the personal competence in relation to a specific task. Whereas the qualification approach started with the single elements and gradually developed in the direction of a more coherent understanding, the competence approach starts with a whole,

such as the type of person who will be able to manage a certain task and, from this position, eventually identifies different qualifications that must be available or acquired (Illeris, 2009, pp. 83–84).

He also emphasised that future events are unpredictable and that competence involves adequately handling future and unexpected situations.

Guerrero and De los Ríos (2012) defined professional competence by including the following characteristics:

a) The components of professional competencies are a composite of personal attributes (capacities, motives, personality traits, self-image, aptitudes, attitudes, values, personality, etc.) that complement and integrate themselves in conjunction with other elements related to the context of work (knowledge, abilities, skills, values, behaviours, actions, experiences, etc.).

b) The use of professional competencies and their context in jobs refers to the efficiency, effectiveness and success through collaboration and problem solving in which the task was carried out. It also refers to the capacity to cope with changing professional contexts.

c) The evolution and evaluation of competent professionals. Considering that competent professionals are formed in a changing context, it is reasonable to consider that they also need to evolve. The evaluation of competent professionals is a challenge that must be assumed, especially if the need for certification is required.

(Guerrero & De los Ríos, 2012, p. 1293)

The development of professional competence in perioperative nursing postgraduate education takes place in several areas, including clinical practice. In this PhD thesis, the development of professional competence is considered both an acquisition process and an interactive process. The acquisition process is an individual's internal psychological process involving the interaction between handling learning content and the individual's incentive/motivation for learning. This process involves an external interaction between the learner and the learner's social, cultural and physical learning environment (Illeris, 2011; 2012). The development of professional competence encompasses the construction of meaning and understanding related to professional practice and the professional role one is to enter (Illeris, 2012). Illeris (2012) emphasised that competence

development is an advanced and demanding form of learning that presupposes that the learner changes and reconstructs already acquired knowledge and insights in light of new knowledge and experiences.

Professional identity is how perioperative nurses think and feel about themselves (Kristoffersen, 2021). Several theoretical frameworks have been used to understand the idea of professional identity (Briggs, 2007; Hunter et al., 2007; Trede et al., 2012). One definition of professional identity is 'how we perceive ourselves as professionals based on our attributes, beliefs, values, motives and experiences in relation to our profession' (Rees & Monrouxe, 2018, p. 202). Professional identity may be included in professional development, as it has been described as 'the sense of being a professional' (Paterson et al., 2002, p. 7). It is integrated into personal identity and is therefore perceived as a requirement in the process of professional identification (Öhlén & Segesten, 1998).

Professional identity development begins when students enter education, gaining theory and practice to understand their future professions and professional roles (Andrew, 2013; Johnson et al., 2012). Theoretical knowledge seems like an important issue when it comes to the development of professional identity (O'Connor, 2007), and it can be an important prerequisite for reflecting 'and for perceiving coherence between the theoretical and practical components of education' (Hatlevik, 2012, p. 870). Reflecting and critical thinking are fundamental in the learning process at all levels of professional experience (Rønnestad, 2008).

Professional identity is also described as a transition into their future work as professionals (Zhang et al., 2017). Within this transition, personal and professional experiences accumulate and adjust (Aagaard et al., 2017) based on new knowledge, skills, roles, responsibilities and professional environments (Seo & Kim, 2017). For this reason, professional identity is a dynamic and adaptable process that leads to the development and understanding of students' future professional practice and obligations to the profession (Bagnasco et al., 2019; Hörberg et al., 2019).

Professional identity development is also described as 'a pivot between the social and the individual' (Wenger, 1999, p. 145), as identity is a meeting between the individual and the collective component. A well-developed professional identity can lead to professional success (Hanna et al., 2019).

3 THEORETICAL FRAMEWORK

Ontology deals with fundamental questions about what reality is. Epistemology deals with questions about how knowledge is created and the preconditions and validity of knowledge (Delanty & Strydom, 2003). Understanding learning has been debated as far back as during the time of the Greek philosophers Socrates, Plato and Aristotle. Plato and Aristotle asked questions about truth and knowledge: 'Is it to be found within us (rationalism) or is it to be found outside of ourselves by using our senses (empiricism)?' (Austin et al., 2001, p. 2). Rationalism holds that the way we perceive things is a product of reason. Through logical or mathematical thinking, we can create true knowledge. Empiricism believes that knowledge comes from experience. It is acquired knowledge through the observation of an external reality (Delanty & Strydom, 2003). In this PhD thesis, epistemological thinking is based on the empiricist view that perioperative nursing students learn through experiences in ISBL. Moreover, knowledge is created through perioperative nursing students' experiences, not from the rationalist view of thinking about developing knowledge. Nevertheless, various beliefs in the educational context and learning encouragement are still being debated (Austin et al., 2001). In higher education, student learning remains an ongoing subject (Yu et al., 2021).

In this PhD thesis, learning is understood as a process in which external or internal stimuli lead to changes in a person's knowledge and behaviour, encompassing mental, emotional, physical and practical domains (Hodkinson et al., 2008). Professional learning occurs through practical–theoretical understanding, experience, interaction and reflection and contributes to the development of professional competence at the individual, organisational and societal levels (Dahlgren et al., 2019b).

'There is less consensus on what and how participants in interprofessional simulations learn, and there is a lack of theoretical understanding of how learning could be understood and researched' (Rystedt et al., 2019, p. 9). The theoretical framework presented in this chapter comes from the overarching aim of the thesis. This aim involves an interest in the complexity of human learning processes and competence development as we explore and describe perioperative nursing students' learning from experiences in ISBL during their education.

In this chapter, a different tradition of learning theories used in SBL/ISBL and the theoretical framework for this PhD thesis are presented.

3.1 Learnings theories in SBL/ISBL

ISBL is a pedagogical approach that involves collaborative learning and incorporates elements from several learning theories, such as relevant cognitive factors, motor skills and social interaction (Tolsgaard et al., 2016). Identity processes concerning the self, others, tasks and settings have been developed (Cantor et al., 2019). These identity processes are important for fostering human behaviour and goal setting.

3.1.1 Behaviouristic and individual constructivist perspectives on learning

The behavioural tradition of learning assumes that students' learning occurs because of external influences (Niosi, 2021). This tradition views learning as a result of external influences and focuses on inner mental processes, acknowledging the student as central to cognition and learning. Skinner (1904-1990), the father of modern behaviourism, considered learning to be the production of wanted behaviours and rejected the influences of mental processes (Austin et al., 2001). Today, learning requires more complex thinking and includes higher mental processes, specifically cognitive processes. Students construct knowledge, and their interest and analytical thinking are guided by how humans process information and make sense of their own experiences (Rystedt et al., 2019). This cognitive or individual constructivism is built on Piaget's theory (1970). Piaget focused on how the brain organises knowledge and what happens when we remember, think and solve problems. This theory is about humans' spontaneous proclivity to interpret and organise the world around them as they strive to find meaning and coherence in their lives. The problem with cognitive constructivism is that, to a small extent, it considers learning to take place in a social context and that knowledge is socially constructed. This PhD thesis emphasises that learning in ISBL occurs in a social activity and that knowledge is socially constructed.

Research on learning is usually related to cognitivism as a reaction to behaviourism. It focuses on the transfer of something learned in one context to another. Therefore, studies on learning and SBL/ISBL are usually randomised controlled trials that measure performance in an experimental group compared to a control group (Boet at al., 2014; Haddeland et al., 2021; Mulyadi et al., 2021). This finding has increased our knowledge of the effect of ISBL but has left out the learning process (Rystedt et al., 2019), as individual outcome measures do

not provide a sufficient basis for describing how ISBL contributes to learning (Battista, 2017).

3.2 Learning theories in this PhD thesis

The theoretical framework of this PhD thesis is built on the sociocultural perspective (Vygotsky, 1980) of learning and Engeström's (2015) activity theory (AT). These learning theories were chosen because ISBL offers participants active learning in a realistic environment in a social context in which activity and social interactions are essential to learning and professional development. Therefore, AT can guide us in understanding ISBL and its complexity and contribute to explaining learning processes and viewing the dynamic interactions between students. The artefacts described as tools used to create these interactions, for example, the simulator (Battista, 2017; Cole & Engeström, 1993), are included. The transition of competence is presented as motivation and learning are strongly connected to each other (Bandura et al., 1999). Theoretical theories about motivation are also presented in this chapter.

3.2.1 Sociocultural perspective on learning

ISBL offers participants active learning in a realistic environment in a social context in which activity and social interactions are essential to learning and professional development. Whereas the behaviouristic and constructivist perspectives of learning are concerned with individual learning, the sociocultural perspective of learning is viewed as an outcome of all human activities. It is rooted in Vygotsky's (1980) work. Learning is the interaction between students and the learning environment, and individual learning results from participating in activities with others. Activities and communication are essential to learning, and intellectual development is created in language as a social occasion. Language and interaction are important in Vygotsky's theory, and intellectual development and thinking originate from language and interaction in a social context. Social language is used for interpersonal communication and silent inner speech as a basis for thoughtful reflection and awareness. In this way, language and thought are linked in such a way that thought is not solely expressed in words but exists through them (Vygotsky & Kozulin, 1986).

The zone of proximal development (ZPD) is the distance between individuals' actual development level in independent problem solving and their level of possible development through collaborative problem solving (Vygotsky,

1980). ZPD occurs when social interactions occur between a student and a more knowledgeable person (Smagorinsky, 2018). These interactions include those between learners and more knowledgeable peers or other actors that enable learners to perform tasks beyond their current competence.

An important element in the sociocultural view of learning is mediating artefacts and how these artefacts affect communication between people. The term mediating refers to how we interpret the world through tools rooted in different social practices. Vygotsky's ideas form the basis of AT and presuppose that the physical and intellectual tools used to mediate the reality of people in their professional fields are experienced and realistic. Physical and intellectual tools should be characterised and presented to develop knowledge, skills and understanding being rooted and validated in the framework of a real system, in which actions and practices must constitute each other (Säljö & Moen, 2001).

3.2.2 Perspectives on AT in the ISBL context

AT was developed by Engeström (1987), and it was based on Vygotsky's (1978) sociocultural theory, which focuses on goal-directed activities (Cole & Engeström, 1993). In AT, activities are defined as 'mediational processes in which individuals and groups of individuals participate, driven by their goals and motives, which may lead them to use new artefacts or cultural tools' (Yamagata-Lynch, 2010, p. 17). Vygotsky focused on mastering tools to develop higher mental functions and asserted that tools and signs mediate the interaction between learners. He differentiated between tools (e.g., simulators, surgical equipment, etc.) and signs (e.g., communication, language, etc.) (Karanasios et al., 2021) but toned down this separation and shifted to a more semantically oriented account of psychological tools (Tzuriel, 2021). Categorising mediation has been found to be not functional, and all forms of tools are considered artefacts (Cole, 1999; Engeström, 1999a; 1999b). In ISBL, artefacts can be used, for example, to achieve students' goals; the simulator and communication are considered artefacts.

Engeström introduced an activity model composed of the following components: *subject, object, mediating artefacts, community, division of labour* and *rules*. Viewing this model in the ISBL context, the participants are the *subjects* engaged in a common activity, and the *object* is their learning objectives 'towards which the activity is directed and which is moulded and transformed into outcomes' (Tomaz & David, 2021, p. 223). *Mediating artefacts* refer to

equipment, such as surgical instruments and communication, as tools used to perform their activity task. C*ommunity* refers to the participants 'who share the same objects' (learning objectives) (Tomaz & David, 2021, p. 223). *Division of labour* refers to the participants' division of activity tasks, 'power and status between the members of the *community*' (Tomaz & David, 2021, p. 223). *Rules* 'refer to the explicit or implicit regulations, norms and standards that constrain actions and interactions within the activity system' (Engeström & Sannino, 2017, p. 6).

Activity theorists are concerned not only with what is learned in one context but also with learning as a transformative process (Engeström, 1993; Yamagata-Lynch, 2010). For example, students participating in ISBL during their education may gain good learning processes and outcomes. Nevertheless, the learning that occurs should be transformed and used in clinical practice.

3.2.3 Learning as a transfer from previous experiences

Transfer is utilised as a metaphor to define the application of competence developed in one context and used in another, as it indicates that something is moved from one situation to another (Lobato, 2012). It does not mean that the effect of a previous task and knowledge remains intact; instead, it is a process in which transfer involves active interpreting, modifying and reconstructing (Tuomi-Gröhn et al., 2003). Transfer is not seen as the simple transportation of skills and knowledge from one activity to another 'but as the formation of a new pattern of activity-oriented to the object' (Tomaz & David, 2021, p. 246). In sociocultural theories of transfer, theorists focus on three themes: '1) the practices that are present in the learning situation; 2) the participation of individuals with those practices; 3) the potential overlap between the transfer context and the learning context' (Danish & Gresalfi, 2018, p. 4; Lobato, 2012).

3.3 Motivation and learning

Motivation and learning processes have an extensive connection, and they are important to students' aspirations and achievements (Lyons et al., 2021). Therefore, they are an important aspect of participants' learning in ISBL. Motivation is defined as students' inclination, energy and drive to learn, work effectively and achieve their potential (Martin, 2009). There are many theories about motivation. One of these theories is Bandura's theory of self-efficacy beliefs, which 'determines how people feel, think, motivate themselves and

behave' (Bandura & Ramachaudran, 1994, p. 1). Motivation can be categorised as intrinsic, extrinsic and amotivation (Ryan & Deci, 2017; Yardimci et al., 2017). Several theories can help us understand more about motivation. In sociocultural learning theories, motivation for learning changes from reflecting on individuals' goals to reflecting the learning context in which activities and practices frame participation and action in more or less motivated learning methods (Nolen et al., 2015). In this way, motivation is viewed from both an individual and collective perspective.

3.3.1 Bandura's theory of self-efficacy

Theorising about motivation involves evaluating one's competence. In this PhD thesis, self-efficacy is considered an important learning outcome because it is a factor in motivating students to increase their competence and future encounters with clinical practice. Self-efficacy is linked to student achievement and can influence academic success, student motivation and regulative learning outcomes (Bandura, 1997; Schunk & Pajares, 2005; Vermunt & Donche, 2017). Bandura introduced the construct of self-efficacy, which refers to the 'beliefs in one's capabilities to organise and execute the courses of action required to produce given attainments' (Bandura, 1997, p. 3). Self-efficacy is the belief in (Multon et al., 1991; Schunk & Pajares, 2010) or expectation of (Hackett & Betz, 1989; Schukajlow et al., 2012) one's capability to perform tasks or actions. This description indicates that people's self-efficacy is not of a general nature but is related to specific situations. Self-efficacy is related to an individual's capability, and it should be phrased in terms of 'can do' rather than 'will do' because it involves an assessment of one's own ability instead of a will that represents an intention (Bandura, 1997). Individuals can judge themselves as competent in a specific field and less competent in another field. This means that self-efficacy is related to specific stations and tasks, which is not the case for related concepts such as self-esteem, self-confidence and locus of control (Maibach & Murphy,1995). These are the personal characteristics of individuals that have a certain stable influence on people's behaviour.

Bandura described collective efficacy 'as a shared belief in the power to produce effects by collective action' (Bandura, 2000, p. 75). Team performance can be related to collective efficacy. Nevertheless, collective efficacy can be created by individuals' behaviour. Therefore, it is important to be aware of the conditions that increase the performance of individual teamwork behaviour. The

initial success experiences of collective efficacy may have a continuing result on a team's function over time (Tasa, et al., 2007).

In this PhD thesis, the term 'belief' is used because the participants in the study can only express what they believe without absolute proof that it is right.

Mental processes affect self-efficacy. Mastery experience is the most important; the participants can master the learning objectives offered by the simulation scenario. According to Bandura et al. (1999), their expertise in mastering leads to success and strengthens their beliefs in personal efficacy. Vicarious experiences through different roles, such as observing role models and managing learning objectives during simulation sessions, enhance one's belief in one's capability to do the same. The next one is included in the SBL/ISBL context, in which the participants interact with each other in a social context. Social interaction and verbal conversion can encourage students to believe in their mastery. Furthermore, the participants' experience of stress and anxiety levels during their participation in SBL/ISBL can affect their self-efficacy (Bandura & Ramachaudran, 1994).

3.3.2 Students' motivation and identity development: Self-determination theory (SDT)

In the 1980s, two American psychologists developed SDT to clarify identity development. SDT represents a broad framework for studies on human motivation and defines the role of motivation regulators in forming and maintaining identities. The authors described human motivation as lying in a continuum that features three categories of motivation: amotivation, extrinsic motivation and intrinsic motivation (Deci & Ryan, 2013).

SDT describes amotivation as the absence of motivation. When activated by external forces (e.g., winning awards), it is called extrinsic motivation; when activated by internal forces (e.g., willingly engaging in the pursuit of interest or enjoyment), it is called intrinsic motivation. Identity is internalised during the transition from external to internal regulation and enhances an integrated part of an individual's sense of self (Deci et al., 1994). Motivation focuses on three psychological needs: competence, relatedness and autonomy (Cruess & Cruess, 2006; Ryan & Deci, 2017). Competence is the ability to demonstrate mastery in a specific area (Garavalia et al., 2002). Relatedness is to feel a connection with others, such as being part of a particular profession or group. Autonomy refers to an individual's tendency to self-organise experiences and actions (Garavalia et

al., 2002). These three domains' experiences of support and growth can generate high levels of motivation, maintain the specific identity in question and are linked to feelings of success and well-being (Deci & Ryan, 2008). Furthermore, the social environment supports the satisfaction of competence, autonomy and relatedness (Adams et al., 2017). For example, the interaction between the ISBL environment and the participants is important for identity development.

The more that identity is internalised, the more it signifies in-depth and flexibly enacts the aspects of one's identity and self (Cruess et al., 2016).

4 AIMS OF THE PhD THESIS

The overarching aim of this PhD thesis is to gain knowledge and insights into perioperative nursing students' learning and development of professional competence using ISBL as a pedagogical approach.

This aim involves an interest in how ISBL can contribute to increased quality and capability among perioperative nursing students to meet acute situations with the competence needed as recently graduated nurses.

This thesis encompasses three papers with the following aims:

I. To explore perioperative nursing students' experiences of ISBL to gain a deeper understanding of how this educational tool can be used to support students' learning and enable them to achieve the intended learning outcomes.

II. To describe perioperative nursing students' experiences with how ISBL contributes to self-efficacy in communication, interdisciplinary collaboration and prioritising tasks in acute situations.

III. To explore recently graduated perioperative nurses' experiences of ISBL during postgraduate education and investigate whether and how this learning approach contributes to the development of their professional competence in meeting acute clinical situations.

5 DESIGN AND METHODS

This chapter describes this PhD project's study philosophical perspective and the design and methods used in the three studies. Subsequently, the samples and settings, data collection and analysis of the data collected are described. Table 1 (p. 42) provides an overview of the three studies.

5.1 The PhD project's study philosophical perspective

The chosen methods of this PhD project's study belong to the postpositivist, interpretive and constructivist paradigms. Paradigms are assets of common beliefs and agreements shared by communities of researchers, such as nursing education, thus regulating science (Kuhn, 2012). They are temporal in the context of times and social trends (Østern et al., 2021) and are characterised by different ontological, epistemological and methodological approaches (Weaver & Olson, 2006). Therefore, research paradigms are fundamental assumptions about science and reality to understand the relationship between ontology (i.e. how to view reality), epistemology (i.e. how to conceive the nature of knowledge) and axiology (i.e. the role and values of the research process and methodology) (Bunniss & Kelly, 2010; Kneebone, 2002; Park et al., 2020). Therefore, a paradigm can guide scientific findings through assumptions and principles (Park et al., 2020).

In this PhD project, the assumption in post-positivism differs from that in positivism from ontological and epistemological perspectives. It is about understanding the world. Post-positivism emphasises the difference between the epistemological position that research outcomes comprise an estimate of truth and the positivist position, in which outcomes are the absolute truth (Creswell, 2019). Furthermore, post-positivism critiques the positivist understanding of dualism and objectivity, as all knowledge is considered subjective. It is impossible to find one truth in qualitative research. Diverse interpretations and biases must be considered, and the researcher must be aware of using interpretivism and constructivism. Moreover, the philosophical idea of post-positivism is that post-positivists do not believe in rigorous cause and effect; instead, they believe that effects are probabilities that may or may not occur (Creswell, 2019). Here, the ontological question is as follows: What is the nature of reality? As a qualitative researcher in this PhD project, I assume that there are

several realities, that reality is not rigid and that individuals construct this reality (Creswell, 2019).

This PhD project includes a constructivist ontological view and an interpretive epistemological paradigm view. According to the constructivist ontology view, people construct their understanding and knowledge of the world by experiencing things and reflecting on these experiences (Pripp, 2016). Furthermore, this does not happen in a vacuum but in a social context by interacting with others (Vygotsky, 1980). Nevertheless, we must be aware that we are alone in our struggles to understand ourselves and our existence as individual human beings. This creates distance from us to others, but we must interpret or understand others as we live together. This happens through understanding tradition, culture, language and history (Farooq, 2018). I searched for knowledge through experiences and emphasised multiplicity and complexity in humanity (Pripp, 2016). Through focus groups and individual interviews, I asked for the participants' experiences with ISBL. I transcribed the interviews and interpreted them. Perioperative nursing students constructed their own understanding and developed knowledge and skills regarding their future profession through experiences and reflection on these experiences when participating in ISBL (Adom et al., 2016). Through the participants' experiences, I developed an explanation, understanding and knowledge. According to Dilthey, a German hermeneutic philosopher, there is a difference between explaining versus understanding, and this difference links the concept of explaining through the positivist paradigm and understanding through the post-positivist and interpretivism paradigms (Dilthey, 1989). Maintaining an objective distance is necessary when explaining while removing this distance to understand human beings. Ricoeur disagreed with this dichotomy and considered it useless (Farooq, 2018). He argued that the concepts of explanation and understanding are not methods, as explanation is considered a method, while understanding is comprehension. Ricoeur found that explanation and objective analysis need to be conducted before comprehension can occur (Ricoeur, 1991). In this PhD project, I used Ricoeurs' argument about the necessity of using time reading as a 'long detour of explanation to reach the ultimate destination of understanding' (Farooq, 2018, p. 268). The explanation also included conducting a structural analysis of the transcribed interview text to identify the parts and their relationships with one another (Farooq, 2018).

5.1.1 My preunderstanding

As a researcher, I must reflect on my role during the research process. Relationships and context are essential elements of the knowledge that are constructed from qualitative interviews (Malterud, 2011). This ethical issue concerns my role as a researcher in my field and my preunderstanding. As a human being, I understand myself and the world around me. We all have a position in the social world, and this position characterises the way we see this world (Bourdieu et al., 1995). In my understanding, the world around me does not appear as unworked copied pictures. I have my background comprising earlier histories, unconscious experiences and insights. Hans Georg Gadamer (1900–2002) wrote about this theme, which contributes to our future understanding of something and calls it our prejudice or our preunderstanding (Eilertsen, 2000). My preunderstanding affected my new knowledge about perioperative nursing students' and perioperative nurses' experiences with ISBL because of my interpretation. Therefore, I want to bring my preunderstandings to consciousness to reflect upon them and understand their influence on me and my research.

Reflectivity is a term that comes from sociology. Qualitative research uses reflectivity to describe the process between researchers and their research. Researchers commit to, reflect on and know that their preunderstanding affects the interpretation during analysis (Willig, 2013). Qualitative research requires that preunderstandings are brought to consciousness to provide the phenomenon under investigation with the best opportunity to reveal itself (Geanellos, 1998).

My background is that I have worked as a perioperative nurse for 12 years. Then, I started working as a teacher educating perioperative nurses and have been in this profession for four years. During my job as a teacher educating perioperative nurses, I started using SBL/ISBL as a pedagogical approach. I included SBL/ISBL in the perioperative nursing students' curricula. During this process, I started questioning myself about this learning method and the students' learning processes and learning outcomes. I wanted to gain more knowledge about this pedagogical approach and understand how to organise these activities to best support students' learning.

I know that the use of a qualitative research method can take me, as a researcher, mentally and physically closer to the participants than using questionnaires and statistics. At the same time, I think that my proximity to the

research field will help me understand perioperative nursing students' and perioperative nurses' experiences with ISBL and enable me to ask follow-up questions relevant to the phenomenon. In analysing data, the participants' lived experiences with ISBL should be fixed in text, which always requires interpretation (Lindseth & Norberg, 2004). My preunderstanding can influence this analytical process and interpretation. Qualitative studies, in which researchers have knowledge and proximity to the field, require reflection to give empirical data an analytical interpretation. When I read and interpret data, my preunderstanding and knowledge of a phenomenon can also help me gain insight into ISBL. Nevertheless, it is important to be reflective during the research process. As my earlier experiences as a perioperative nurse and teacher using ISBL have taught me, I have to be aware of my preunderstanding to prevent it from affecting my data collection.

My research role is new, and I must develop reflectivity as a competence during my PhD project. I must see the importance of my role in interacting with the participants, the empirical data, the theoretical perspectives and my preunderstanding in this project. A methodological challenge related to phenomenological–hermeneutic interpretation is that I have to develop awareness about my prejudices and preunderstandings when I interpret the text (Gadamer, 2012). This awareness can help me to gain a new understanding of the text. Therefore, I must reflect on my position and relation to the text. My preunderstandings can affect my openness to the data; thus, I must learn to be critical of my interpretations. For example, I must ask myself if the data are relevant and how my experiences could have affected my interpretation of the text. The challenge of not being too subjective in my interpretation of the text can be difficult, but I must remain objective when assessing the text. The objective is to position the text and language in a historical context, against which I put my history and then compare these horizons for a meaningful interpretation (Gadamer, 2012).

As a qualitative researcher, I am aware that subjectivity is always a problem when interpreting transcribed texts. In phenomenological analysis, 'bracketing' is an essential component of phenomenological reduction, which separates a phenomenon from what is previously known about the phenomenon investigated. It was important for me to focus on the phenomenon of ISBL and to be open-minded, such as being near but distant enough to be aware of any

preconceptions before intuiting or analysing. I had to be focused, present and reflective, slowly searching for the essence of ISBL (Giorgi, 2009).

5.2 Design and methods of the three studies

The aims of studies form the basis of the selection of the design and methods (Polit & Beck, 2018). For this PhD project, a qualitative design was selected. Studies 1 and 3 used an inductive explorative design to gain a deeper understanding of ISBL as a complex phenomenon (Polit & Beck, 2017). Inspired by Ricoeur (1976), a phenomenological hermeneutical method was used when analysing the data (Lindseth & Norberg, 2004). In Study 2, a deductive descriptive design was employed to describe perioperative nursing students' experiences with ISBL as a phenomenon and how this phenomenon contributed to their self-efficacy. Here, the data were subjected to a directed content analysis approach (Assarroudi et al., 2018; Hsieh & Shannon, 2005) using Bandura's theory of self-efficacy (Bandura, 1977; 1997) and its four sources of information, which can lead to a person's self-efficacy beliefs as generic categories.

5.3 A phenomenological–hermeneutical perspective

Phenomenology is the method of exploring the meaning of a phenomenon (Lindseth & Norberg, 2021). According to Zahavi, phenomenology is 'the science or study of the phenomena' (Zahavi, 2018, p. 9). The meaning of a phenomenon that we may not have understood but have accessed is our way of gaining knowledge. 'It reveals itself as understandable assumptions, attitudes and actions' (Lindseth & Norberg, 2021, p. 2). Edmund Husserl (1859–1938) established this dimension of meaning as the centre of phenomenology, which has been further modified. This is suitable for Studies 1 and 3, the aims of which are to explore perioperative nursing students' and recently graduated perioperative nurses' experiences with ISBL. Therefore, this PhD project explored ISBL as a complex phenomenon by asking perioperative nursing students and perioperative nurses about their experiences with ISBL as a phenomenon. Using a phenomenological method, I was more interested in the 'how' rather than in the 'what' of a phenomenon (Zahavi, 2018) and examined the phenomenon through how it emerged. Phenomenology is about the relationship between man and the world in the world. Phenomenological epistemology is knowledge of the doctrine of what emerges, and as it appears in the individual's consciousness, the human world of life is the starting point for

scientific analysis. From a phenomenological perspective, a phenomenon's individual experience is emphasised more strongly than intersubjective theories and objective truths (Zahavi, 2018).

ISBL is a phenomenon experienced in contexts, situations and historical contexts. Consciousness and subjective experience are always part of a context in the world. Accounting for how ISBL emerges through perioperative nursing students' experiences as lifeworld, finding their meaning and illuminating them from a critical perspective create a basis for knowledge development. It is about understanding the phenomenon in experienced human life. The lifeworld view has its origins in phenomenology and hermeneutics, as humans cannot experience something without any interpretation. Therefore, the world is a world of subjective experiences (Dahlberg et al., 2008).

Hermeneutic interpretation is a qualitative research tradition that draws on interpretive phenomenology, which focuses on the lived experiences of individuals and how these experiences are interpreted (Polit & Beck, 2017). It is about understanding and interpreting to uncover the meaning of something. In this PhD project, I wanted to understand how ISBL could support students' learning and enable them to achieve their intended learning outcomes by understanding their experiences of learning through ISBL.

Ricoeur (1976) wrote about phenomenological hermeneutics. In our quest to understand a phenomenon precisely, how to do it is important. For Ricoeur, discourse (i.e. the reflection) should be in a dialectical relationship between event and meaning. Meaning is understood as the speaker's intention and the sentence's meaning, while event is when someone speaks. Therefore, what is the relationship between text and speech? It is about the movement of speech to text towards meaning, and reading the text involves interpretation and belonging (Farooq, 2018). In this PhD project, speech was audio-recorded and transcribed into text. Listening to the perioperative nursing students' interview sentences during the transcription started the thoughts and reflections. Therefore, it was important for me to conduct and transcribe the interviews as a PhD student. Ricoeur (1976) constructed meaning in a text by relating it to the text as a whole. This text reconstruction is hermeneutical, as it requires a holistic understanding of the parts of the text. Conversely, by constructing details, one constructs wholeness. This involves a constructivist ontological stand and an interpretive epistemological position for me as a researcher, constructing knowledge through the participants' experiences when interpreting the transcribed text (Adom et al.,

2016). When analysing the data through construction and reconstruction, the meaning of the participants' experiences is transferred to knowledge (Charalambous et al., 2008). Lindseth and Nordberg (2004) developed a phenomenological hermeneutic method to understand human beings' experiences (Lindseth & Norberg, 2004). Ricoeur inspired this method, and his phenomenological hermeneutical interpretation theory represents the opening into the hermeneutical circle when beginning the interpretation of the text. This circle moves through three methodological steps: naïve reading, structural analysis and comprehensive understanding (Klemm, 1983; Lindseth & Norberg, 2004; 2021; Ricoeur, 1976).

5.4 A qualitative directed content analysis

Study 2 aims to describe perioperative nursing students' experiences with how ISBL contributes to self-efficacy in communication, interdisciplinary collaboration and prioritising tasks in acute situations. Therefore, this study employed a qualitative directed content method using Bandura's theory of self-efficacy (Bandura, 1997) as a guide (Assarroudi et al., 2018; Hsieh & Shannon, 2005). The qualitative descriptive approach uses a lower level of interpretation (Sandelowski, 2010), as a theory was used to guide and direct the analysis of the data. Content analysis has different scientific paradigms, and this poses some challenges. The discussion on ontological and epistemological roots has its origin in a positivistic paradigm, but it has undertaken a broad transformation and appears today more as an interpretative approach in the qualitative paradigm (Graneheim et al., 2017). This is now a validated research process identified by several realities, the mutual formation of data and the progress of individual and multifaceted perceptions of a phenomenon (Lincoln & Guba, 1985). The ontological assumptions are open and different from the researchers' viewpoint. 'The epistemological basis of qualitative content analysis is that data and interpretation are co-creations of the interviewee and the interviewer, and interpretation during the analysis phase is a co-creation of the researchers and the text' (Graneheim et al., 2017, p. 29), as text is presupposed to imply more than a single meaning (Sandelowski, 2011).

5.5 Overview of the three studies

The following sections present the sample and setting, data collection and analysis of the three studies. The sample, setting and data collection are the same

in Studies 1 and 2. We chose to do this to save time and money, as Norway is a long country, and the participants came from different parts of the country.

Table 1. Overview of the three studies

Studies	Design	Aim	Sample	Data collection method	Analysis
Study 1	Explorative (inductive)	To explore perioperative nursing students' experiences of ISBL to gain a deeper understanding of how this educational tool can be used to support student's learning and enable them to achieve the intended learning outcomes	34 perioperative nursing students enrolled in a postgraduate programme (18 months) or a master's degree programme (2 years)	6 focus group interviews with 4–8 participants in each focus group	Phenomenological–hermeneutic
Study 2	Descriptive (inductive and deductive)	To describe perioperative nursing students' experiences with how ISBL contributes to self-efficacy in communication, interdisciplinary collaboration, and prioritising tasks in acute situations	34 perioperative nursing students enrolled in a postgraduate programme (18 months) or a master's degree programme (2 years)	6 focus group interviews with 4–8 participants in each focus group	Directed content analysis
Study 3	Explorative (inductive)	To explore recently graduated perioperative nurses' experiences of ISBL during postgraduate education and investigate whether and how this learning approach contributes to the development of their professional competence in meeting acute clinical situations	16 newly graduated perioperative nurses	16 individual interviews	Phenomenological–hermeneutic

5.5.1 Sample and setting in Studies 1 and 2

Deans or department heads at four universities and university colleges in Norway responded positively to participating in this study (Appendix 3). Students enrolled in a postgraduate (one-and-a-half years) or a master's degree programme (two years) in perioperative nursing were informed (Appendix 6) and recruited by their perioperative teachers between April and October 2019. The students were eligible for inclusion if they had participated in ISBL with other students as anaesthetic nursing students during their education and if the ISBL scenario

involved an acute situation. Furthermore, the focus group interview was to be conducted no later than three months after the students had participated in ISBL. In 2019, a total of thirty-six perioperative nursing students signed their written informed consent forms, and thirty-four eventually participated: thirty-one (91%) were females and three (9%) were males. Their ages ranged from 25 to 50 years (mean: 34.5). Before commencing their postgraduate studies, they had worked for 2–24 years (mean: 9.4) as RNs. The participants' experiences of SBL/ISBL before starting their postgraduate education. Six participants had never participated in SBL/ISBL, eleven participated 1–5 times, five participated 6–10 times, eight participated 11–15 times, and four participated 16–20 times.

Table 2. Participants' demographic characteristics in Studies 1 and 2 (n = 34).

Gender	n	%
Female	31	91,1
Male	3	8,9
Age		
Mean (min-max)	35.4 (25─50)	
Years worked as an RN before starting postgraduate nurse education	Age	
Mean (min-max)	9.4 (2─24)	
Number of times participating in SBL/ISBL before entering further postgraduate nurse education	n	%
0	6	17.6
1─5	11	32.4
6─10	5	14.7
11─15	8	23.5
16─20	4	11.8

5.5.2 Data collection in Studies 1 and 2

Focus group interviews were used because they are useful for better understanding how participants feel or think about a phenomenon. Data were generated through the social interaction between the participants, which contributed to more detailed descriptions than those obtained through individual interviews (Bradbury-Jones et al., 2009; Krueger & Casey, 2015). In these studies, focus groups offered the ideal perspective for obtaining knowledge regarding the use of ISBL in educating perioperative nurses, as little is known about this topic (Kitzinger & Barbour, 1999). The participants reflected on their experiences of participating in ISBL during their education by interacting with

fellow students. They experienced ISBL as a common perspective during their education and were all in an educational programme to become perioperative nurses. This homogeneity promoted a sense of commonality that better shared and understood ISBL (Krueger & Casey, 2015). Each of the six focus group interviews in this study consisted of four–eight participants. According to Krueger and Casey (2015), the size of focus groups relies on the complexity of the theme.

One focus group interview was conducted to test the interview guide with eight perioperative nursing students who had participated in ISBL six months before and to ask questions about the interview guide. The participants were asked about the clarity of the questions, such as whether they were understandable, relevant and logically constructed and whether any questions were missing. The interview guide (Appendix 7) included open questions focusing on perioperative nursing students' experiences through participating in ISBL during their education. Part of the interview guide also targeted the students' experiences with ISBL, linking it to the development of self-efficacy. The testing of the interview guide caused only minimal corrections; for example, 'Can you discuss?' was changed to 'Can you tell?'. We chose to include this interview even if the students had participated in ISBL six months prior (instead of three) and did not meet the inclusion criteria because the data in the interview were rich, and the participants remembered the ISBL well. The set inclusion criteria were maintained because it is assumed that people remember better the event they participated in best when it was not too long ago and have had a chance to reflect on it.

The PhD student conducted the focus group interviews as moderator, and a co-author served as an assistant moderator. The interviews were held in a group room at the educational institution where the perioperative nursing students were enrolled. The moderator asked questions, and the assistant moderator made field notes. A dictaphone was used to record the interviews. The interviews lasted between 110–145 minutes and had an overall mean duration of 122 minutes.

5.5.3 Data analysis in Study 1

The PhD student transcribed the interviews verbatim. The data were then analysed and interpreted using a phenomenological–hermeneutic method inspired by Ricoeur (1976). This method is suitable for analysing texts, such as interviews, and has the advantage of moving dialectically between

comprehension and explanation. It understands the text from what it says to what it talks about, from sensing to the essence of meaning. The goal is to understand the meaning of the narrated experience and to go beyond the meaning of the words. The interpretation encompasses three interactive phases: naïve reading, structural analysis and comprehensive understanding (Lindseth & Norberg, 2004; 2021).

In the naïve reading, the PhD student and her supervisors preserved each focus group interview as text. Each text was read several times to reflect on it and gain an overall perception of the text to grasp the meaning and wholeness of the participants' experiences of ISBL. The PhD student and supervisors went back and forth during the analysis until a first naïve understanding was developed. In this stage, a phenomenological attitude must be retained by withdrawing from any prior assumptions and being open to the phenomenon—a technique known as bracketing—to express the understanding of the text in phenomenological terms (Lindseth & Norberg, 2004; 2021).

After the naïve reading, NVivo12 (QSR, I. P. L., 2018) was used to structure the entire text. In the structural analysis, the PhD student divided the text into meaning units using Word and constructed tables. The texts were read several times and formulated into condensed descriptions that gave meaning. The supervisors and the PhD student discussed the units of meaning and then identified the themes and subthemes. These were consistent with the naïve reading, which was then confirmed.

In the final interpretation phase (comprehensive understanding), the interpretation was developed as a whole, with reflections on the PhD student's and the supervisors' preunderstanding. Together with the structural analysis, these theories and earlier studies on ISBL (Lindseth & Norberg, 2004) provided fresh insight into the perioperative nursing students' experiences of ISBL.

Transcribing the sixth interview and analysing it did not provide new data, and data completeness was attained (Morse et al., 2002; Sandelowski, 1995).

Table 3. Examples of structural analysis in Study 1.

Meaning unit	Condensed meaning	Sub-theme	Theme
P10: Yes, but I think that someone should keep some frames and make some rules on how the game should be played. Just as children need it, so do we need a framework for how play should be done. Oh, I think that it's a little important, then.	Create a framework for SBL and rules for how it should be done.	Creating structure	Customised ISBL
P8: Maybe it is a prerequisite that you know a little about the previous subject. As P7 said, you can look at that ankle instrument in the simulation, but if you don't have anything to hang it on, it will disappear quickly. At least, I think so. If I have nothing to hang it on, I will learn very little.	If you want to gain new knowledge, it is a prerequisite to have basic knowledge and skills to have something to associate it with.	Implementing ISBL in a perioperative nursing educational program	Customised ISBL
P23: I also think that it might be beneficial to have it in an operating room where you can actually find the equipment you need. You know where the cabinets are located. It is easy to find the equipment, and you know what you need. You have a surgical suction that functions, and it is in a place you are familiar with.	ISBL is the most favourable when it is carried out in an operating room, which is similar to clinical practice and where the equipment functions so that the situation and the challenge are like those in clinical practice.	Simulation frames	Customised ISBL
P19: You have to feel the instruments and get things done with your hands. But I agree with P18 that roles are very important. It depends on the role you have. It's like that.	Experience learning in an active role that activates emotions versus having a passive role.	Roles	Customised ISBL
P21: I don't think the patient came in on two wheels. When considering how to position the patient on the table, I think it is an important part of stress and a stress factor in itself. Getting the patient right on the table in a hurry, while at the same time coordinating and opening the equipment.	Some of the tasks in their role are missing from the scenario. Therefore, these situations do not become as stressful as those in the real world.	Relevance of the simulation case	Reality of the experience of ISBL

Meaning unit	Condensed meaning	Sub-theme	Theme
P14: Just like when we were going to use or open that surgical compresses. Just as we were going to open them, they taped the bags again. They had been used before. When we went to open them, it was impossible to get them up. These are things that interfere with learning.	Experience finding out that the equipment to be used has been used before and that you cannot open it using a sterile technique.	Realistic environment and equipment	Reality of the experience of ISBL
P34: Yeah, because at least I felt like I got a lot out of that day. [It is said yeas by many participants in the room.] P29: In terms of mastering Caesarean delivery in the simulation? P27: Yeah, I thought a lot about that simulation the first time I attended a Caesarean delivery in clinical practice.	One learns a lot through ISBL, and one can transfer that experience to clinical practice.	Transfer to clinical practice	Preparedness for clinical practice
P17: How would you react in an emergency situation? It's not something you will know in advance if you're not trained.	To be trained about how to react in an emergency situation, because you do not know.	Gaining valuable non-technical skills and technical skills.	Preparedness for clinical practice

5.5.4 Data analysis in Study 2

This study utilised a directed content analysis (Assarroudi et al., 2018; Hsieh & Shannon, 2005) based on a current theory about a phenomenon (Hsieh & Shannon, 2005; Polit & Beck, 2017; Sandelowski, 1995). All textual data were transcribed immediately by the PhD student and then read several times with her supervisors to catch a sense of the whole. After this stage, data saturation was experienced, as no new data emerged (Sandelowski, 1993). Bandura's theory was used to identify the main concepts. His self-efficacy theory includes four sources of information to develop self-efficacy (Bandura, 1997): mastery experience, vicarious experience, verbal persuasion and social influence and physiological response to performance. These four sources were used as predetermined categories. In the second stage, predetermined categories were applied to the data. The PhD student searched for meaning units that corresponded with each of the predetermined categories. In this stage, NVivo12 (QSR, I. P. L., 2018) was used to organise the text. In stage three, the meaning units concerning each predetermined category were transferred to MS Word from NVivio12 and inductively condensed (Table 4). The PhD student, her supervisors and the

research team discussed the condensation process. In stage four, the condensed meaning units were coded by the PhD student and discussed with the supervisors and the research team. Throughout the coding process, the PhD student, her supervisors and the research team went back to the texts to perform re-analysis to identify texts missing from the predetermined categories and texts that had newly appeared (Assarroudi et al., 2018). In stage five, the codes were abstracted into sub-categories. This was a back-and-forth process in which the codes were examined for differences and similarities and abstracted into predetermined categories (Figure1).

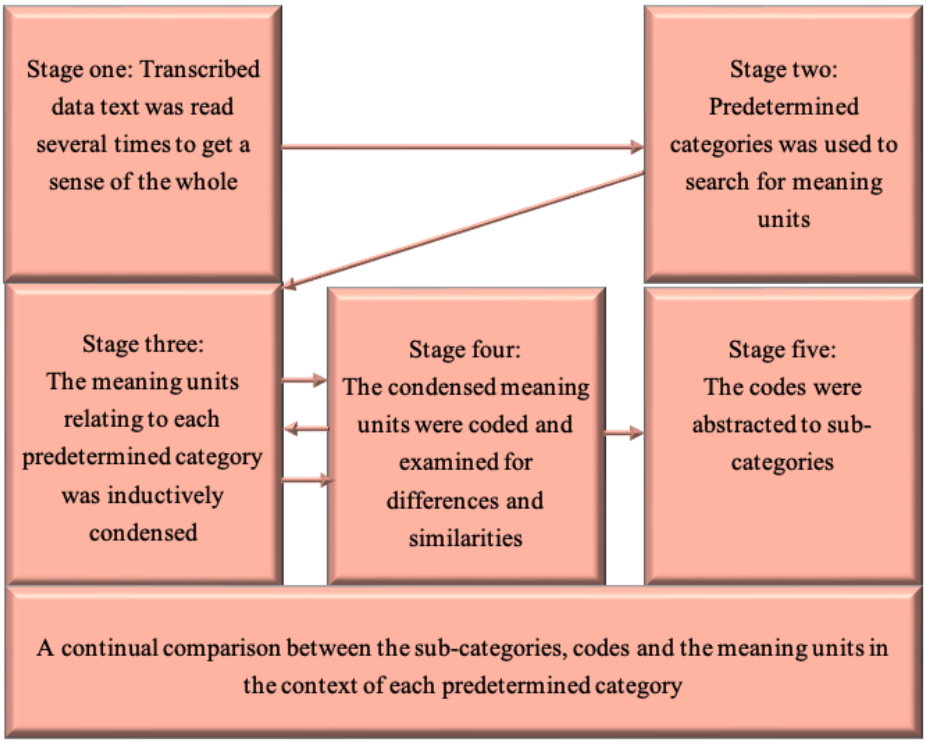

Figure 1. The analysis process using directed content analysis in Study 2.

Table 4. Examples of directed content analysis in Study 2.

Meaning unit	Condensation	Code	Sub-category	Predetermined category
P34: It is also the case in which, yes, you get shaky and such, but you can still work anyway. To work simultaneously when you feel the adrenaline rush and to feel that you have experienced it before.	Experience the situation in which one is shaking and feels the adrenaline rush but is still able to work.	Feeling of mastering challenges in an acute situation	Sense of mastery during ISBL	Mastery experience

Meaning unit	Condensation	Codes	Sub-category	Predetermined category
P27: Some may think that there are two different feelings of mastery. [It is said yes by other participants in the room.] P27: For me, I feel that it is one thing to master in a simulation but another thing to master in real life. They are two different things. [It is said yes by other participants in the room.] P27: But if you experience mastery in the simulation, then it makes you think that you will manage it in clinical practice, like in a real situation. But I do not think that the real feeling of mastery comes until you perform it on a real person.	There are two different feelings of mastery: to master it in simulation and to master it in real life. If you experience mastery during simulation, it makes you think that you will manage it in practice as well. I don't think that the feeling of mastery comes until you do it on a real person.	Feeling of mastery in ISBL and in clinical practice	Mastery senses in ISBL and clinical practice	Mastery experience
P26: Yes, from the first to the second time. If you have already been through it once, then you will know what you need to do. Then it might be a little easier the second time. P24: A little easier[the second time] that's okay. Then you know: There it is and that's the equipment. Okay. So, you do not spend time thinking about it a second time.	You know more about what you are going through the second time around. It is easier the second time because you know where the equipment is and therefore do not spend time looking for it.	If you observe first and then do it yourself, you become more prepared	Manage better performance when observing first	Vicarious experience

Meaning unit	Condensation	Codes	Sub-category	Predetermined category
P31: That is probably the benefit I got as an observer. You somehow see, and it's kind of nice if you see exactly where communication fails. Or when they give a message and the others do not get this message or something. If you are aware of such things. Or the other person may have to be a little aware that he received it. He nods, says yes or confirms something or the other. It is a little exciting to see how fast things can go wrong. We say something, and we continue to work, even if they have not confirmed that, either. It's a little interesting.	The benefit of being an observer is seeing where communication fail, or if a message is given but is not received. One becomes aware of these things or when someone nods or says yes to confirm. It is exciting to see how fast things can go wrong, because when something is said, they continue working even if they did not hear it.	Observing others and see what is important in interprofessional communication	Gaining competence through observing	Vicarious experience
P30: Also, it was the observer role then. I was one of those in that section who had never seen it before. Then, I was told to observe the others. There were two of us. But what was it that we were supposed to observe? It was very challenging. I had no idea what to observe, even with a guide.	To have an observer role and not see what is being simulated. Being told to observe was a difficult experience because I did not know what to observe, even with a guide.	Having little experience and being told to observe	Competence to know what to focus on when observing	Vicarious experience

Meaning unit	Condensation	Code	Sub-category	Predetermined category
P8: You get a better feeling then. P9: Yes, you do. At the same time, you wonder if they have caught everything. [It laughs loud and good in the room.] Have they seen everything that happened in the scenario? They may have turned their backs, but you can go home with a slightly better feeling. P10: Yes, you also get a feeling that you have mastered something, despite the fact that you sit and think, 'My God, this is not possible!' P9: And maybe you have higher expectations of yourself than those around you.	You feel better, even if you wonder if they have seen everything. Still, you go home with a better feeling and the feeling that you mastered it, even if you think that you made a mistake and had higher expectations of yourself than the others around you.	Focusing on what went well	Positive versus negative approaches to situations	Verbal persuasion and social influence
P14: That review afterward is important in relation to thinking about what you have actually done. Oh, you may be left with some questions that require answers. For example, why did things go wrong, or why did they go well? Oh, what did I actually do right. What did I do wrong? It's one thing to say good things about yourself or bad things about yourself, but to hear it from the teachers who are observing—I think that's very important.	The review is important. It makes you reflect on what you have done and the questions that require answers, such as why things went wrong or why they went well. It is one thing to say good things about yourself, but it is also important to hear this from teachers and observers.	To request feedback from a competent person in a professional manner	The desire for constructive feedback	Verbal persuasion and social influence

Meaning unit	Condensation	Code	Sub-category	Predetermined category
P5: Also, for me, they focus on the whole team and perioperative nursing. They do not overlook us, no. P4: That everyone is equally important. P5: Yes. That they were interested in the whole team. So, it's clear that you feel more like a member of the team.	There was focus on the whole team and perioperative nursing. We were not overlooked. Everyone is equal and feels like a part of the team.	One's profession as important	Being in an interprofessional context	Verbal persuasion and social influence
P14: Yes, you certainly can, but if it goes beyond trying, you will not get the same benefit from the simulation anymore. It's when you get to try, feel a little bit stressed and realise what you can and cannot manage. You really learn something from the simulation.	To get to practice and get to know and feel the stress and what you manage in such a situation, then you get something out of simulating.	How one manages to work in an acute situation	Positive stress	Physiological response to performance
P31: I was supposed to be a surgeon once too [One of the participants says, 'That's right'.]. Once as a doctor, and it's just silly. I had no idea. Moderator: So, was there something in the roles? P31: It was a stressful moment for me.	Experiencing being a surgeon, even though it was silly because you did not understand what it was like at all. This became a stressful moment.	Taking on a role outside one's own profession	Unnecessary stress	Physiological response to performance

5.5.5 Sample and setting in Study 3

Managers from five educational institutions in Norway gave their approval to carry out this study (Appendix 3). Perioperative nursing students taking a postgraduate programme (one-and-a-half years) or a master's degree programme (two years) received information (Appendix 9) about the study and were recruited by their teachers. Individual interviews were conducted with sixteen perioperative nurses (Table 5) between March 2019 and November 2020. The sample size produced rich data and was deemed suitable (Malterud et al., 2016). To be included in this study, the participants were required to have participated in ISBL with other professionals during their education. Other professionals

could be anaesthetic nursing students. Another inclusion criterion is that the simulation case should include an acute situation. Furthermore, the interviews should be conducted three to five months after they graduate from perioperative nursing education.

Table 5. Participants' demographic characteristics in Study 3 (n = 16).

Gender		
Female		Male
14 (87%)		2 (13%)
Age		
Mean	Min	Max
36.1	27	52
Years worked as an RN before starting postgraduate nurse education		
Mean	Min	Max
10,1	2	21
Number of times participating in SBL/ISBL before entering postgraduate nursing education		
4	0	
5	1–5	
3	6–10	
4	11–15	
Mean (min-max)	5,6 (0–15)	
5 participants had taken part in SBL/ISBL after their perioperative nursing education		

5.5.6 Data collection in Study 3

The interviews with the perioperative nurses were conducted by the PhD student. The semi-structured interview guide (Appendix 10) included open and follow-up questions. The topics were the new graduates' experiences of ISBL during their education, how ISBL helped their professional development in entering clinical practice as newly graduated and their clinical practice experience after graduation and participating in acute situations. One example of the questions was, 'Can you please tell me how you experienced your meeting with acute situations in clinical practice as a newly graduated perioperative nurse?', and the follow-up question was, 'Can you further elaborate on the experiences you had in which you felt prepared? Please provide an example, if possible.' All 16 interviews were conducted in an undisturbed location away from the participants' workplaces.

The PhD student used Skype for Business in four interviews because of the geographically remote locations of two participants and the COVID-19 situations (two participants). The interviews were audio-recorded and transcribed by the PhD student. The interviews lasted 43–86 minutes (mean 61 minutes).

5.5.7 Data analysis in Study 3

In this study, we analysed the text using the phenomenological–hermeneutical method of Lindseth and Nordberg (2004; 2021), as this approach is suitable for the analysis of text interviews, including life experiences (see analysis in Study 1).

The PhD student, her supervisors and the research team participated in the analysis. In the first step, during naïve reading, the PhD student and her supervisors read with an open mind all the texts 'to grasp its meaning as a whole' (Lindseth & Norberg, 2004, p. 149). A phenomenological attitude was adopted to open up to the phenomenon described in the text. A phenomenological attitude is described as bracketing: the researchers distance themselves from any prior assumptions of the text in a phenomenological context (Lindseth & Norberg, 2004; 2021). The second step was structural analysis, in which the text was read several times to generate condensed descriptions that revealed their meanings (Table 6). NVivo12 (QSR, I. P. L., 2018) was used to split the text into meaning units in this step. The PhD student, her supervisors and the research team discussed the units of meaning together in this analysis process and found the sub-themes and themes. In the third step, the results were reflected together with the relevant literature, and a critical interpretation was written as a comprehensive understanding (Lindseth & Norberg, 2021).

Table 6. Examples from the structural analysis in Study 3.

Meaning unit	Condensed meaning	Sub-theme	Theme
P11: Even though I am a recent graduate, I know what will happen. It [ISBL] has given me a greater understanding of these situations. Yes, absolutely. Even though I'm new, I'm not completely unprepared. No, I'm not quite that. Because I know the basics, I cannot control what will happen according to what kind of patient is coming and what condition he is in. Oh, about such things, I can be unprepared, of course, but I have an understanding of what is going to happen.	I am a recent graduate and know what will happen. It [ISBL] has given me a greater understanding. I'm new but not unprepared. I can't control what will happened and I can be unprepared, but I have an understanding of what will happen.	Development of general competence	Competence in handling acute situations
P1: Today, in acute situations, I have to remember the elementary, important or the most important. It was especially in the simulation with the emergency caesarean section that I got to see, in a way, that I had to be organised for what should be prioritised.	In acute situations, I have to bring out what is elementary and most important, especially in the simulation of an emergency caesarean section. You have to be organised when determining what to prioritise.	Competence in prioritising	Competence in handling acute situations
P12: I think I have managed to, that the simulation has managed to alleviate my nervousness and stress in real situations. That's how I feel a little. I finished a little bit of it at school. At least, that's how it feels now. Oh, when I come out of practice, I am focused on the tasks I have to do. But I have not been so stressed in this situation.	I believe that the simulation has managed to reduce stress in real situations. I feel that. It feels like I had finished it at school. Oh, when I come out of practice, I'm focused on the tasks. I have not been so stressed in these situations.	Competence in working in stressful situations	Competence in handling acute situations

Meaning unit	Condensed meaning	Sub-theme	Theme
P1: We had a simulation in which we had a patient in the prone position. We suddenly had to turn the patient over due to ventilation problems. And it's just like that. It was actually a fantastic example because I have experienced it so many times now since I've started working. Anything can happen here. You cannot expect things to go as planned.	We had a simulation in which we had a patient in the prone position. We suddenly had to turn the patient over due to ventilation problems. It was a fantastic example. I've experienced it many times since I've started working. Anything can happen here, and you must not expect things to go as planned.	Contingency–planning competence	Competence in handling acute situations
P1: Hm, yes, and this with repeating things, maybe. To be on the safe side. It's used more in trauma. When someone asks for something, you give feedback that you have already done it. Right. To understand the importance of things being done and that everyone agrees.	Like in trauma, when someone asks for something, you give feedback that you have done it. Things should be repeated to be on the safe side. To understand the importance of things being done and that everyone agrees.	Interprofessional communication competence	Competence in interprofessional teamwork
P10: Like in a trauma team, for example, there are an awful lot of different people in that team. You have bioengineers. You have emergency nurses. You have doctors—so many different roles. I feel that it is constructive that the roles are so clear, as when we simulated at school. We practised it. It's kind of like, you know, yeah. Everyone does their thing and knows who to talk to and who to ask. You know who the leader is. It kind of works so easily in a way.	In a trauma team, there are an awful lot of different people, and it is constructive that the roles are clear just like when we simulated and practised. Everyone does their thing and knows who to talk to and ask. You know who the leader is. It works so easily.	Interprofessional collaboration competence	Competence in interprofessional teamwork

Meaning unit	Condensed meaning	Sub-theme	Theme
P1: Then it's like, yes, I have a little more faith that I can manage something now. Now, I'm actually done. I'm still in a learning process, but yes. It feels good to have it in your backpack, that you have finished your education and will somehow put what you can into clinical practice. It feels good, for the most part.	I believe that I can manage something. I'm done, but I'm still in a learning process. But it feels good that now you have finished your education and will put it into clinical practice.	Development of self-confidence	Professional identity development
P11: The first roles that people have are leader, surgeon, orthopaedist and bioengineer, so I have got them with me. All participants in the trauma team must have their place. Everyone is important. Furthermore, I am part of the team, and it has made me very proud that perioperative nursing is part of this.	The roles that people have, so I got them with me. All participants in the trauma team have their place and everyone is important, and I am proud part of the team.	Belonging to a profession in an interprofessional team	Professional identity development

5.6 Ethical approval and considerations

In this PhD project, the studies followed the guidelines of the Norwegian National Research Ethics Committees (The Norwegian National Research Ethics Committees, 2014), the principle of the Declaration of Helsinki and the World Medical Association Declaration of Helsinki (WMA, 2013). The PhD project was approved by the local Ethical Committee of the University of Agder (Appendix 1). The three studies included in this PhD project were evaluated and approved by the Norwegian Centre for Research Data (NSD) (ref.2019/363692) (Appendix 2). In recruiting participants, the study obtained permission from the department managers of the Norwegian universities and university colleges included in this PhD project (Appendix 3). The participants were recruited by their teachers, who had received information prior. Their teachers were informed about highlighting to the students the voluntary nature of participation and that their decision to participate or not did not have any consequences on their teacher–student relationship. Their teachers did not have any interest in this PhD project. Participation required oral and written information distribution and signed informed consent (Appendices 6 and 9). The written information

emphasised the principles of anonymity, voluntariness and the right to withdraw from the study without reason.

In Study 3, the participants were recruited by their teachers as perioperative nursing students, but they graduated perioperative nurses when they participated. Thirty-one perioperative nursing students signed written consent forms to participate in this study. However, some did not graduate before June 2020 and could not be interviewed as newly graduated perioperative nurses before autumn 2020. As the personal situations of some of the participants changed during this period, the number of participants was reduced by six. Furthermore, five participants did not respond to the second contact, and one interview was not conducted because the participant did not work as a perioperative nurse following graduation. Nineteen individual interviews were conducted with recently graduated nurses. Of these, however, three were excluded because of the participants' work situation (their work as newly graduated perioperative nurses did not involve acute situations). As they were recently graduated perioperative nurses employed in hospitals, we asked their new employers for their permission (Appendix 4). Overall, sixteen individual interviews with recently graduated perioperative nurses were conducted, included and transcribed in Study 3.

In this PhD project, the PhD student declares no conflicts of interest with any of the participants, organisations or publishers involved.

6 RESULTS

This chapter presents the three papers published as part of this PhD thesis (attached at the end are the full articles). The results from the papers are not elaborated on, but a summary of the PhD thesis's results is presented. The results are linked to the overarching aim of this PhD thesis, which is to gain knowledge and insights into perioperative nursing students' learning and development of professional competence using ISBL as a pedagogical approach.

6.1 Paper 1

Kaldheim, H. K. A., Fossum, M., Munday, J., Johnsen. K. M. F., & Slettebø. Å. (2021). A qualitative study of perioperative nursing students' experiences of interprofessional simulation-based learning. *Journal of Clinical Nursing, 30*, 174–187.

Aim: To explore perioperative nursing students' experiences of interprofessional simulation-based learning to gain a deeper understanding of how this educational tool can be used to support students' learning and enable them to achieve the intended learning outcomes.

Results: During the analysis, three themes were identified: customised interprofessional simulation-based learning, the reality of the experience of interprofessional simulation-based learning and preparedness for clinical practice. Each theme had sub-themes (Figure 2).

6.1.1 Customised ISBL

According to the participants, customised ISBL was used to generate structure and connection between briefing, simulation sessions and debriefing. Thus, they experienced order and less chaos and felt mentally prepared for the simulation session and the opportunity to obtain the knowledge and learning outcomes offered by the pedagogical approach. In the context of customised ISBL, the participants encountered experiences that encompassed the implementation of ISBL in a perioperative educational program, simulation frames and roles in ISBL.

6.1.2 Reality of the experience of ISBL

The reality of ISBL is another strong theme affecting the participants' learning processes and outcomes. For them, it was about experiencing the relevance of the simulation cases and the realistic environment and equipment.

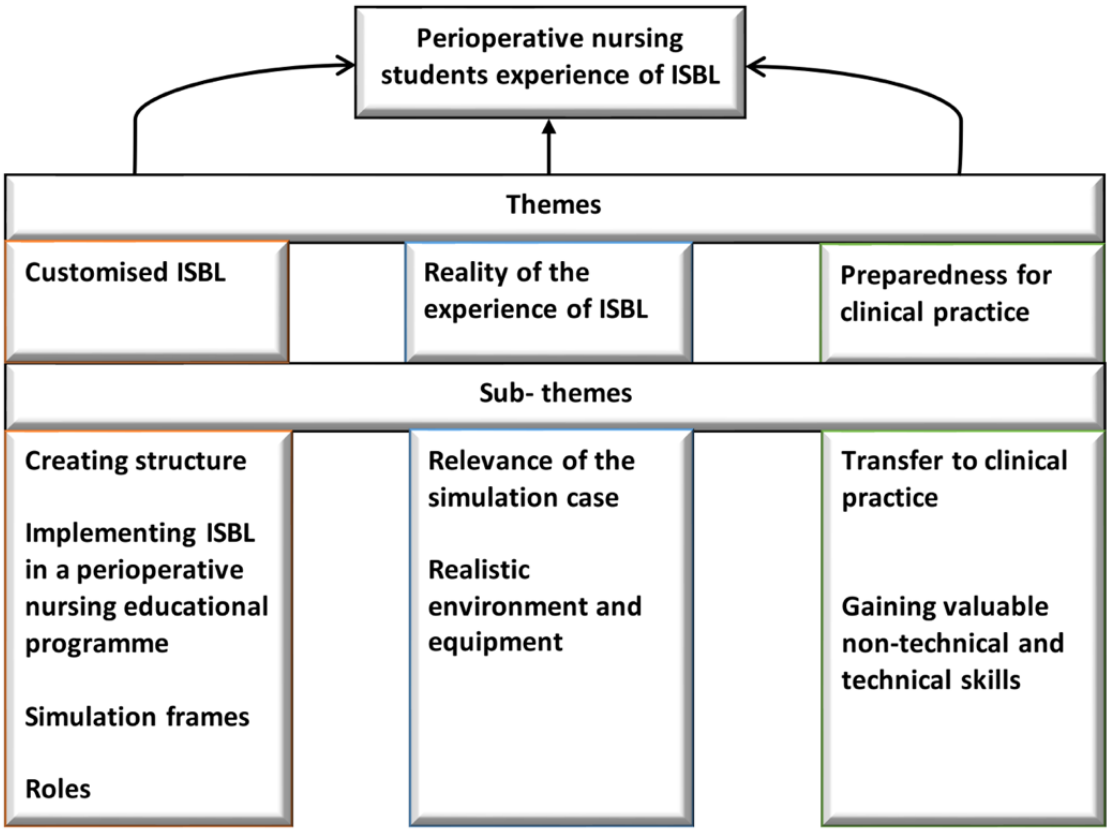

Figure 2. Overview of the themes and sub-themes in Study 1.

6.1.3 Preparedness for clinical practice

For the participants, participating in ISBL during their education made them feel more prepared to go into clinical practice. It was about transferring the simulation experience and gaining valuable non-technical and technical skills, resulting in an increased feeling of security.

6.2 Paper 2

Kaldheim, H. K. A., Fossum, M., Munday, J., Creutzfeldt, J., & Slettebø, Å. (2021). Use of interprofessional simulation-based learning to develop perioperative nursing students' self-efficacy in responding to acute situations. *International Journal of Educational Research, 109,* 101801.

Aim: To describe perioperative nursing students' experiences with how interprofessional simulation-based learning contributes to self-efficacy in communication, interdisciplinary collaboration and prioritising tasks in acute situations.

Results: The results showed that well-designed/prepared interprofessional simulation-based learning could develop self-efficacy in communication,

interdisciplinary collaboration and prioritising tasks in acute situations (Figure 3).

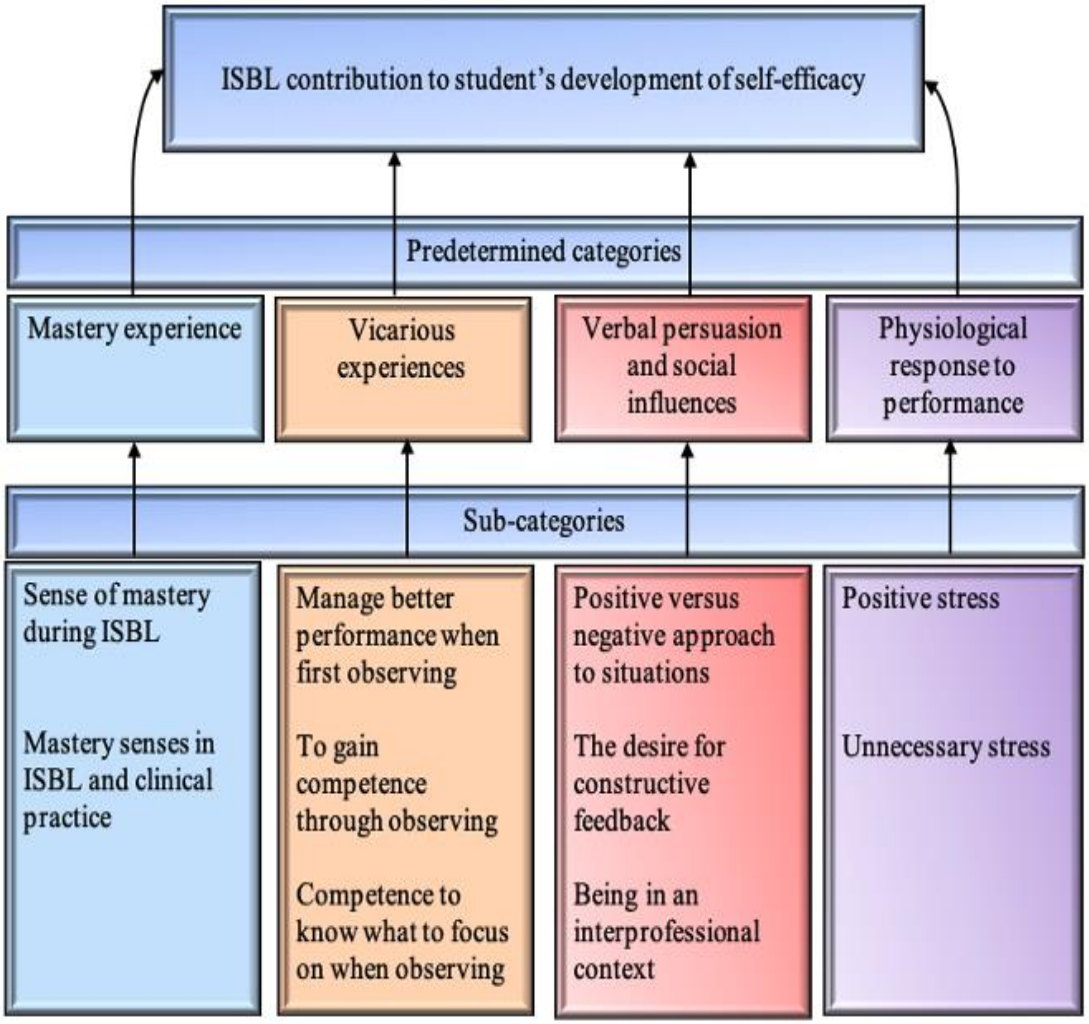

Figure 3. Overview of the predetermined categories and sub-categories in Study 2.

6.2.1 Mastery experiences

The participants experienced being in an acute situation in ISBL and managed to perform their tasks and sense mastery experiences. They also experienced different mastery senses in clinical practice and ISBL.

6.2.2 Vicarious experiences

The participants talked about their experiences of observing others during ISBL, which led to self-reflection on others' performance. This observation generated a thought process about their future performance and how they would solve the challenges themselves during the simulation session. Conducting the simulation

case two or more times allowed the participants to observe others first in performing tasks and to do the same tasks in an active role. The participants also valued the observational experiences because they provided competence, making them feel more confident in facing clinical practice. Furthermore, the participants highlighted their need to observe others to gain meaning and knowledge for further use.

6.2.3 Verbal persuasion and social influences

The participants talked about their experiences receiving verbal feedback on themselves and social influences from others when they participated in ISBL. Much of the feedback took place during the debriefing. Nevertheless, they found that being in a social learning context with other students and education professionals entailed social influences throughout the ISBL process. How the facilitator approached the situations during the simulation session in a debriefing was vital for the participants and for further mastering their experiences in ISBL.

It was important for the participants that feedback was given constructively and professionally by competent people. They expressed their thoughts about being in a social context practicing their future profession with other education professions, and how they experienced this and the social influences it had on them.

6.2.4 Physiological response to performance

For the participants, the physiological responses when participating in an ISBL were about feeling stress and gaining stress reactions. They talked about two types of stress: unnecessary and positive. They described stress as a subjective experience related to their expectations, performance and challenges that the simulation case demanded. This stress was positive for them because they were able to get to know themselves better, their bodily reactions and how they managed to deal with the stress that arises during acute situations. They perceived unnecessary stress as needless and stole focus from immersing in the simulation case.

6.3 Paper 3

Kaldheim, H. K. A., Fossum, M., Munday, J., Creutzfeldt, J., & Slettebø, Å. (2022). Professional competence development through interprofessional

simulation-based learning assists perioperative nurses in postgraduation acute clinical practice situations. A qualitative study. *Journal of Clinical Nursing.*

Aim: To explore recently graduated perioperative nurses' experiences of ISBL during postgraduate education and investigate whether and how this learning approach contributes to the development of their professional competence in facing acute clinical situations.

Results: During the naïve reading, three themes emerged: competence in handling acute situations, competence in interprofessional teamwork and professional identity development (Figure 4).

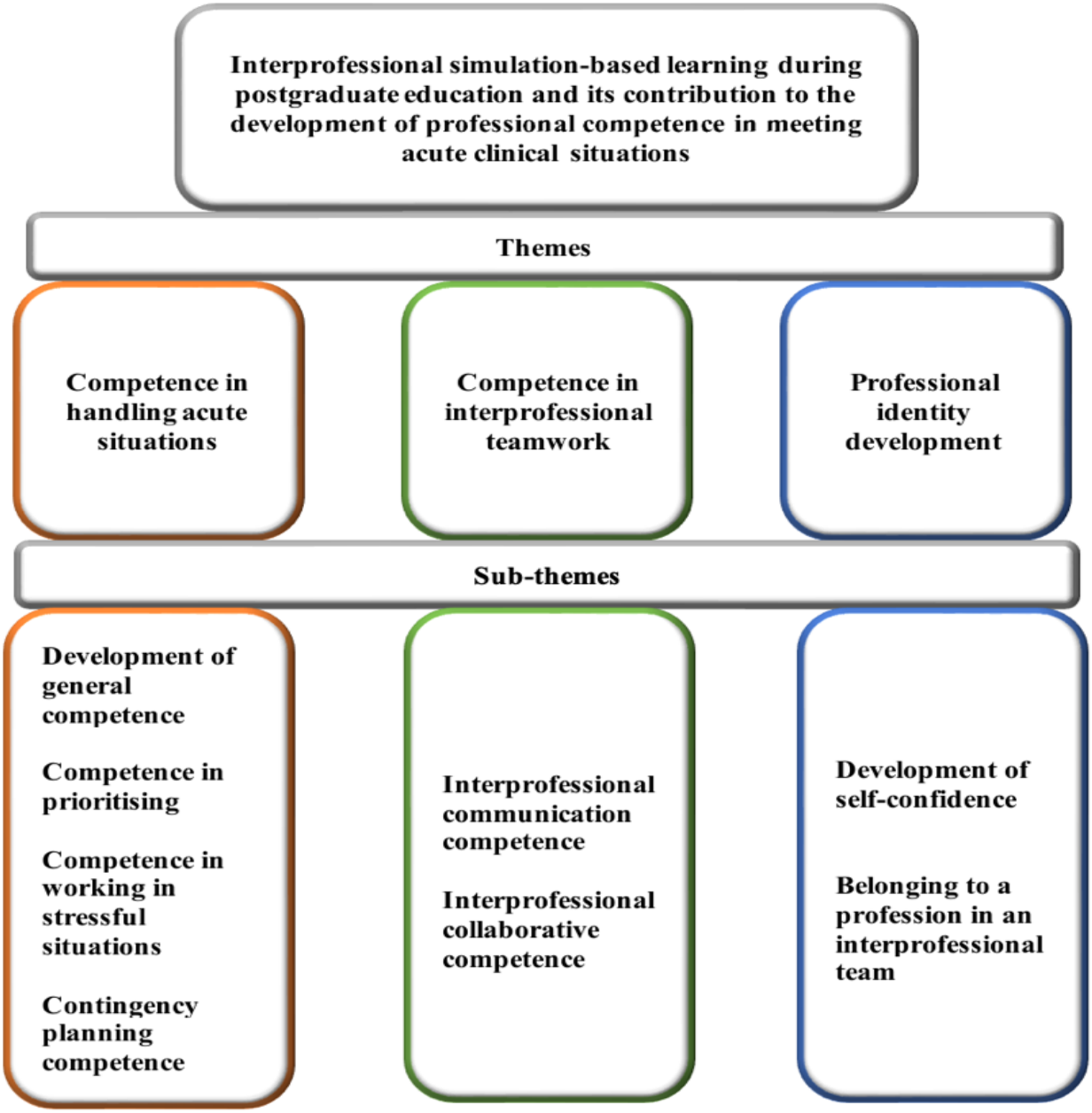

Figure 4. Overview of the themes and sub-themes in Study 3.

6.3.1 Competence in handling acute situations

According to the participants, taking part in ISBL during their education developed their competence to face acute situations in clinical practice as new graduates. They gained increased knowledge and work-related skills through the development of general competence, competence in prioritising, competence in working in stressful situations and contingency planning competence.

6.3.2 Competence in interprofessional teamwork

The participants gained knowledge and practical experience through ISBL by working in an interprofessional team in acute situations. Therefore, they increased their competence in working with other professionals as newly graduated perioperative nurses. They also developed interprofessional communication and collaborative competencies.

6.3.3 Professional identity development

Participating in ISBL during their education influenced the participants' development of self-confidence as newly graduated perioperative nurses. They also developed a professional identity, as they experienced their own roles and other professionals' roles and felt that they belonged to an interprofessional team.

6.4 Summary of results

This section presents a summary of the results of the three studies, which are linked to the overarching aim of this PhD thesis: to gain knowledge and insights into perioperative nursing students' learning and development of professional competence using ISBL as a pedagogical approach (Figure 5). The arrows in Figure 5 show a one-way direction, starting with the critical prerequisites when using ISBL as a pedagogical approach. This is important and forms the basis for perioperative nursing students' further professional learning for their professional competence development and the transfer of professional competence to clinical practice.

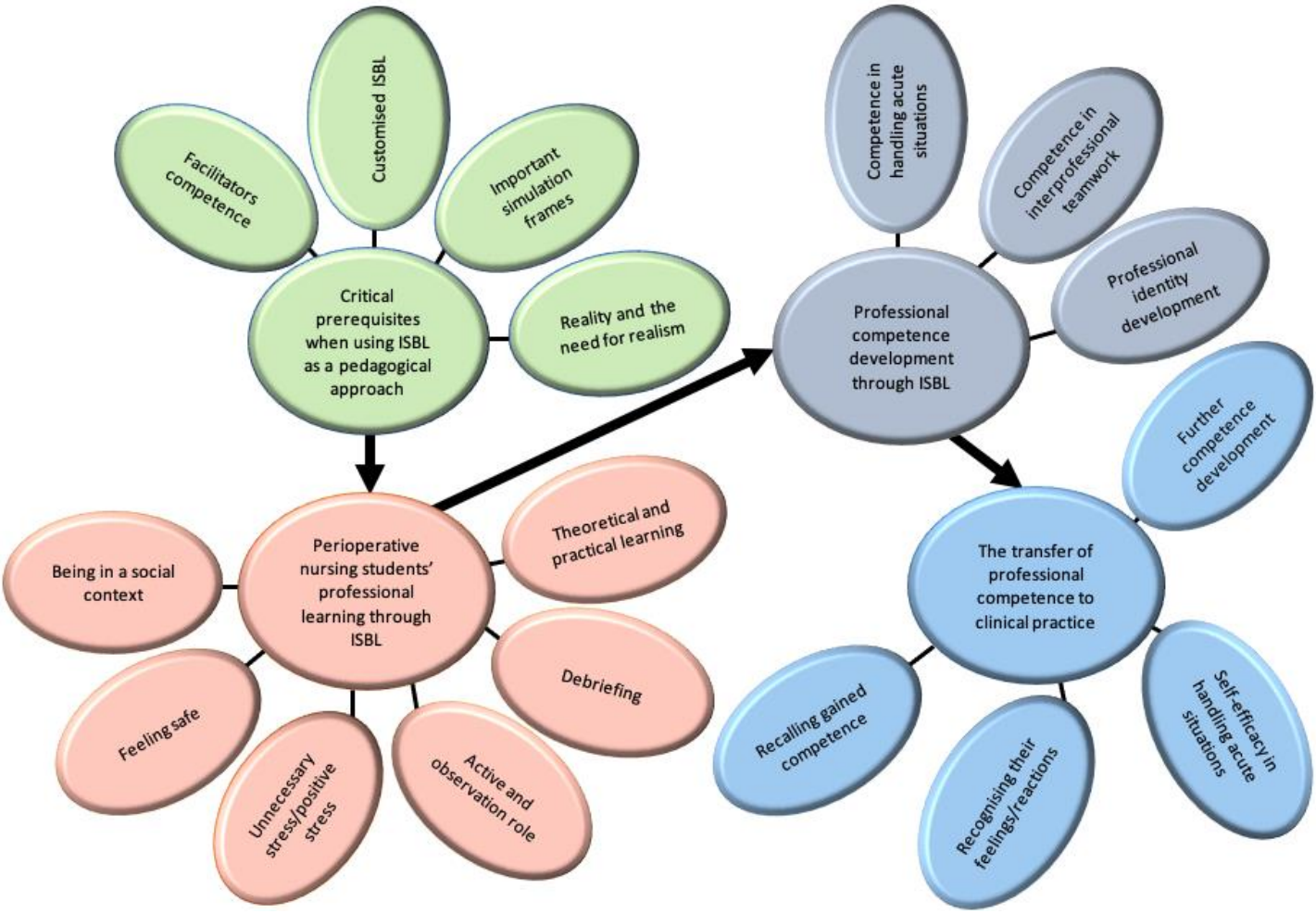

Figure 5. Overview of the overall results of this PhD thesis. The direction of the arrows shows the phenomenon of learning processes and the development of professional competence through ISBL and the transfer of professional competence to clinical practice.

All studies showed that perioperative nursing students developed professional competence to face acute situations through ISBL and that they were able to transfer professional competence to clinical practice. The results of Study 1 provided the most valuable knowledge about the critical prerequisites when using ISBL as a pedagogical approach. Studies 2 and 3 specified perioperative nursing students' professional learning through ISBL.

6.4.1 Critical prerequisites when using ISBL as a pedagogical approach

The results of this PhD thesis reveal critical prerequisites to consider when planning, preparing and conducting ISBL to support participants' learning and achieve learning outcomes.

Study 1 showed that ISBL had to be customised to the participants' needs to generate structure and connection between briefing, simulation sessions and debriefing. The facilitator(s) had to create this structure, providing the participants with essential information in the briefing by creating an overview and insights before attending the simulation session. Information during briefing should include the history of the simulation case, roles and seeing and knowing the simulation room with the simulator. Moreover, the participants wanted to know where they could find the equipment and identify what kind of equipment they had at their disposal. They needed a presentation of the actors to determine who participated in the simulation session. Learning objectives should be highlighted in all the elements of ISBL to experience the aspects continuously and logically. This creates a more structured learning process. Debriefing should start immediately after the simulation session, without disruptions, so that the participants can continue to focus. A structured debriefing had to clarify the learning objectives and review the course of events in the simulation case to create a shared understanding of the situations in the simulation session.

The participants in this PhD thesis were perioperative nursing students who participated in ISBL with other students from other professional education (e.g. anaesthetic nursing students). The results proved the need for facilitator(s) in each professional field when customising ISBL. They also suggested possibilities for specific profession-oriented information, such as perioperative nurses' roles in acute situations, additional required information regarding tasks, equipment and non-technical skills as prioritisation.

Studies 1 and 2 highlighted the importance of including all represented professional groups equally. Some participants did not receive a briefing and were, therefore, less prepared for ISBL than other students from different programmes, such as anaesthetic nursing students. Some participants also reported less focus on their role in the debriefing.

All studies revealed that competent people, such as perioperative nurses and teachers with professional competence in the participants' profession, should guide ISBL. Moreover, the facilitator(s) should have pedagogical competence to

be informed about ISBL and to conduct constructive debriefing: to create an overview and reflection among the participants, give constructive feedback, elevate situations and develop good learning processes. The facilitator should know the importance of focusing on the positive situations generated during the simulation session. According to the participants, the facilitator should create a safe atmosphere during debriefing so that the participants are encouraged to speak up. The participants wanted a facilitator who could understand their vulnerability in such a situation as being exposed to a context where everybody could observe each other perform and receive feedback.

Studies 1 and 2 showed that the content should be relevant to the participants' future professional roles. The learning objectives should fit their learning assumptions and stages in their educational programme. Moreover, the ISBL should be pitched at a level of complexity that the participants could handle while being challenged, but not to the extent that it could create chaos. At the same time, the participants found it motivating to face challenges outside their comfort zone within a safe context, such as ISBL, to see how they worked under pressure and experienced working in an interprofessional team. Before entering advanced ISBL, the participants expressed that they needed basic technical skills to have a foundation on which to build new knowledge. If the ISBL was too challenging, they would continue to focus on their technical skills rather than non-technical skills. Study 3 also showed that ISBL should be at a level where they had prerequisites to manage gaining a sense of mastery.

The participants wanted more frequent and regular SBL/ISBL during their education to learn more, expand their list of simulated acute situations and improve their simulation skills.

In Study 1, the participants considered it important for ISBL facilities, such as ISBL rooms, to be large enough and have space for all the participants to simulate together. The ISBL centre should include different rooms. For example, the debriefing should be held in a room without equipment to prevent the participants from being distracted and losing focus on the reflections in the debriefing.

Moreover, the ISBL room should look like an operating room similar to the one in clinical practice. The simulator should make sounds and speak, and the surgical equipment needed to be like they would encounter in clinical practice. Only then would they find it easier to immerse themselves in the simulation case,

manage to identify themselves in their perioperative nurse role and transfer their ISBL experiences to perioperative clinical practice.

The participants encountered a significant lack of equipment, equipment that did not work and equipment that had already expired. This made it challenging for them to perform their tasks during the simulation session.

According to Study 1, time is a critical frame factor in ISBL. The participants needed time during briefing to ask questions related to their profession and other subject-specific queries, familiarising themselves with the equipment and preparing for their task. There should be sufficient time to allow the participants to play both roles as active and observer to obtain good learning processes and learning outcomes. During debriefing, there should be enough time to construct a shared understanding by reviewing the course of events in the ISBL case and exploring in-depth what happened in the simulation session. This fostered reflective thinking and reflection among the participants in their performance and bound theory and clinical practice together.

According to Studies 1 and 2, the participants needed to experience realism, as reality in ISBL played an essential role in the learning process and outcomes of the participants. In Study 1, the participants stressed that the simulation case in the ISBL should include their professional role and function, just like in clinical practice. It should provide a realistic sequence of actions so that they can experience time limitations in an acute situation. In an ISBL case, including surgery, the surgical team must represent the same profession as in clinical practice. The surgical team should include a surgeon(s), anaesthetic nurse(s), perioperative nurse(s) and an anaesthesiologist. A realistic environment and equipment were also necessary for the participants, and they found it important that the equipment was designed for the surgical procedure in the simulation case. In Study 2, the participants expressed that to gain a sense of mastery, their simulation activities should be experienced realistically.

6.4.2 Perioperative nursing students' professional learning through ISBL

The results from Studies 1 and 2 revealed that the participants experienced learning through constructive learning processes during ISBL when they felt mentally prepared for the simulation session. Feeling mentally prepared created a more structured learning process as they gained an overview and insights into reducing unnecessary stress. This allowed them to focus more on important learning goals and master tasks in the simulation session.

Study 2 showed that unnecessary stress impeded constructive learning processes, as the participants lost concentration and that unnecessary stress prevented them from immersing themselves in the ISBL. It also hindered their feeling of mastery. The participants felt unnecessary stress when assigned a role outside of their professional domain and when they perceived ISBL as artificial. When the content and learning objectives were too demanding, this created chaos and produced unnecessary stress. When they felt assessed, they also felt performance anxiety. The participants felt negative stress, leading to fewer constructive learning processes when they experienced artificial ISBL, did not know when they should pretend in a simulation session and had to pretend too much.

In Studies 1 and 2, the participants revealed that they learned when they felt safe, were sufficiently prepared for the ISBL, did not harm the patient, and could make mistakes without feeling judged. The participants in Study 1 developed more independence in their perioperative nursing practice in ISBL than in clinical practice because ISBL offered them a safe environment where they could not harm the patient. Moreover, a safe atmosphere made the participants feel more secure during the simulation session, making it easier for them to focus on the tasks that the scenario demanded. It was important for the participants to feel safe during the debriefing. In this way, they could touch on other situations in which the participants could perform tasks more efficiently and learn from their mistakes.

The results of all the studies showed that the participants learned from being in a social context with students from other professional education and students from their own professional fields. They evaluated themselves and their professional roles in the ISBL context. In Study 2, when the whole team was focused on as a unit and received equal attention in an ISBL, the participants felt like an important part of the team. The feeling of belongingness led to a sense of psychological safety, which gave them the courage to speak up on the team, thereby developing the necessary knowledge. In Study 1, when the simulation case did not adequately represent the participants' role and tasks, and/or when they did not gain much attention during debriefing, the participants felt less important and less valuable in the team. This affected their professional identity development. Study 2 supported this, and the results showed that when participants gained less attention, they felt that their professional roles in the interprofessional team were unnecessary. All studies revealed that the

participants learned to be part of an interprofessional team in a social context, such as when they performed together, practiced communication and cooperated in an acute situation. They learned by observing each other's roles and found that all roles were important. They also realised how dependent they were on each other to ensure patient safety.

Studies 1 and 2 showed that the participants learned through active roles by being engaged in the simulation case, performing tasks and reflecting on this. Those who actively simulated could immerse themselves more quickly in their respective roles. Receiving a role outside one's professional education, for example, a midwife, surgeon or the voice of the simulator, did not create a good learning process with subsequent learning outcomes.

Gaining emotions through experiences such as working under stressful conditions and receiving positive stress constituted an active form of learning. They worked hard to challenge themselves actively, making the experience their own by experiencing emotions, realising how they managed these emotions and handling work in stressful situations.

Studies 2 and 3 revealed that the participants gained a sense of mastery through ISBL, increasing their confidence that they would master similar situations in clinical practice. However, Study 3 also showed that ISBL could provide experiences that would lead to decreased self-confidence. For example, one participant experienced complete failure and did not gain any sense of mastery.

Some participants in Study 2 felt a difference in the sense of mastery between ISBL and clinical practice. They related this to the emotions they felt when an acute situation represented a living patient in a life-or-death context. Nevertheless, the results from all studies showed that the participants experienced physiological responses to their performance, linked mainly to feelings of stress. Positive stress emerged from challenges that could provide them with a sense of mastery when working in an acute situation. Stress as an effect of adrenaline gave the participants the experience of working under stressful conditions, and this was perceived as positive.

The results in Studies 1 and 2 showed that the participants also gained valuable learning outcomes through observation (vicarious experiences). The participants understood the simulation session and saw how the team implemented, prioritised and communicated. The participants could easily capture non-technical skills as observers when observing others. They saw how

communication involved everyone and how quickly it could fail. Observing others led to self-reflection on others' performance and how they could solve the challenges in the simulation case. When having an observer role in ISBL rather than an active role, the participants found it difficult to determine whether they had achieved the learning outcomes, as they did not get to try it themselves.

Studies 1 and 2 showed how the participants experienced constructive learning when they had an active role, especially when trying both roles. In Study 2, the participants found that observing and being active increased their performance both individually and as a team. The second simulation team (i.e. the first one to observe) was more organised, calmer and managed to place greater focus on non-technical skills. Communication was considered more precise.

The participants in all three studies discussed debriefing and perceived it as an essential learning phase in ISBL. Debriefing fostered reflective thinking through verbal persuasion and social influences, as shown in Study 2. The results in all three studies revealed that when debriefing had a positive approach, it created possibilities to touch on other situations in which the participants could have performed tasks more efficiently and learned from this. It also strengthened the participants' learning experience of mastery in ISBL, as it was critical and put high demands on their performance. In Study 2, the participants found debriefing important in promoting and increasing self-trust in mastery experiences during ISBL.

In Study 1, when debriefing did not focus on their role, the participants experienced a confusing learning process with adverse outcomes. If the initial approach to the situations in debriefing was negatively focused, little opportunity was given for further self-reflection. In Study 2, the participants wanted constructive feedback from people with relevant competences to understand their performance. Receiving positive and negative evaluations and constructively discussing them in a learning environment where everyone could learn from each other were beneficial. Study 3 showed that including theoretical and practical learning in ISBL during postgraduate education allowed the participants to face acute situations with understanding and preparedness as recent graduates. Participating in ISBL during postgraduate education prepared the participants for clinical practice. The results in all three studies also showed that ISBL combined theory and practice and linked them through reflection, leading to constructive learning processes and outcomes.

6.4.3 Professional competence development through ISBL

The results of all studies showed that the participants developed professional competencies to meet acute situations through ISBL.

As indicated in Study 3, taking part in ISBL during their education enabled the participants to develop the competence to face acute situations in clinical practice as new graduates. They gained increased knowledge and work-related skills through the development of general competence, which gave them the basis to face acute situations as newly graduated. They viewed perioperative nursing as complex; therefore, it was important that theory substantiate their actions.

Furthermore, taking part in ISBL during their perioperative nursing education made the participants more competent in prioritising as newly graduated perioperative nurses in acute situations. In Study 1, as perioperative nursing students entering clinical practice, the participants developed competence in prioritising through ISBL. In Study 2, the participants developed self-efficacy in prioritising tasks. Conversely, in Study 3, some participants felt that they did not have sufficient competence in prioritising and would have liked to have more experience with realistic ISBL during their education.

In all the studies, the participants became aware of their reactions when facing acute situations through ISBL. Specifically, Study 3 showed that the participants experienced increased competence in working in stressful situations. They also understood that as perioperative nurses, they had to learn to work in a contingent manner to expect the unexpected and that anything could happen in the operating room. Things usually go as planned, but they must learn to turn around quickly and act as the situation dictates.

In Study 1, the participants felt more prepared for clinical practice when ISBL was part of their education, as they gained valuable non-technical and technical skills. In Study 2, the participants achieved a sense of mastery during ISBL and therefore developed self-efficacy in communication and interdisciplinary collaboration. In Study 3, newly graduated perioperative nurses felt that experiencing ISBL during their education increased their competence in interprofessional teamwork. They developed interprofessional communication

competencies, such as closed-loop communication[2]. Moreover, the participants realised how important it was to have a leader who communicated clearly in a trauma team.

ISBL provided a basis for good collaboration between professions, as students were allowed to simulate together, thus understanding each other's tasks and future teamwork. Furthermore, the participants in Study 3 developed competence in interprofessional collaboration as they experienced being in an interprofessional context and a member of an interprofessional team. They gained insight into their professional roles and tasks in an acute situation, helping them know what to do in such a situation and learn how to work with others in a team. The participants who had undergone an ISBL case that represented a trauma found it helpful because they had to observe their roles and the others' professional roles in the team. Through ISBL exercises, they gained greater insight into and understanding of the team dynamics in a trauma team. It became easier when they faced an acute situation in clinical practice as a recent graduate. By participating in ISBL during perioperative nursing education, the participants in Study 3 gained increased insight into and understanding of how dependent an interdisciplinary team was on each other and how important it was that everyone worked well together as a unit. They had to wait for each other when performing tasks, and one depended on the other professions to perform their tasks to get started.

Through ISBL, they gained awareness of and experience in how personal qualities could affect collaboration and the relationship between the various team members in the interprofessional team. Calm, confident personalities created a positive atmosphere within the interprofessional team. The opposite was also experienced when some personalities created stress and acted without clarity, leading to uncertainty and less security. Thus, the participants experienced a worsening of the collaboration.

In all studies, the participants experienced professional identity development when they became part of an interprofessional team. They saw

[2] The term closed-loop communication originated from military radio transmissions, and it is 'a terminology used to describe a teams' ability to deliver concise information (the call out), confirm reception of information (the check back), and acknowledge correct understanding of information (closing loop)' (Abd El-Shafy et al., 2018, p. 59; Peyre, 2014). This kind of communications can prevent errors and increase the speed and efficiency with which tasks are completed (Abd El-Shafy et al., 2018).

themselves performing their future professional tasks as perioperative nurses, thus enabling them to gain a better understanding of their professional role in an interprofessional team. They also developed a professional identity when collaborating and communicating in real practice. Through ISBL, they became members of an interprofessional team and evaluated themselves in this social context. They also developed a professional identity through increased self-confidence and became more aware of their professional role and a feeling of belongingness to their profession in an interprofessional team.

6.4.4 The transfer of professional competence to clinical practice

In Study 1, the perioperative nursing students experienced transferring their gained competencies from ISBL to clinical practice by recalling their experiences and recognising their feelings and reactions from ISBL.

In Study 2, the participants gained mastery experiences by taking part in ISBL. This strengthened their faith that they would be capable of mastering similar acute situations in clinical practice.

In Study 3, recently graduated perioperative nurses who experienced ISBL during postgraduate education developed the necessary competence that allowed them to face acute situations with understanding and preparedness. Participating in ISBL during their education made them feel safer as new graduates in the face of a similar acute situation as they had in the ISBL scenario. For example, it was important to have prior experience in acute caesarean section, and this made the participants feel safer when facing such a situation as a newly graduated perioperative nurse.

In Study 3, the newly qualified perioperative nurses remembered their ISBL experience, in which they participated during their education in perioperative nursing when facing acute situations in clinical practice. Picturing in their heads their experiences in active learning brought forth the knowledge and skills they had gained through ISBL. They took these knowledge and skills to clinical practice as newly graduated and reflected on their ISBL experiences. They would call upon them and apply them in clinical practice. Through ISBL, the participants developed knowledge and skills for continuous learning and could further develop these skills when entering clinical practice as recently graduated perioperative nurses. As newly qualified perioperative nurses, they developed their competence further whenever they faced acute situations. They gained knowledge and skills as a basis on which they could continue to build

new knowledge and skills when they entered clinical practice as graduates. Additional ISBL supported their developing professional identity and strengthened their courage to speak up in an interprofessional team context.

7 DISCUSSION

This chapter discusses the results and methodological considerations.

7.1 Discussion of results

This study's overarching aim is to gain knowledge and insights into perioperative nursing students' learning and development of professional competence using ISBL as a pedagogical approach. The knowledge and understanding in this PhD thesis come from perioperative nursing students' and newly graduated perioperative nurses' experiences of ISBL. Unlike rationalist thinking, here, learning is emphasised as coming from experiences and reflecting on these experiences (Pripp, 2016). This does not happen in a vacuum but in a social context by interacting with others (Vygotsky, 1980).

The results of this PhD thesis regarding perioperative nursing students' and nurses' experiences of ISBL are considered new, as there is limited research in this professional field (Kaldheim et al., 2019). The results showed critical prerequisites to consider when planning and designing ISBL as required for perioperative nursing students' learning and for achieving the intended learning outcomes. This knowledge is fundamental to understanding how to organise ISBL to support perioperative nursing students' learning through ISBL. According to Dahlgren et al. (2019a), this is important knowledge because there is a need for research to improve ISBL practices to ensure effective delivery and optimal support for learning.

The results also revealed that the perioperative nursing students' professional learning through ISBL identified the learning processes that could provide knowledge about why ISBL could be justified as a powerful pedagogical approach. This knowledge is needed, important and new in the ISBL literature (Rystedt et al., 2019), as there seems to be a lack of knowledge about the process of students' learning and the ways that knowledge can emerge and manifest in ISBL (Hopwood et al., 2019).

The perioperative nursing students found that ISBL contributed to the increased quality and capability of perioperative nursing students and recently graduated perioperative nurses to face acute situations with competence. These qualitative results show that ISBL provides learning conditions that can develop the knowledge and skills required to work in an interprofessional team.

Moreover, the participants transferred the competencies they gained from ISBL to clinical practice as newly graduated perioperative nurses. This result is

important, as there seems to be little evidence regarding students' transfer of professional competence to clinical practice after graduation or how ISBL influences future practice (Seaton et al., 2019). In this PhD thesis, the transfer is viewed as a process that involves active interpreting, modifying and reconstructing (Tuomi-Gröhn et al., 2003). Here, transfer is not measured in randomised controlled trials, and this does not mean that the effects of a prior task and knowledge remain intact.

7.1.1 Critical prerequisites when using ISBL as a pedagogical approach

The results showed the critical prerequisites to consider when including more than one profession when using this pedagogical approach. The other critical prerequisites are facilitators' competence, important simulation frames, tools and participants' experiences of reality in ISBL.

1. **Customising ISBL requires collaboration between educators with different professional backgrounds**

ISBL involves more than one profession, more than one curriculum, educators and traditions. The results showed that customising ISBL seems more challenging than customising SBL. This is consistent with Creutzfeldt et al.'s (2016) study, which indicated that ISBL could be challenging when the number of professions involved is increased (Creutzfeldt et al., 2016). Thus, planning and designing customised ISBL requires collaboration between educators from different educational backgrounds. This ensures that ISBL includes all the participants' content and learning objectives in their educational programme and that each profession is considered an important member of the interprofessional team (Herrington & Schneidereith, 2017; Watts et al., 2021).

Some participants were not included equally as professionals when they participated in ISBL. One reason for this may be a lack of cooperation between educators from different educational backgrounds when customising ISBL. Moreover, there are cultural/historical links between SBL/ISBL and the area of anaesthesiology (Kaldheim et al., 2019), and the perioperative nursing field does not have a long tradition in ISBL. The planning and organising of SBL/ISBL in hospitals and education are still dominated by the field of anaesthesiology. Therefore, this PhD thesis stresses the equal inclusion of all professions when planning and conducting ISBL in educational institutions and clinical practice. Including all professional participants in ISBL can provide experiences that create constructive learning situations, processes and outcomes for all participants, regardless of their professional education. According to AT,

experiences are formed through collective activity by acting and coordinating with other professionals (Danish et al., 2021).

Learning objectives are important for educators to guide valid and reliable ISBL (Cantrell et al., 2017b; Mirza et al., 2020). The results of this PhD thesis reveal that educators should use learning objectives as a starting point when creating an ISBL scenario to make the scenario relevant for all students involved. According to AT, learning objectives are important because they set the motive and driving force of an activity (Engeström, 2000), and they should be chosen purposely by educators (Danish et al., 2021). The participants in ISBL should be engaged when considered subjects in Engeström's activity model. The learning objective directs the activity, which can turn into outcomes (Engeström & Sannino, 2017). AT enables us to understand how fundamental it is that all professional participants are involved with relevant learning objectives to engage in all phases of ISBL. Relatedness is one of the three psychological needs of motivation in SDT. Professional participants in ISBL need to feel connected with the professional team and as part of a particular professional group (Garavalia et al., 2002; Ryan & Deci, 2017).

Moreover, the participants wanted more SBL and ISBL to gain simulation competence. This could create higher-quality ISBL for perioperative nursing students. This seems to be an important consideration, as first-time simulation participants require more assistance when participating in SBL/ISBL (Kelly et al., 2019). Additionally, ISBL requires participants to have simulation experience (Dieckmann, 2009). Therefore, when customising ISBL, educators must consider the participants' SBL and ISBL skills.

2. 'Upper-level' support needed to enable collaboration between educators in different professionals' education

'Upper-level administration' can be considered 'as deans, associate deans for education' (Charles & Koehn, 2020, p. 136; Thibault, 2011). The upper-level administration is central to providing the necessary resources to develop well-customised ISBL and promote structure, constructive learning processes and outcomes for participants. Furthermore, upper-level administration must support educators in different educational professions in cooperating to deliver ISBL experiences that create constructive learning processes and outcomes (INACSL, 2016d). In Norway today, there is a significant focus on SBL/ISBL. In the white paper Education for Adjustment (2021), the government indicates that it will, through dialogue with other European Economic Area countries, look at the

possibilities for changes in the Vocational Qualifications Directive (European Commission, 2020). The is to make simulation replace some parts of the practice (Ministry of Education and Research, 2021b). ISBL can be costly when deciding on resources to plan and implement ISBL in education (Charles & Koehn, 2020). Thus, the upper-level educational administration is responsible for supporting educators who plan and design ISBL. Furthermore, the importance of using ISBL for learning and teaching and how essential it is in the future to ensure enough competence in the different nursing professions and resources should be understood.

3. A facilitator's competence and the need for a facilitator in the participants' own professional field

Perioperative nursing students required facilitators within their professional field who could provide them with specific profession-oriented information, for example, in terms of the perioperative nurses' role in acute situations. Furthermore, competence to give constructive feedback during debriefing in a way that makes them feel included and important. Studies have shown that facilitators must teach technical and non-technical skills and reveal the differences between clinical practice and ISBL in terms of realism (Alinier & Oriot, 2022; Husebø et al., 2012). This information is important in preventing misunderstandings and limitations in ISBL (Tyerman et al., 2019). The results of this PhD thesis showed how complex it is for one facilitator in one professional field to provide enough information to students in each educational profession. Facilitators can gain an overview by participating in the implementation, planning and preparation. Nevertheless, it seems too complex to obtain competence in each professional field to serve students from different professional educational levels. In the ISBL literature (Dahlgren et al., 2019b), the facilitators' role is described as complex. Therefore, it seems strange that there is little evidence regarding the number of facilitators required to facilitate ISBL. Moreover, there seems to be a shortage of literature on the required competence of a facilitator in ISBL. This study showed the need for a facilitator in each professional field participating in ISBL to ensure that all participants feel included, are seen, gain profession-specific information and learn from professionals in their field.

Facilitators require pedagogical competence to create constructive learning processes and outcomes as well as a safe atmosphere for the participants in ISBL. Webster and Keebler (2020) supported this finding in their study,

stating that instructions from a facilitator are a critical condition of ISBL and could be the key to participant learning (INACSL, 2016a).

Some participants did not receive a briefing or reported less focus on their role in the debriefing. This could have been caused by the facilitator's competence or lack of competence in perioperative nursing. There seems to be a need for more educated facilitators to handle the increased use of ISBL in educating perioperative nurses (Kaldheim et al., 2019).

4. Important simulation frames and reality in ISBL

The results confirmed that having simulation frames to create authentic experiences for participants is vital in ISBL. Simulation frames set the standards for the tools in ISBL as they offer possible actions and limitations in ISBL. Realistic equipment is an essential tool, and the results showed that the equipment affected the participants' learning processes and outcomes. Vygotsky's learning theory forms the basis for AT and is in accordance with the results of this PhD thesis. The theory presupposes that physical and intellectual tools must mediate reality for people and must be characterised by knowledge, skills and understanding rooted and validated in the framework of a real system constituted by actions and practices (Säljö & Moen, 2001).

The participants in the ISBL were perioperative nursing students, and for them, it was important that the room where they would simulate looked like the room they would use in clinical practice. Most educational institutions in Norway that educate perioperative nurses have invested resources in their simulation centres and built an operating room. This is necessary, especially when the government in Norway demands that educational institutions increase their working life relevance to students. This is also important when some SBL/ISBL replace parts of clinical practice (Ministry of Education and Research, 2021b).

Another simulation tool is the simulator. The participants wanted a simulator that could create sounds and speak. According to Dieckmann et al. (2019), simulators are constructed differently in terms of technological quality. Advanced simulators are high-tech, with heart and lung sounds, palpable pulse, eye movement and voice interaction (Lioce et al., 2020). As simulators cover many fields, they are all different. A simulator should be 'constructed in the context of activities' (Dieckmann et al., 2019, p. 184). In ISBL, the participants in an interprofessional team should work with a simulator that addresses their specific learning needs (Dieckmann et al., 2019). Dieckmann et al. (2019) also pointed out that perceiving a simulator as a human being could interfere with the

participants' learning process and outcomes. Given this finding, there still seems to be a lack of simulators developed specifically for perioperative nursing settings. Developing a simulator in activities is challenging for perioperative nursing educators (Kaldheim et al., 2019). Simulators should be developed that include surgical procedures for use in perioperative nursing, as perioperative nursing students need them for interaction to achieve their learning objectives through activity. According to AT, practising activities can develop new skills and knowledge among students (Battista, 2017).

The simulation frames can be closely related to different fidelities and the participants' reality experiences. INACSL (2016c) defined fidelity as 'the ability to view or represent things as they are to enhance believability' (INACSL, 2016c, p. S42). Fidelity can be conceptual, physical/environmental and psychological (INACSL, 2016c). Moreover, fidelity is a term used to describe the degree of perceived realism in ISBL. The results of this PhD thesis revealed that when the participants experienced ISBL with a high level of realism, they managed to immerse themselves in the ISBL session. Immersion is 'the level to which the learner becomes involved in the simulation' (Lioce et al., 2020, p.23). Participants who have a high amount of immersion show that they treat ISBL as real life (Lioce et al., 2020). Therefore, when planning and conducting ISBL in perioperative nursing education, ISBL should have a high-fidelity level to create a realistic experience for the participants.

One example of the absence of experiencing realism is performing a role outside of their profession, preventing them from immersing. For example, some participants saw the role of a surgeon as being filled by someone who could not perform surgery. It was strange to be perioperative nursing students learning from someone who did not have the knowledge or skills to perform surgery. Performing the role of perioperative nurse in the simulation session requires using available tools for conducting perioperative nursing tasks and learning from them. Therefore, the roles that are not intended for the students' learning in ISBL should be filled by persons with affiliated knowledge and skills to represent the roles. Illeris (2011; 2012) supported this by pointing out that developing professional competence requires the construction of meaning and understanding related to professional practice and the professional role one is to perform. AT supports our understanding of the complexity of learning in ISBL by clarifying the associations among roles and how they affect the complexity of the participants' experiences (Battista, 2015).

Time was another important frame factor for the participants, as they needed time during briefing. This is supported by Morrison and Catanzaro's (2010) study. There should also be enough time during debriefing to explore the simulation session in depth and reflect as needed. Dieckmann et al. (2012) found that reflective thinking in debriefing can generate knowledge. The results showed that for the participants, there should be enough time to perform both observer and active roles in the simulation session.

7.1.2 Perioperative nursing students' professional learning through ISBL

The perioperative nursing students' learning using ISBL was conveyed through positive and unnecessary stress (negative stress), being in a social context, being in an active or observer role and using reflection in a learning process. The participants' learning processes and outcomes were highly affected by the critical prerequisites discussed in the first section of this chapter. This is understandable, given that learning is understood as a process in which external or internal stimuli change a person's knowledge and behaviour, encompassing mental, emotional, physical and practical domains (Hodkinson et al., 2008).

1. **Emotions as positive and unnecessary stress experiences and their effect on participants' learning processes and outcomes**

In ISBL, the participants experienced emotions such as positive stress and unnecessary stress, which affected their learning processes. This is in accordance with other studies indicating that emotions, such as stress, often occur in SBL/ISBL and can affect learning (Al-Ghareeb et al., 2019; LeBlanc & Posner, 2022). The results of this PhD thesis showed how various emotional experiences affected the participants' learning processes and outcomes.

Through ISBL, the participants experienced positive stress, creating constructive learning processes and outcomes. This is consistent with other studies indicating that positive stress can lead to personality development, learning processes and outcomes (Denovan & Macaskill, 2017; Kachaturoff et al., 2020; Pitt et al., 2018). The positive stress experiences in ISBL came from the challenges the participants faced during ISBL. Furthermore, mastering these challenges created constructive learning processes. According to Bandura (1999), the experience of mastering can lead to success and strong beliefs in personal efficacy. For the participants, positive stress enabled them to know themselves better and how to handle acute stressful situations. They evaluated themselves and their competence and gained mastery experience. This leads to increased

self-efficacy, which is an important learning outcome of participating in ISBL. Self-efficacy is an important learning outcome, as it can motivate students to improve their competence in clinical practice (Multon et al., 1991; Schunk & Pajares, 2010). Moreover, it gives them the expectation that they are capable of performing tasks or actions (Hackett & Betz, 1989; Schukajlow et al., 2012). When they experienced positive stress, they felt the effects of adrenaline rush and actively participated by immersing themselves in their role in the simulation session. Positive stress also provided realistic experiences of stress similar to the stress they could encounter in real acute situations. According to Bandura (1999), mental processes affect self-efficacy, and mastery experiences are the most important in developing self-efficacy. In the ISBL, in which the participants gain experience by mastering the learning objectives, this can strengthen the participants' beliefs in personal efficacy, contrary to the feelings of complete failure and lack of mastery, which decrease the participants' self-efficacy and self-confidence.

The unnecessary stress experienced by the participants impeded constructive learning processes as the participants lost concentration, preventing them from immersing themselves in ISBL. This aligns with previous studies stating that unnecessary stress as distress (negative stress) is a human condition of overload or deprivation that could lead to disorganisation (Denovan & Macaskill, 2017; Kachaturoff et al., 2020; Pitt et al., 2018). For the participants in this PhD thesis, unnecessary stress hindered them from gaining mastery. When the participants found the content and learning objectives too challenging, they did not feel prepared for ISBL, which made ISBL too difficult for them. They found it strenuous to perform in the simulation session, and they became distracted and unable to focus on the intended learning objectives. This is consistent with an integrative review that synthesised the current research findings on students' experiences of emotions and the effects on students' learning in SBL. During SBL, the students were found to experience emotional overload, which was defined as a high cognitive load (Madsgaard et al., 2022). This can be explained using Vygotsky's ZPD, as the participants found ISBL too demanding, even with a facilitator as a guide. The distance between the participants' actual level of development in independent problem solving and their level of possible development through collaborative problem-solving was too far. As SDT describes motivation as focusing on three psychological needs, one of which is competence, and as competence is the ability to show mastery in

a specific area (Garavalia et al., 2002), creating ISBL that is too demanding for the participants can cause students to be less motivated (Deci & Ryan, 2008).

Emotions affect attention, memory, cognitive and metacognitive thinking strategies, judgment, decision-making, mental resources and extrinsic and intrinsic motivation (Artino Jr et al., 2012; Gluck et al., 2008). The participants in this PhD thesis needed to feel safe when participating in ISBL, which influenced their learning process. Feeling safe caused less anxiety, reduced unnecessary stress and made the participants more focused when participating in ISBL. Studies have found that negative emotions could reduce concentration (Lee & Son, 2022; Levin et al., 2007).

There have been different views regarding emotional response (e.g. stress), and some have argued that stress might not impair performance. Whether stress is negative or positive, it can improve learning processes (MacDougall et al., 2013). Conversely, other studies have shown that high cortisol levels, which indicate stress, impair performance (Arora et al., 2010; LeBlanc, 2009). There is a need for emotions in ISBL to create constructive learning processes, but too much is overwhelming and too little is not engaging enough (Bath & Lawrence, 2012). The results of this PhD thesis show that it is not only about having 'too much' or 'too little'. It is the type of perceived stress that determines whether it has a constructive influence on the participants' learning processes and outcomes. Perceived unnecessary stress is generated from situations that can be prevented. Positive stress was created to provide a realistic experience and increase the participants' attention, in contrast to unnecessary stress, which took the participants' attention.

Attention is crucial for learning. This is defined as continuously focusing and concentrating attention on a specific point over a period of time (Roda, 2011). Liu et al. (2022) found that anxiety and cognitive load affected nursing students' attention, supporting the results of this PhD thesis. Anxiety and high cognitive overload lead to unnecessary stress and affect the participants' concentration and attention. In the literature, attention and flow seems close where 'flow' is explained as an optimal mental state in which people engage in a short period of immersive experiences while doing activities (Csikszentmihalyi et al., 2014). Flow is a desirable state to generate in ISBL (Yoo & Kim, 2018), as it can develop self-esteem and collective efficacy (Kim & Park, 2018). A precondition for generating flow is 'a balance between perceived challenges and perceived skills' (Csikszentmihalyi et al., 2014, p. 232). This supports the results

of this PhD thesis, as negative stress occurred when the participants found the ISBL too challenging. Negative stress also prevented the participants from achieving flow, affecting their learning processes and outcomes. Jung and Roh (2022) found that cognitive load mediates the relationship between learning flow and clinical reasoning skills, supporting the results of this PhD.

Memories are also important for learning, and memories from emotional situations, such as negative ones, tend to remain vivid, detailed and long-lasting than those from neutral conditions (Kensinger, 2009). In this PhD thesis, the participants who experienced much unnecessary stress remembered well. Nevertheless, it was not the intended learning they remembered but the factors that created the unnecessary stress that distracted them. An important issue is that there must be a connection between the stress created and the learning outcomes (Smeets et al., 2007). This result is consistent with this PhD thesis, in which the participants experienced positive stress as constructive learning. Positive stress was created and related to the acute stressful situation and corresponded between the stressful context and the learning objectives in ISBL.

When the participants experienced too much unnecessary stress, the ISBL became chaotic. This can be explained by the fact that when people are in a stressful situation, they are less able to retrieve information from their memory (Vogel & Schwabe, 2016). Therefore, it became too difficult for the participants to reason and make sense of the situation.

2. Perioperative nursing students learn in a social context

Learning from a sociocultural perspective is considered an interaction between students, the learning environment and activities, in which communication is essential to learning (Vygotsky, 1980). This theory is in accordance with this PhD thesis, which reveals that the participants learned from being in a realistic environment in a social context interacting with other students from different professional education and students from their professional fields. Therefore, individual and collective aspects are closely connected with each other in an ISBL. This is consistent with AT, which states that ‘an activity is always understood as a collective phenomenon’ (Tomaz & David, 2021, p. 223) within a group, for example, an activity in an ISBL, where individuals perform actions as interactive, collaborative activities. The participants in this PhD thesis learned individually and collectively, and this can be explained using the concepts of internalisation and externalisation introduced by Vygotsky to explain how an individual develops from novice to one who knows practice. Internalisation

means absorbing new knowledge, whereas externalisation implies that one has become able to promote new ideas, knowledge and innovative measures. Learning about practice through internalisation eventually leads to externalising the proposed changes. This externalisation is important in collective learning and social expansion (Engeström, 1999b). However, internalisation and externalisation are still forms of individual learning because they are about what individuals do. Collective learning occurs when the participants in ISBL learn from each other through communicating and discussing their practice in an interprofessional team (Engeström, 1999b). This learning is imperative to developing collective efficacy (Bandura, 2000) among the participants in an ISBL. This is in accordance with the participants' experiences in this PhD thesis, as they learned individually through an active and observer role and collectively by learning from each other. Afterwards, they reflected on and discussed the situations from the simulation session in the debriefing with a professional facilitator, learning both collectively and individually.

ISBL offered the participants learning processes that included performing their professional roles and tasks and interacting across different roles. The participants evaluated themselves in this social context. Feeling included made them feel that their professional group was influential in the interprofessional team. The opposite happened when they did not feel included and viewed their profession as less valuable. Confirming this, May (1996) found that professional integrity relates to how a group of people self-evaluate in a social context and how society perceives that group.

According to AT and Engeström's activity model, this can be seen as the 'division of labour' of the participants' division of activity tasks. The participants in this PhD thesis saw their roles and the others' roles and dependence on each other as a team. 'Rules', which are explicit or implicit regulations, norms and standards, were integrated into the participants' actions and interactions (Engeström & Sannino, 2017). Receiving equal attention in each professional education and focusing on the whole team resulted in experiences of being an essential part of the interprofessional team. From this view, professional responsibility is part of the collective and individual sense of professional identity created and shaped by prevailing social attitudes and norms.

3. Professional learning through active and observer roles

According to AT, learning is conceptualised as a practice (Engeström, 1999b). In this PhD thesis, ISBL is considered a practice that offers participants learning

through activities. The results of this study show that the activities should be relevant to the participants' professional roles, and that the interprofessional team should include roles like in clinical practice. These were the prerequisites for becoming engaged in the ISBL and supported constructive learning processes. This is consistent with Weller and Civil's (2017) study, which states that for ISBL to be effective, each team member must be engaged. The participants also claimed that the interaction between the team members should have the fidelity needed to represent the whole team in the scenario. Weller and Civil (2017) supported the idea that assigned roles should define professional roles in the clinical environment. Battista (2017) found that role assignment affected participants' activities and the complexity of their engagement. This aligns with the results of this PhD thesis, in which the participants conveyed that their assigned role in the ISBL influenced their learning processes and outcomes in the simulation session. Performing an active role, the participants experienced becoming engaged in the simulation session and reported physiological and psychological reactions and increased adrenaline as their bodies became stressed. According to AT, 'actions are goal-directed processes' that individuals or groups 'undertake to achieve their goals' (Battista, 2015, p. 189).

In sociocultural learning, mediating artefacts are elements that affect communication between people. Mediating here is how we interpret the world through tools rotated in different social practices. Furthermore, 'tools, rules and roles present in the context under investigation mediate participants' actions, that participants use to achieve a goal' (Battista, 2015, p. 189). Being an active participant included learning through communicating with the ISBL environment using tools, performing tasks and communicating with other participants, as well as interprofessional communication and cooperation. Dieckmann et al. (2012) underpin this by saying that ISBL includes roles, cultural artefacts and tools and facilitates rich interactions through extensive activities. The participants in this PhD thesis revealed that they learned using cultural artefacts and tools through active roles. They learned by being active, trying actively and making their own experiences through bodily emotions. This is consistent with the deliberate practice theory, which states that learners must experience practice as active for learning to be effective (Lai et al., 2016).

In social learning theory, observational learning emphasises outcomes involving attention, memory and motivation (Tolsgaard et al., 2016). In this PhD thesis, the participants experienced a different learning process in an active role

versus an observer role. Performing an observer role generated valuable learning through non-technical skills instead of being active and focusing on technical skills. They also became more engaged in assuming an active role in ISBL than an observer role. This is supported by Harder et al. (2013), who found that participants in the observer role experience a lack of engagement and prefer to be assigned active roles (Harder et al., 2013). Engagement refers to an individual's active involvement in learning activity (Christenson et al., 2012). Researchers have found a strong link between engagement and learning outcomes (D'Mello, 2017). Engagement includes a multidimensional construct of behavioural, emotional, cognitive and agentic engagement (Reeve, 2012). The results of this PhD thesis reveal that participants learned through simulation engagement.

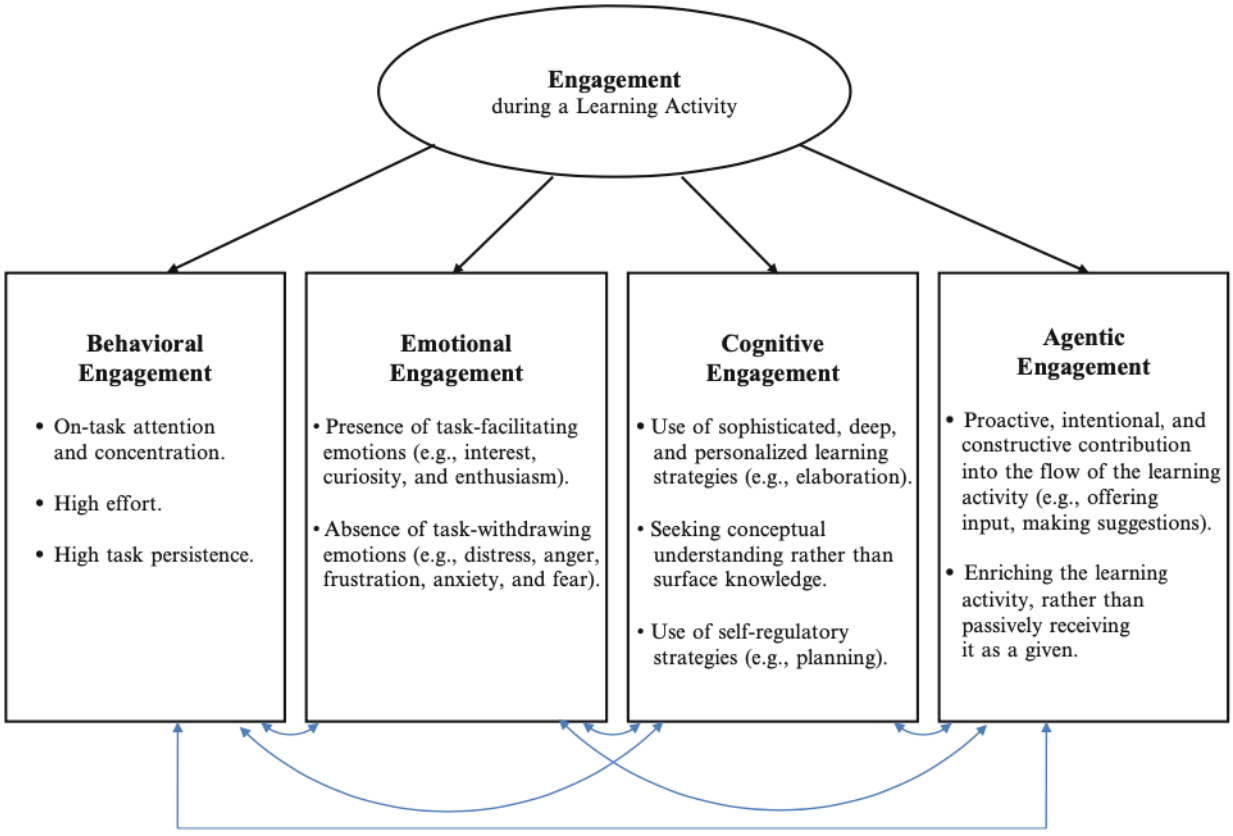

Figure 6. Four interrelated aspects of students' engagement during a learning activity (Reeve, 2012, p. 151). With permission from Reeve (2022) for use in this PhD thesis.

Figure 6 shows the interrelated aspect of students' engagement during a learning activity (Reeve, 2012), for example, being active in a simulation session. This figure illustrates how vital engagement is in a constructive learning process.

Additionally, when assuming an observer role, the participants did not know whether they had achieved the learning outcomes. They were not able to try it out themselves and did not experience mastery as an important learning outcome in ISBL.

Evidence shows that observation is helpful in learning complex skills but is less effective than physical practice. Observation provides vital information on valuable strategies, coordination patterns and identifying and correcting errors (Wulf et al., 2010). This supports the results of this PhD thesis indicating that the participants acting as observers learned from the other participants' mistakes. According to Bandura's (1999) self-efficacy theory, mastery and experience are the most important factors when participants experience something by themselves. Vicarious experiences (e.g., an observing role) can strengthen one's belief in one's capability to do the same. The participants in this PhD thesis learned constructively by being in an active role, but assuming both roles, especially observing first, increased their performance individually and within the team.

4. Constructive learning through reflection

Reflections are defined as 'the process of creating and clarifying the meaning of experience (present and past) in terms of self' (Boyd & Fales, 1983, p. 101). Reflection allows students to learn from their experiences (Bulman & Schutz, 2013; Schön, 1987). The results of this PhD thesis reveal that the participants learned through reflections and that ISBL connected theory and practice throughout the reflections. The participants experienced this as constructive learning, leading to professional development. This is supported by Barbagallo (2021), who found that reflections promote the capability to understand practical performance and substantiate it with theory. Furthermore, it generates effective professional learning, as reflection is required to achieve generalisation and application (Barbagallo, 2021).

When the participants assumed an active role and an observer role, this encouraged reflection, but it emerged differently. Being assigned an active role in the briefing initiated a thinking process of reflection as preparation before action. Evidence supports this and demonstrates that reflection before an activity benefits the briefing process (Chamberlain, 2017). Further reflection in an active role is associated with performance and team performance (Zhang et al., 2020). In this PhD thesis, the participants did not mention reflection in action, but they gained new knowledge and competencies by being active. As indicated in other

research, it is understandable that capturing reflection in action in ISBL could be difficult, as it is challenging to catch the participants' thoughts; therefore, reflection is left to be uncovered in the debriefing (Ha, 2020; Mulli et al., 2022; Zhang et al., 2020). Mulli et al. (2021) suggested that facilitators should be able to identify and support students' reflection in action. Participants benefit from reflection in action, such as performing skills, adapting and improvising, and understanding new knowledge (Clapper & Leighton, 2020; McMullen et al., 2016). In an observer's role, reflection cannot be linked directly to action. In other words, observation enables reflection on action but not a reflection in (or during) action (Wulf et al., 2010). This is consistent with the results of this PhD thesis, as the participants in an observer role gained an overview of the simulation session and saw how the team implemented, prioritised and communicated. This observation led to self-reflection on others' performance and included thoughts about how they would solve the simulation case/scenario challenges. Vygotsky (1980) emphasised that language functions as a silent inner speech as a tool for thought and reflection. Language is also a tool for communication between people. It is essential in encoding, storing and structuring information as well as in developing thought processes (Vygotsky, 1980).

The results of this PhD thesis support the promotion of reflection in ISBL, as reflection can support professional learning through practical–theoretical understanding, experience and interaction. Evidence supports this (Dahlgren et al., 2019b).

According to the INACSL (2021) Healthcare Simulation Standards of Best Practice™, ISBL must include a planned debriefing process because debriefing fosters reflective thinking through verbal persuasion and social influences. They use the term 'process', which 'aims to identify and resolve gaps in knowledge, skills, attitudes and communication-related to the individual, team, and/or system' (Decker et al., 2021, p. 27). The results of this PhD thesis show that fostering reflective thinking in a debriefing process requires the facilitator to have a positive approach when starting the debriefing. Debriefing stimulates reflective thinking through verbal persuasion and social influences. It creates a safe atmosphere that leads to a constructive debriefing process in which the participants feel safe reflecting and receiving feedback, touching on situations in which they could have performed more efficiently. The participants needed a safe place to reflect constructively and identify and resolve knowledge, skills and

attitude gaps. This is consistent with Rudolph et al. (2014), who found that it is important to build a 'safe container' in ISBL and debriefings to create an environment of trust and openness where mistakes are not lawbreaking but mysteries to be solved (Rudolph et al., 2014). Learning through reflection in debriefing involves integrating participants' experiences and encouraging conscious consideration or reflection of activity during the simulation session. This conscious reflection can promote insight by connecting thoughts, beliefs and actions (Decker et al., 2021; Kolbe et al., 2015; Schön, 1987). In Vygotsky's theory, language and interaction are important. He asserted that intellectual development and thinking originated from phrasing and exchange in a social context. This fits with ISBL and debriefing, in which participants use interpersonal communication with peers and silent inner speech to thoughts for reflection and awareness (Vygotsky & Kozulin, 1986).

The participants were often critical of their performance and needed help to see things from a broader perspective and to see what went well. Having a positive approach strengthened the participants' experiences of mastery in ISBL, leading to positive reflections. Mastery experiences can strengthen beliefs in personal efficacy (Bandura et al., 1999), and debriefing support in a constructed positive way can enhance future performance (Maibach et al., 1996). Therefore, it is imperative to facilitate debriefing by taking a positive approach to strengthen participants' mastery experiences through positive reflections (Decker et al., 2021). This is in accordance with SDT, which states that positive, competence-relevant feedback can enhance participants' intrinsic motivation (Danish et al., 2021). Furthermore, the participants found that a negatively focused debriefing gave little opportunity for further self-reflection. Helpful attitudes from facilitators, as well as honesty, curiosity and holding, can facilitate debriefing in a positive context (Kolbe et al., 2015).

The results also show that gaining constructive feedback from people (facilitators) with relevant competence is essential and lead to reflections. The participants wanted to understand and learn from their performance through reflections. In a safe environment, they could constructively reflect on their performance so that all participants could learn from each other. INACSL (2021) supports this by asserting that the debriefing process 'should encourage reflections, exploration of knowledge, and resolution of performance/system gaps while maintaining psychological safety and confidentiality' (Decker et al., 2021, p. 29).

7.1.3 **Professional competence development through ISBL**

The participants developed professional competencies to meet acute situations through ISBL. The results reveal outcomes that made them more prepared for clinical practice as perioperative nursing students and influenced the way they face acute situations as recent graduates. Competence involves different types of qualifications integrated into personal competence concerning a specific task; these qualifications are elements that gradually develop in the direction of a more coherent understanding (Illeris, 2009).

1. Competence in handling acute situations

In acute situations, there is a need to handle multiple demands; therefore, competence in prioritising is important to avoid errors in care delivery. It prevents interruptions and delayed patient treatment (Pierre et al., 2016). The results of this PhD thesis reveal that the participants developed skills in prioritising in acute situations. ISBL provided the participants a greater understanding of prioritisation as recently graduated perioperative nurses. It included knowledge and a functional aspect of knowing how to prioritise, which were integrated into their professional development. Acute situations occur suddenly, causing a shortage of time to decide and prioritise (Sterner et al., 2018). Therefore, for patient safety (Gawronski, 2019), perioperative nurses should develop competence in prioritising acute situations during their education. It must include evaluation, decision-making and action competence through in-depth knowledge of traumatology and trauma treatment and the perioperative nurses' role in acute situations (Ministry of Education and Research, 2021a).

Acute situations can be stressful for interprofessional teams. As stress affects team members' performance, they should learn and exercise how to manage stress. A small 'dose' of stress can be helpful as it can make people more focused, but excessive stress impairs overall situational awareness and can create tunnel vision (Brindley & Slemko, 2022). The results show that through ISBL, the participants gained experience in working under stress. They learned how they reacted in stressful situations in a controlled environment. This is important because stress can make it more demanding to execute higher-level tasks when participants have tachycardia and general sympathetic overactivity (Kent et al., 2020). Awareness of one's reactions when working under stress is imperative to minimise error (Brindley & Slemko, 2022). Therefore, this learning outcome is

essential for perioperative nurses to manage acute situations and increase their performance (Vincent et al., 2021).

Perioperative nurses usually care for people in acute and life-threatening situations in which the surgical patients' condition can change quickly. These situations require perioperative nurses to adapt rapidly and act as the situation dictates (Smith, 2019). The results reveal that the participants gained contingency planning competence. Through ISBL, the participants learned how to expect the unexpected and to prepare themselves mentally for the worst possible scenarios. If something happened suddenly, they would be prepared to manage the situation. Contingency planning allows participants to concurrently prepare and stand by to react to interoperative difficulties (Stansfield, 2022). As unexpected situations may happen during surgery, these experiences through ISBL enable participants to be prepared and adjust their plans (Nyberg et al., 2021).

2. Competence in interprofessional teamwork

The results show that through ISBL, the participants gained knowledge and practical experience that increased their competence in interprofessional teamwork, both as perioperative nursing students and as recently graduated perioperative nurses. This includes competence in interprofessional teamwork, such as interprofessional communication and collaboration competence. This finding is supported by other studies (Cory et al., 2020; Gawande et al., 2003; Nieuwoudt et al., 2021), which state that this is an important outcome, as adverse events in the operating room come from failure in communication and teamwork, leading to intraoperative errors (Christian et al., 2006; Gawande et al., 2003; Picard et al., 2022).

The participants learned the importance of clear communication and repeated messages in acute situations. They also learned the usefulness of close-loop communication, which was further developed during clinical practice after the perioperative nursing students had graduated and started working as perioperative nurses. Cory et al. (2020) found a significant knowledge gap before ISBL in closed-loop communication and critical principles for effective communication. Closed-loop communication was improved after ISBL (Cory et al., 2020). Therefore, ISBL is a robust pedagogical approach when educating perioperative nursing students to prepare for interprofessional teamwork and communication, and it is imperative for patient safety in acute situations (Beitz, 2019; Lamparyk et al., 2021; Murphy, 2019).

Working together requires independent and interdependent responsibilities and tasks to ensure patient safety (Munday et al., 2015). Therefore, it is an important learning outcome for the participants in this PhD thesis that ISBL developed their competence in interprofessional collaboration during their education. The participants increased their understanding of each other's professional roles and the importance of team cohesion. They also gained insight into their professional roles and how they could relate to different roles in the team. For teamwork to function well, team members require 'non-technical skills' (Mitchell & Flin, 2008). For perioperative nurses, non-technical skills, such as collaboration and communication, are closely associated with patient safety in their work environment. They create valuable interactions within the surgical team (Hanssen et al., 2020). ISBL is a robust pedagogical approach in interprofessional team training as it can provide high-quality and safe surgical care (INACSL, 2021; Paige et al., 2020).

3. Professional identity development

Through ISBL, the participants experienced professional identity development during their education. They became part of an interprofessional team interacting with other students from different professional educations. In this way, the participants increased their understanding of their professional role in an acute situation. They gained a sense of being professionals when collaborating and communicating with other students from different professional education programmes. In professional identity development, including 'the feeling of being a professional' is important (Paterson et al., 2002, p. 7). A solid professional identity emerges when professionals feel connected to their professional group, develop understanding through knowledge, acquire professional skills and experience a commitment to the professional group (Wenger, 1999). Professional identity development includes 'a pivot between the social and the individual' (Wenger, 1999, p. 145). Here, identity became a meeting between the individual and other participants in a social context. The participants in this PhD thesis's perception of ISBL occurred through their performance of their future professional tasks as perioperative nurses. Their social perceptions happened through collaboration and communication. This increased the participants' understanding of their professional role in an interprofessional team in an acute situation and gave them a sense of belonging to their future profession and thus an emerging sense of identity. This result is supported by Ryan and Carmichael (2016). SDT states that 'interaction between

the individual and the environment is key to the theories' application to identity development' (Griffin et al., 2017, p. 192). This supports the results of this PhD thesis regarding ISBL and identity development.

Describing professional identity as how professionals think and feel about themselves (Kristoffersen, 2021) integrates professional identity into their experiences of themselves (Öhlén & Segesten, 1998). The results reveal that the participants evaluated themselves in the social context of being students from one professional education in ISBL with other students from other professional teachings. This social context collectively influenced their development of professional identity. They saw how their professional role was included in the ISBL and received attention. Socialisation is 'the process by which a person learns to function within a particular society or group by internalising values and norms' (Cruess et al., 2014; Mylrea, 2018, p. 3). This active process involves transforming students into professionals who recognise their profession's values, attitudes and behaviours (Hammer et al., 2003). The participants' professions should be included in the ISBL to make them feel a sense of professional identity. When their professional roles did not receive the same focus and attention as the other students in other professions, they felt like extras in the scenario. This made them feel like a less important part of the interprofessional team, with reduced professional identity development. Professional identity can be related to self-concept (Hoeve et al., 2014; Johnson et al., 2012), which encompasses cognitive and affective aspects, such as self-esteem, self-awareness, self-confidence and self-worth. When the participants received equal attention and when the whole team was focused, the participants felt like being part of the team. The gained a sense of psychological safety, which gave them the courage to speak up in the team and develop the necessary knowledge. Managing to speak up is an essential competence, as perioperative nursing is expressed as caregiving in a hierarchical context in which speaking up for the patient can be challenging (Willassen et al., 2018). A well-developed professional identity is important for success (Hanna et al., 2019), and a stronger professional identity and self-confidence are needed for courage to speak up in an interprofessional team to ensure patient safety. This aligns with the study of Rød et al. (2021), which stated that when participants become self-confident through ISBL, they find the courage to speak up by asking questions and expressing disagreement. A robust professional identity can make professionals feel connected to their professional group and society, collectively and socially. They understand

through knowledge, acquisition of professional skills and commitment to the professional group (Ryan & Carmichael, 2016).

Dall'Alba underscored that professionalisation incorporates transformation, as it involves an embodiment of understanding of the practice. Further, 'social structures and traditions of practice frame what we do and who we are as professionals' (Dall'Alba, 2009, p. 32). To develop a professional identity, students need to be exposed to pedagogical approaches that immerse them in their profession (Stupans & Owen, 2009). Therefore, the authenticity of learning experiences is important for developing professional identity (Reid et al., 2011). This aligns with the results of this PhD thesis.

In SDT, to clarify identity development, motivations and focus are explained using three psychological needs: competence, relatedness and autonomy and the involvement take part in motivation and the development of one's sense of self (Cruess & Cruess, 2006; Ryan & Deci, 2017). The results of this PhD thesis show that ISBL involves all three psychological needs: 1) Competence is the participants' ability to demonstrate mastery during ISBL within their professional area (Garavalia et al., 2002); 2) Relatedness is the feeling that they become more aware of their professional role and of belongingness to their profession in an interprofessional team; 3) Autonomy enables participants to reflect on their performance and self-organise their experiences and actions (Garavalia et al., 2002). Support and growth experiences in these three domains can generate motivation, maintain the specific identity in question and are linked to success and well-being (Deci & Ryan, 2008). Therefore, ISBL is an essential pedagogical approach to developing perioperative nursing students' professional identity.

According to SDT, identity development is an outcome of a process of 'internalisation, occurring as the student transition from extrinsic through to an intrinsic state of motivation' (Mylrea, 2018, p.46). Developing professional identity in students' education using SDT as a theoretical framework can increase our understanding of the emotional processes behind students' identity development in ISBL.

7.1.4 The transfer of professional competence to clinical practice

The participants experienced a transfer of gained competence from ISBL to clinical practice as perioperative nursing students entering clinical practice and newly graduated perioperative nurses encountering acute situations in clinical

practice. This is supported by the study of Solheim and Flo (2021), which showed that nurses could still recall their experiences from SBL 12–18 months after the SBL, consistent with other studies (Marker et al., 2019; Rød et al., 2021).

The transfer of learning involves a complex process in which participants use their ISBL experiences, recall their developed professional competencies and apply them in clinical practice. They developed these transfers of learning competencies when entering clinical practice as newly graduated perioperative nurses through constructive processes as a reconstruction of learning. The transfer is not considered as a simple transferring of skills and knowledge but as a reconstruction described by activity theorists who are interested in learning as a transformative process (Engeström, 1993; Yamagata-Lynch, 2010). The transfer is a metaphor for explaining developed competence moving from one context and used in another. There is a debate concerning what correctly drives environments transversely. It is argued 'that an individual's knowledge structures allow movement between contexts or perception of contexts as similar' (Danish et al., 2021, p. 127; Lobato, 2012). When we think about transfer, it is common to believe that one's learned situation or task can be transferred directly to another problem or task. Therefore, research on the use of SBL/ISBL has often focused on the effects (Dahlgren et al., 2019b), considering the importance of evaluating the effect of SBL/ISBL, for example, on nurses' skills and knowledge (Hegland et al., 2017). It is a cognitive way of thinking, also referred to as a normative account of transfer, as it is valued by certain types of transfer that scholars will determine whether they occurred or not (Danish et al., 2021). This PhD thesis shows that the transfer of learning is more complex than a direct transfer of learned competencies from ISBL to clinical practice.

Nevertheless, the participants' transfer of competence as newly graduated supported them and allowed them to face acute situations with understanding and preparedness. Reflecting the processes in ISBL experiences developed the participants' knowledge and skills as continuous learning and is important in the reconstruction process of learning and professional development. Professional competence developed during ISBL was further developed in perioperative students and nurses when they entered clinical practice. According to AT, transfer is a process that involves active interpreting, modifying and reconstructing (Tuomi-Gröhn et al., 2003). Transfer occurs when reflecting and seeing new patterns related to the activity-oriented aim (Tomaz & David, 2021).

This transfer ensures safe care for patients in acute situations. Evidence shows that recently graduated RNs and advanced practice nurses lack the necessary confidence and, occasionally, clinical experience to ensure safe patient care (Murray et al., 2018). The transition process for newly graduated RNs and advanced practice nurses in hospital settings identifies the importance of achieving competence for safe practice before entering clinical practice (Reebals et al., 2022). The results of this PhD thesis reveal that ISBL can help students and make it easier and less complicated for them to transition to practice. Other studies have also supported this finding (Cant & Cooper, 2017; Shin et al., 2015).

Professional identity development and its transfer to clinical practice is a dynamic and adaptable process that begins during their education (Andrew, 2013; Johnson et al., 2012). For this reason, professional identity is a dynamic and adaptable process that leads to the development and understanding of their future professional practice and an obligation to the profession (Bagnasco et al., 2019; Hörberg et al., 2019).

7.2 Methodological considerations

This section discusses the quality of research undertaken in this PhD thesis using a model that involves eight quality criteria in qualitative research (Tracy, 2010). The eight criteria are universal hallmarks for high-quality qualitative methods across paradigms and focus on the research study's means and ends (Tracy, 2010).

7.2.1 Worthy topic

Before this PhD thesis was initiated, a literature search was conducted on the topic, exposing a gap in the literature on perioperative nursing and using SBL/ISBL (Kaldheim et al., 2019). The literature calls for more knowledge to improve ISBL practice (Dahlgren et al., 2019b) and students' transfer of developed professional competencies through ISBL to clinical practice after graduation (Seaton et al., 2019). Therefore, this PhD study provides new knowledge and insights into ISBL as a pedagogical approach in perioperative nursing education. This new knowledge and understanding of issues were experienced by the participants involved in research, thus generating 'educative authenticity' (Lincoln & Guba, 1985).

In the education of nurses and specialised nurses, there is a need to meet competence challenges caused by COVID-19, which showed a critical demand

for the education of several specialised nurses. Moreover, changes in the population's age and more complex patient situations require healthcare professionals with advanced competencies to ensure safe outcomes for surgical patients (von Vogelsang et al., 2020). Educating more nurses calls for more practice places. Therefore, the use of ISBL is growing in educational institutions.

7.2.2 Rich rigor

The data collected provided rich data regarding ISBL as a complex phenomenon. The participants gave detailed descriptions and explanations about the topic (Weick, 2007). Collecting data simultaneously in Studies 1 and 2 with the same participants can have given us reduced data. Collecting data separately in each of these studies could have resulted in richer data, as the participants could have given more in-depth answerers when focusing on fewer themes in the interviews and could have used more time.

The participants were perioperative nursing students and nurses who had experienced ISBL as a common perspective during their education. This homogeneity promoted a sense of commonality, which better shared and understood ISBL (Krueger & Casey, 2015). Searching for experiences in different educational institutions gave comprehensive results, as there was a variance in how the educational institutions conducted ISBL regarding quality.

Given the study's goals, I as the PhD student, my supervisors and the rest of the research team considered this sample size to be appropriate (Tracy, 2010) as data saturation was reached in all studies (Sandelowski, 1993). We also collected demographic data to better understand who the participants were in all the studies.

Using focus group interviews in a phenomenological–hermeneutic method has been discussed. The argument against using focus groups and phenomenological research is that phenomenology seeks essential characteristics or 'essences' of phenomena in a manner that requires individuals to describe their experiences in an 'uncontaminated' way (Bradbury-Jones et al., 2009, p. 663). As a nurse researcher, it is essential to develop critical awareness using focus group interviews and phenomenology. However, this study's focus groups were consistent with phenomenological research and beneficial; they inspired participants to discuss and open new perspectives. Still, using focus group interviews could have hindered some participants from telling their stories. Therefore, the moderator (the PhD student) and assistant moderator had the

responsibility to handle all the participants and create a safe environment so that everyone could share their experiences. Therefore, in this PhD thesis, the focus groups were led by a moderator and an assistant moderator. This strengthened the data collection as these two individuals performed these roles throughout Studies 1 and 2, increased the participants' awareness of the issues and stimulated the participants to share their experiences.

As the PhD student, I conducted and transcribed all the interviews, strengthening the data by going back and forth by listening to the participants' tone and use of voice. These are important sources when interpreting the data (Kvale & Brinkmann, 2015). The research team in Studies 1, 2 and 3 consisted of researchers from different disciplines. Studies 1 and 3 discussed the inductive results that emerged during the analysis and discussed them with the existing literature and theory. In Study 2, we deductively used Bandura's theory to identify the main concepts (Bandura, 1997). According to Weick (2007), richness is also generated through a 'requisite variety' (Weick, 2007, p. 16), which includes theoretical constructs, data sources, contexts and samples.

7.2.3 Sincerity

Starting this PhD tour, I, as the PhD student, had my preunderstanding regarding the use of SBL/ISBL in educating perioperative nurses. Furthermore, I was new and a novice in conducting research and did not know the literature and theories related to ISBL. After each focus group interview, the assistant moderator and I discussed our feelings and thoughts. I wrote down notes regarding my subjective feelings to make sense of my thinking and preunderstanding. Having supervisors with different nursing focuses expanded my view of ISBL and assisted me in being more open to the text when I was naïve in reading the interviews. My preunderstanding could have affected the analysis, but we discussed the analysis with the research team while interpreting the transcribed data. During all stages of the research, we reflected on our preunderstanding and tried to remain open and objective when assessing the text for confirmation. We wanted to be honest and show transparency during this PhD thesis research process. Nevertheless, according to Ricoeur (1976), there is more than one probable interpretation, and the text is likely to have more than one meaning (Lindseth & Norberg, 2004). Sincere researchers not only consider their own needs but also care for their participants and want to convey their experiences with genuine respect (Tracy, 2010).

7.2.4 Credibility

Credibility refers to the trustworthiness, verisimilitude and plausibility of the research findings (Tracy, 2010). In qualitative research, a thick description is required for achieving credibility. Therefore, I tried to illustrate the complexity of the data in all studies with my supervisors and the rest of the research team by presenting tables containing examples of all the analyses performed. Figures were created to provide an overview of the findings of the three studies.

We did not observe or spend time in the field, as the perioperative nursing environment in Norway is small. I have been in this teacher environment for some time and know this environment. Therefore, with my supervisors, I chose to interview the perioperative nursing students and nurses and not become too close to the environment. With my preunderstanding, I needed this distance to be able to read the interviews in a naïve way. However, as a consequence, we did not receive rich tacit knowledge through observing. Thus, during the interviews, the assistant moderator and I wrote down comments on silences, humour and emotions that emerged. When transcribing the interviews, I noted down the times when the participants laughed and talked over and described the atmosphere in the room to understand the interactions and behaviour of the group individually.

Triangulation can be considered valuable in different paradigms despite the argument that it does not improve accuracy (Tracy, 2010). It may be a limitation of this PhD thesis that we did not use more variations in the methods. Nevertheless, we chose a qualitative method because there is scarce evidence in the field being studied. Therefore, we wanted to explore the area of interest and ISBL as a phenomenon in perioperative nursing.

7.2.5 Resonance

In the three studies, I tried to convey the participant's experiences with ISBL with clarity. The context of this research is ISBL used in perioperative nursing education, but the results can be relevant to other professions and nursing specialities using ISBL. Knowledge of qualitative methods can be transferred and valuable in different contexts (Tracy, 2010). The knowledge and insight gained can be shared among educators who use ISBL in their professional contexts and used to increase their delivery of this pedagogical approach and improve their practice.

7.2.6 Significant contributions

This PhD thesis extends knowledge and insights into perioperative nursing students' learning and development of professional competence using ISBL as a pedagogical approach and can improve practice using ISBL in perioperative nursing education.

7.2.7 Ethics

I ensured that that this PhD thesis had high ethical standards by avoiding plagiarism and not falsifying information. As a researcher, I ensured that the research had ethical approval.

All the participants provided their written informed consent. We pointed out that participation was voluntary and that they had the right to withdraw at any time. The participants received information, and their teachers recruited them. They were informed that deciding not to participate or dropping out of the study would have no negative consequences for them. To ensure confidentiality, interview citations were anonymised using participant numbers. Institutional names were also not mentioned.

7.2.8 Meaningful coherence

The research design, data collection and analysis with their theoretical framework created a meaningfully coherent PhD thesis as they achieved the overarching aim, provided relevant knowledge and gave implications for practice (Tracy, 2010).

8 CONCLUSIONS

ISBL is an important pedagogical approach in perioperative nursing education as it develops professional competence and self-efficacy in facing acute clinical situations. There are critical prerequisites to consider when planning and conducting ISBL to give it a well-designed and prepared structure. ISBL is more complex than SBL, as there is more than one professional participating, and it requires cross-disciplinary cooperation to customise for all the participants. Effective pedagogical approaches should be used to develop competencies transferable to clinical practice and to improve perioperative nurses' performance as recent graduates, which may increase patient safety in acute situations. Therefore, ISBL should be implemented in perioperative nursing education.

8.1 Implications for clinical and educational practice

This knowledge and insight can expand the potential of this pedagogical approach for perioperative nursing education. In an interprofessional simulation context, these results can contribute to improving the practical relevance of simulation for all participating professions to ensure constructive learning processes and optimal learning outcomes, such as developing professional competencies to meet acute situations in clinical practice and positive professional identity development.

The results of this PhD thesis expand the knowledge of how participants learn through ISBL. This is important when planning and developing this pedagogical approach. ISBL requires that all relevant professions be included in a team to create collective efficacy, leading to more motivated and robust team behaviour and functioning. An increased team function can improve interprofessional teamwork, thus contributing to the enhancement of patient safety in clinical practice.

Educators and facilitators should use the expanded knowledge about self-efficacy beliefs and their significance in ISBL when designing ISBL that promotes learning experiences that increase self-efficacy beliefs. Self-efficacy beliefs can result in more motivated students who work harder, persevere longer and have fewer unfortunate emotional reactions when encountering difficulties than those who lack faith in their capabilities. Self-efficacy can also strengthen recently graduated perioperative nurses' self-confidence in their knowledge and skills in managing acute situations. It is important for patient safety as it

improves competence and enables perioperative nurses to speak up when working in an interprofessional team.

The perioperative nurses transferred their competence development from ISBL in postgraduate education to clinical practice, thus improving their performance. This result supports the necessity of implementing ISBL in perioperative nursing education to prepare students for clinical practice and improve clinical practice and patient safety in acute situations.

The results of this PhD thesis show and justify how important this pedagogical approach is in the education of perioperative nurses, nursing specialities and professional education to develop their professional competence and identity and prepare them for clinical practice.

8.2 Perspectives for further research

Further research on ISBL should include all professional education students or nursing specialities to investigate the whole team's experiences through this pedagogical approach, to enhance the understanding of how ISBL can be organised to ensure good learning processes and outcomes for all participating professions. Further to determine how to organise briefings and debriefings to promote and create constructive learning processes in ISBL. Future research should investigate the facilitator's role in ISBL and how this role can facilitate ISBL for the whole team, as the results show that there is a need for facilitators in each participating profession.

Research directions should also focus on the interprofessional team's collective efficacy development through ISBL to understand how to deliver this pedagogical approach by stimulating and developing collective efficacy. This is important as collective efficacy can motivate more robust team member behaviour, affecting the team's functioning (Tasa et al., 2007).

Learning processes in ISBL deserve more study to gain more knowledge about creating constructive learning processes in ISBL. Emotions such as stress affect participants' learning, and this needs more focus in ISBL research.

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APPENDICES

Papers 1–3

1. Approval from the Research Ethics Committee of the University of Agder.
2. Approval from the Norwegian Centre for Research Data (NSD).
3. Letter to the department managers of educational institutions.
4. Letter to the privacy representatives of hospitals.
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6. Information about Studies 1 and 2 and the participants' informed consent forms
7. Interview guide for Studies 1 and 2.
8. Demographic data collection form for Studies 1 and 2.
9. Information about Study 3 and the participants' informed consent forms.
10. Interview guide for Study 3.
11. Demographic data collection form for Study 3.

Paper 1

A qualitative study of perioperative nursing students' experiences of interprofessional simulation-based learning

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ORIGINAL ARTICLE

A qualitative study of perioperative nursing students' experiences of interprofessional simulation-based learning

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ABSTRACT

Aim: To explore perioperative nursing students' experiences of interprofessional simulation-based learning to gain a deeper understanding of how this educational tool can be used to support students' learning and enable them to achieve the intended learning outcomes.

Background: Despite extensive research, it remains unclear what and how participants learn from interprofessional simulation-based learning. There is a need to specify how interprofessional simulation-based learning should be organised to support and promote learning processes, especially for postgraduate learners. In particular, there seems to be little evidence in the existing literature in the field of educating perioperative nurses, where advanced technical skills and high-quality nursing care are required.

Design: The study's qualitative and explorative design is reported in accordance with the COREQ guideline.

Method: Between May–October 2019, thirty-four perioperative nursing students from four educational institutions participated in six focus group interviews, with four to eight students in each. All participants had previous experience of interprofessional simulation-based learning in acute settings. Data were transcribed verbatim and were then subjected to phenomenological hermeneutical analysis involving three steps: naïve reading, structural analysis and comprehensive understanding.

Results: Three themes were identified the following: customised interprofessional simulation-based learning; reality of the experience of interprofessional simulation-based learning; and preparedness for clinical practice.

Conclusion: Customised interprofessional simulation-based learning was found to be of value to the participants and reflected their feeling of mental preparedness entering interprofessional simulation-based learning. Furthermore, participants' experience of reality when using the tool was a key theme that also impacted how prepared participants felt for clinical practice.

Relevance to clinical practice: The study findings contribute to the further expansion of interprofessional simulation-based learning in perioperative nursing education as a means of developing students' professional competence. This is essential knowledge,

as professional practitioners must reflect on practice to further enhance that practice and patient safety.

KEYWORDS
education, interprofessional, learning outcomes, learning process, perioperative nurse, perioperative nursing, perioperative nursing student, phenomenological hermeneutic, professional identity, simulation-based learning

1 | INTRODUCTION

Perioperative nurses care for people in acute and life-threatening crises, during which the surgical patient's condition can change quickly. This requires foresight and an overview of the patient situation, and ability to work quickly, rationally and creatively under stress (Smith, 2019). As they work in an interprofessional surgical team, along with a nurse anaesthetist, anaesthetist physician and surgeons, perioperative nurses must develop team skills such as leadership, problem solving, communication and decision-making, as well as interpersonal skills, as these are essential for patient safety (Murphy, 2019). Additionally, perioperative nurses must employ critical and analytical thinking to evaluate and revise their practice in line with the available scientific evidence and must remain open to continuous professional and quality development (Cuming, 2019).

The role description for perioperative nurses varies across countries. The present study defines perioperative nursing as care provided by specialist qualified registered nurses variously known as theatre nurses, scrub nurses, operating room nurses and circulating nurses (Callaghan, 2011). In general, perioperative nursing students are re-registered nurses who have enrolled in postgraduate perioperative education. These students must be trained to provide advanced care for patients in high-dependency settings in order to ensure quality practice and enhanced patient safety (Beitz, 2019). The present study explores perioperative nursing students' experiences of interprofessional simulation-based learning (ISBL) to gain a deeper understanding of how this approach can be used to promote effective learning and to support students in achieving intended learning outcomes.

What does this paper contribute to the wider global clinical community?

- The study enhances existing understanding of the complexity of interprofessional simulation-based learning and the need to customise this educational tool to meet participants' needs.
- By evaluating themselves in a social context, participants in interprofessional simulation-based learning begin to shape their professional identity.
- Interprofessional simulation-based learning helps practitioners from different professions to develop mutual respect when working together in a surgical team. This improves interprofessional teamwork and so enhances patient safety in the operating room.

2 | BACKGROUND

Simulation-based learning (SBL) is considered a valuable educational tool that integrates learning in routine tasks, involving role-play of communication techniques and higher-level learning such as analysis and problem solving in problematic scenarios or care settings. SBL offers a realistic experience of real-world settings, integrating practical and theoretical learning and facilitating repetition, feedback, evaluation and reflection (Pilcher et al., 2012). SBL accommodates different degrees of 'fidelity'—the term used to describe a specific simulation activity's level of realism (Seropian et al., 2004) or the extent to which a simulator looks, feels and acts like a human patient (Hamstra et al., 2014).

SBL involves three stages. In the first of these, the facilitator provides information about the simulation scenario, learning objectives and roles, ensures that the participants understand the simulation environment, and shares any other relevant information about the specifics of the simulation experience. In the second-stage simulation session, participants engage actively with a scenario (Tyerman et al., 2019). In the debriefing, participant's experiences (including emotional reactions, actions and interactions during the simulation session) are identified and reflected on. According to Dieckmann et al. (2012), participants need to reflect in this way in order to rebuild and transform their SBL experiences into learning and practice.

In research exploring the use of SBL in the baccalaureate programme of nursing and in clinical practice, systematic reviews confirm that simulation is a useful educational tool that can enhance the knowledge, skills, critical thinking and confidence of undergraduate nursing students (Cant & Cooper, 2017; Jeppesen et al., 2017). In another review, Fisher and King (2013) highlighted students' ability to transfer SBL to clinical environments and to link theory to practice. They also concluded that SBL can potentially enhance confidence and develop critical thinking, clinical judgement and knowledge by exposing students to a broad range of experiences in a safe environment.

In this article, we refer to SBL as well as interprofessional simulation-based learning (ISBL) because the latter is a version of the former. The World Health Organization defines interprofessional

education as an environment in which students from two or more professional backgrounds learn together to facilitate effective collaboration, so enhancing health outcomes (World Health Organisation, 2010). According to previous studies, ISBL outcomes are promising, but further research is needed to improve ISBL practice to ensure effective delivery and optimal support for learning (Dahlgren et al., 2019). As there is little available evidence to guide SBL and ISBL in the field of perioperative nursing (Kaldheim et al., 2019), the present study addresses this knowledge gap.

3 | THEORETICAL FRAMEWORK

Learning is a process in which external or internal stimuli lead to change in a person's knowledge and behaviour, encompassing mental, emotional, physical and practical domains (Hodkinson et al., 2008). ISBL includes collaborative learning and draws on learning theories that address relevant cognitive factors, motor skills and social interaction (Tolsgaard et al., 2016). From a social interaction perspective, knowledge is created through interaction between people, and individual learning is a product of participation in activities with others. As these activities are fundamental to learning potential, communication is an essential element of learning. Intellectual development originates in language as a social phenomenon, and that language is initially a purely social activity that gradually divides into two components: social language, which is used for interpersonal communication, and silent inner speech, which is the basis for thought (i.e. self-reflection and awareness) (Vygotsky, 1978). In progressing to individual problem solving, the perioperative nursing student moves from the intermental to the intramental through what Vygotsky (1978), described as the 'zone of proximal development' (ZPD)—that is, the distance between the individual's actual level of development in terms of independent problem solving and their level of possible development through collaborative problem solving. This includes interactions between learners and more knowledgeable peers or other actors that enable learners to perform tasks beyond their current competence. Observational learning is also an essential component of social learning theory, emphasising outcomes that involve attention, memory and motivation. According to the motor skill literature, the outcomes of observation depend on action imitation and internal representation. From a cognitive perspective, collaborative learning relates to how information is constructed, encoded, saved and restructured (Tolsgaard et al., 2016).

4 | METHOD

4.1 | Aim

To explore perioperative nursing students' experiences of interprofessional simulation-based learning to gain a deeper understanding of how this educational tool can be used to support students' learning and enable them to achieve the intended learning outcomes.

4.2 | Design

To gain an understanding of ISBL as a complex phenomenon, the study employed an explorative qualitative design, using focus group interviews to investigate how participants feel and think about the phenomenon. Data were generated through social interaction between participants, contributing to richer descriptions (Krueger & Casey, 2015). The phenomenological hermeneutical method used to analyse the data was inspired by Ricoeur's (1976) theory of interpretation (Lindseth & Norberg, 2004). The 32-item checklist, Consolidated Criteria for Reporting Qualitative (COREQ) research was used when preparing the manuscript (Appendix S1) (Tong et al., 2007).

4.3 | Participant

Department managers at four higher educational institutions (HEIs) in Norway gave permission for the study to be conducted. Perioperative nursing students who had enrolled in a postgraduate programme in perioperative nursing (18 months duration) or a master's degree programme (2 years of duration) were approached as potential participants and received information about the study, and recruited from their teachers, between April–October 2019. Thirty-six perioperative nursing students signed written informed consent, and of these, thirty-four participated in the study. Students were eligible for inclusion if they had experienced ISBL along with other professionals (e.g. anaesthetic nursing students) and if the ISBL scenario involved an acute situation, that focused on learning interprofessional collaboration and communication. In addition, the focus group interview was to be conducted no later than 3 months after students had participated in ISBL (Table 1).

4.4 | Data collection

The six focus group interviews, each involving four to eight participants, were conducted by the first author as moderator, and with the fourth author as assistant moderator. The moderator asked questions, and the assistant moderator made field notes. To assess the clarity of the interview questions, a pilot interview was conducted with eight perioperative nursing students who had participated in ISBL 6 months earlier. The open questions in the interview guide focused on the students' experiences of ISBL during their education. The students were asked to indicate whether the questions were understandable, relevant and logically constructed, and whether they felt it would be useful to include any additional questions. Only small changes were made as a result of this process—for example, '*Can you discuss?*' was replaced by '*Can you tell?*'. Although the participants in the pilot interview did not meet the inclusion criteria (as it was 6 months rather than three since the students had participated in ISBL), we chose to include their data in the final analysis because the data were rich, and participants could clearly recall their experiences

TABLE 1 Participant's demographic characteristics (n = 34)

Gender	***n***	**%**
Female	31	91
Male	3	9
Age		
Max		50
Min		25
Average		35.4
Years worked as an RN before starting postgraduate nurse educating		
Max		24
Min		2
Average		9.4
Number of times participation in SBL before entering further postgraduate nurse educating	***n***	**%**
0	6	17.6
1–5	11	32.4
6–10	5	14.7
11–15	8	23.5
16–20	4	11.8

of ISBL. All focus group interviews were conducted in a suitable room at the institution in question. Interviews were audio-recorded and lasted between 110–145 minutes. The first author transcribed the interviews verbatim; after naive reading up to the sixth interview, we experienced data saturation, as no new data were emerging (Sandelowski, 1993).

4.5 | Ethical considerations

Institutional approval was obtained prior to data collection, and the study was conducted in accordance with the principles of the World Medical Association (WMA) Declaration of Helsinki (World Medical Association, 2013) and approved by the NSD-Norwegian Centre for Research Data (ref. 2019/363692). Written informed consent was obtained from all participants before the focus group interviews. Before each interview, participants were reminded that participation was voluntary and that they retained the right to withdraw at any time.

4.6 | Data analysis

The data were analysed and interpreted using a phenomenological hermeneutic method inspired by Ricoeur (1976976). The method involves moving between the text as a whole and its constituent parts in pursuit of understanding and explanation, nearness and distance through naive reading, structural analysis and comprehensive understanding (Lindseth & Norberg, 2004). Each focus group interview was treated as a text; during the naive reading, three of the authors (HKAK; MF; ÅS) read through each text several times in order to reflect on it and gain a sense of the whole before discussing it and adding ideas for the structural analysis. Throughout this stage, the researchers adopted a phenomenological attitude, opening up to the phenomenon as described by setting aside any prior assumptions about it—a technique known as *bracketing*—in order to express their understanding of the text in phenomenological terms (Lindseth & Norberg, 2004). Initially, NVivo[12] was used to structure the texts. The structural analysis involved dividing the text into units of meaning, reading the text several times to formulate condensed descriptions that disclosed its meaning (Table 2). The researchers discussed the units of meaning and identified subthemes and themes, and naive reading confirmed that these were mutually consistent. In the final stage (comprehensive understanding), the interpretation was developed as a whole, along with reflections on our preunderstanding, naive reading and structural analysis, as well as theories and earlier studies of ISBL (Lindseth & Norberg, 2004).

4.7 | Rigour

Four criteria were employed to assess the trustworthiness of the findings: credibility, dependability, transferability and confirmation (Lincoln & Guba, 1985). To ensure credibility, three of the authors read the text (naive reading) and discussed the interpretation. The first author divided the text into meaning units and derived the subthemes and themes according to the main themes that appeared during naive reading. At each step, the analysis and interpretation were discussed with other members of the research group, and the main themes were described in-depth to ensure credibility. According to Ricoeur (1976), there is more than

TABLE 2 Examples of the structural analysis

Meaning unit	Condensed meaning	Sub-theme	Theme
'P6: I think like in the second semester when we started with more simulations, and you have to simulate something that you have not participated in before, then it's only the technical skills are the focus. One may not be so mature for completing communications and doing procedures for the first time… I think the anesthesia also felt a bit like that…when we have been with them in debriefing, they have no idea what we have been doing. They haven't seen any of what happened behind that curtain. P11: Usually, we do it when we're out in the field. Then we talk together'	To experiencing inter-disciplinary simulation case with a subject that you have no experience with, then the focus is on the technical skills, because one is not mature to be able to see the non-technical skills and at the same time do procedures for the first time, and this applies to all professions in a inter-disciplinary SBL	Implementing ISBL in a perioperative nursing educational programme	Customised ISBL
'P21: I think that it didn't happen that the patient came in on two wheels, considering when to posited on the table. I think it is an important part of a stress factor that is a stress factor in itself. Getting the patient right on the table, and at the same time at full speed also at the same time, you must coordinate and covered up, and get equipment opened'	To experience that some of their tasks in their role are missing from the scenario and therefore the situations do not become as stressful as it would have been in the real world	Relevance of the simulation case	Reality of the experience of ISBL
'P27: Yes. To just manages to see it for you in a different way. P34: It's something other than just reading about it in a book. P27: Yes, it's something else entirely. P34: Just being able to walk and feel the equipment when you're in the operating room, but it's something else to simulate and that one actually has a patient and how to connect equipment and how to do and. Then it's easier when you get it later. When one in away, physically we have simulated it'	Being able to see it for yourself by knowing it and not just reading it in a book, although it is different to simulate it then you have to connect and see how to do it because you have physically simulated it	Transfer to clinical practice	Preparedness for clinical practice

one probable interpretation, and the texts were therefore likely to have more than one meaning (Lindseth & Norberg, 2004). To ensure credibility and variation sampling in a homogenous group, participants were recruited from HEIs (Lincoln & Guba, 1985). To ensure dependability, we described all stages of the research process, including data collection and data analysis. As ISBL is used in many HEIs, the results may be transferable to other educational contexts. During all stages of this research, we reflected on our preunderstanding and tried to remain open and objective when assessing the text for the purposes of confirmation.

5 | RESULTS

Three themes emerged through the analysis: customised ISBL; reality of the experience of ISBL; and preparedness for clinical practice. Each theme entailed subthemes (see Figure 1).

5.1 | Customised ISBL

Customised ISBL was essential to create structure and connection between the individual elements (briefing, simulation session and debriefing), which contributed to order and less chaos. It allowed the participants the opportunity to feel mentally prepared, obtain knowledge and learning outcomes that ISBL could offer them. Participants expressed experiences that affect the implementation of ISBL in a perioperative educational programme, simulation frames and their experience with roles in ISBL.

5.1.1 | Creating structure

To create structure, participants confirmed the need for facilitator(s) who took responsibility and guided them through the elements of ISBL.

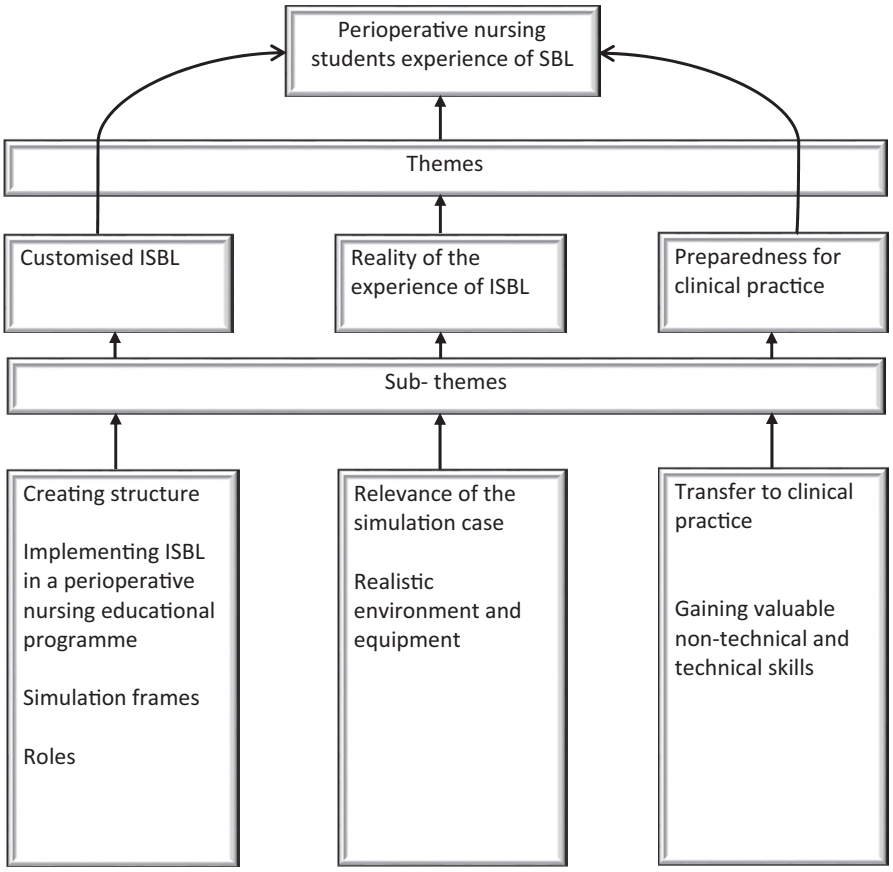

FIGURE 1 Overview of themes with subthemes

> P7: If there was someone who expressed control over the whole process, then I think it would have been very wise. P9: Definitely. (Several others in the room said 'Yes'.) P10: Who went through the phases and took the time needed. P9: Saying something like 'Hi, I'm the boss today'. (Several others in the room said 'Yes'.) P9. Yes, hmm… more structure through the whole thing. P10: That's the word: 'structure'.

To ensure a good overview and insight into the simulation, participants felt that the facilitator should remain in the room during the simulation session. The briefing information should include learning objectives, an introduction to the actors (participants), a history of the simulation case, and an overview of roles and assigned roles. The briefing should also provide a description of the room and the simulator to familiarise participants with the equipment at their disposal and where to find it. They reported being more prepared to improvise during the simulation session if they had received prior information about the lack of technical equipment.

> P16: To have received information about where you would have to improvise a little. [For example] that there was no such surgical instrument like these pliers in this surgical box, and that you had to take what you found. Suppose you had received this knowledge before the simulation session. P18: So, you don't get everything set out and you must find a way to focus. P16: Yes, that she knew that there was no suction here. That she knew that the suction was pretended and not real. So, she had not become so set out of and confused in the simulation session.

Participants said that gaining this overview and insight made them feel safe and reduced unnecessary stress, making it easier to focus on essential learning goals and to master tasks on entering the simulation session.

To maintain focus and to retain their experiences, participants said that debriefing should commence immediately after the simulation session, without any interruption. It was also considered important to clarify learning objectives in order to foster reflective thinking, and then to review the course of events in the case to develop a shared understanding of what happened in the simulation session.

> P14: …in the debriefing, I think we would have gained more from the conversation afterwards if we went through what happened during the simulation session.

The participants felt that students from different educational backgrounds must be provided with the information they needed, as

they all played a key role in the debriefing. Some of the participants reported that they received no briefing and were therefore less prepared for ISBL than other students from different programmes, such as anaesthetic nursing students.

> P3: Have we had so much briefing before? P4: Today at least, we have gone through things in advance. P3: What we talked about before is how a joint briefing on anaesthesia emphasised information to anaesthesia. Then we were standing in the simulation room as perioperative nursing students, wondering what we were going to do.

Additionally, where the debriefing failed to focus on their role, ISBL made them feel less valuable and was experienced as a disordered learning process with no outcomes.

5.1.2 | Implementing ISBL in a perioperative nursing educational programme

Participants requested more frequent and regular SBL throughout their education: regularly to become familiar with the tool, and more frequently to allow them to expand their repertoire of acute situations that they were likely to encounter in clinical practice. They felt that content and learning objectives should be customised to fit their learning assumptions and stage in the programme. They expressed a desire to begin learning basic technical skills before entering advanced ISBL because of the need for 'constructions' on which to build new knowledge. If the content and learning objectives were too challenging, and participants lacked basic skills, the ISBL process became too difficult for them, and they remained focused on technical rather than non-technical skills.

> P6: In the second semester, when we started with more simulations, you have to simulate something that you haven't participated in before. The focus is entirely on technical skills, and you may not be mature enough to communicate and complete procedures at the same time.

At the same time, the participants found it motivating to face the challenges presented by an ISBL because they could learn in a safe context without exposing patients to danger. It was also considered essential that the ISBL was sufficiently demanding to stretch them without being excessively challenging.

> P14: Yes. It's one thing to be allowed to try or to be allowed to take the time you need, and that everything doesn't have to go perfectly well, but only to a certain extent.

The ISBL case has to be pitched at a level of complexity that participants can handle while also being challenged, but not to the extent that it creates chaos.

It was also considered critical that the content of the simulation case was relevant to their future professional role. Some participants felt that the simulation case did not adequately represent their role or tasks, which made them feel that their profession was less important and influenced their development of professional identity.

5.1.3 | Simulation frames

Participants felt that debriefing should take place in a neutral room without equipment that might distract them. To make it easier to immerse oneself in the simulation, to identify with it and transfer experience into clinical practice, the simulation room should resemble an operating room like those encountered in clinical practice.

> P23: I also think it might have been beneficial to have held it in an operating room… where you had to go out to find the equipment you needed. Where the cabinets were known, and it was easy to find the equipment, and you knew what to have. You had surgical suction that functions, and it was a place you were familiar with.

It was also considered essential that the simulator should make sounds and speak, and that surgical equipment worked and was similar to that used in clinical practice.

> P10: I think the equipment should also be matched. That should be a prerequisite. P8: Yes. It is a prerequisite for success. At all. (Many others in the room said 'Yes')

The participants reported equipment that had expired, did not work or had been used before, or that was inadequate and differed from clinical practice, making it challenging to perform tasks in a realistic way.

Participants said that making time for a common briefing was vital in order to create a mutual understanding of working in an interprofessional team. They also needed time to ask questions related to their profession and others that were subject-specific, familiarising themselves with the equipment and preparing for their task. Participants who felt they did not have enough time experienced the learning process as chaotic. Debriefing was considered necessary for the learning process and outcomes, with enough time to explore in-depth and to reflect as needed.

Another important simulation frame was the facilitator's competence, especially their pedagogical competence to be informative, give constructive feedback and frame situations positively. A facilitator must create a safe atmosphere, where participants are allowed to make mistakes without being measured. A safe atmosphere made students feel more secure during the simulation session, and it was easier for them to focus on the tasks that the scenario demanded.

> P14: So, it was very open to trial and error, and [one can] learn from it … that's very important. I never felt that I was being rated for what I did. That's also important, I think … because then you lower your shoulders a bit and focus a little more on the simulation case than on what the teachers think of you.

Facilitators also needed to be competent in the subject of the simulation case and to be able to reflect clinical practice, enabling participants to learn from professionals in the field. Participants referred to the need for facilitators who could provide specific profession-oriented information, noting that there had been too much focus on one profession in ISBL.

5.1.4 | Roles

Being assigned a role in the briefing initiated a thinking process that prepared participants for their task in the simulation session. In contrast, it was considered unpleasant to be assigned the role on the way into the simulation session, and this created unnecessary stress. Participants also commented on the experience of playing an active role versus being an observer; an active role was seen to facilitate engagement in the simulation case and learning process by performing tasks and reflecting on what to do, which made the experience their own.

> P19: I also think that it is like this in practice—that if you look at your role a hundred times… but you don't do it yourself, you will not learn it… you have to feel it in your body. P20: Oh, that's the great thing about simulation—that you can learn by doing things.

In an active role, they also reported experiencing emotions that constituted an active form of learning. For that reason, it was important for participants to take on an active role, to experience the adrenaline and the stress while performing in an acute situation. In an observer role, participants felt they could not access that active learning because they said that they did not experience the emotion or feeling, and so there was no surge of adrenaline as in an active role. Not being active also made it harder to know whether they had achieved the learning outcomes, as they had not tried it themselves. Nevertheless, participants reported that the observer role could deliver valuable learning outcomes, including an overview of the simulation session and how the team implemented, prioritised and communicated.

> P31: [It's] a bit exciting to see how quickly things can go wrong. They say something and continue working, even though we have not heard what they said. It's quite interesting. P29: I think I learned a lot from being an observer—seeing what's wise and what should be done differently.

Participants said that getting a role as an actor, for example, a surgeon, midwife or the voice of the simulator did not create a good learning process with subsequent learning outcomes.

5.2 | Reality of the experience of ISBL

For the participants, the reality of ISBL was its importance for their learning process and outcomes. It was about experiencing the relevance of the simulation cases and a realistic environment and equipment.

5.2.1 | Relevance of the simulation case

To be able to test themselves in a way that resembled the reality of clinical practice, participants said the simulation case should incorporate their professional role and function. It should also deliver a realistic sequence of events so that they experienced time constraints in an acute situation. Otherwise, the learning process would be limited, and valuable learning outcomes would be lost.

> P21: I don't think the patient came in on two wheels; when considering how to position the patient on the table, I think it is an important part of the stress and a stress factor in itself — getting the patient right on the table, in a hurry, while at the same time coordinating and opening the equipment.

In an ISBL involving surgery, the surgical team should include the same professions as in clinical practice. Participants who had experienced a realistic simulation case felt emotions based on real stress, and they recognised these feelings when they encountered a similar situation in clinical practice.

5.2.2 | Realistic environment and equipment

To be able to immerse themselves in a simulation case, participants emphasised that a realistic environment and equipment and a simulator designed for that surgical procedure were prerequisites. If ISBL was unrealistic and too artificial to seem like a real situation, it became more like a play, resulting in unnecessary stress. Unrealistic equipment distracted participants from the simulation case, and they did not get to practise their tasks in a realistic way as in clinical practice.

> P14: Just like when we were going to use… surgical compresses, and we were going to open them, but they had taped the bags again. They had been used before, when we went to open them, it was impossible to get them up. These are things that interfere with learning.

5.3 | Preparedness for clinical practice

Participants reported feeling more prepared for clinical practice when ISBL was part of their education. They felt able to transfer their simulation experience as valuable expertise, and this made them feel safer in clinical practice.

5.3.1 | Transfer to clinical practice

Participants reported that they could transfer experience-based knowledge and skills from ISBL to clinical practice because they could recall their experiences and recognise their feelings and reactions. Unlike reading a book, they got to see and experience the situation physically and bodily. Completing required tasks and learning by doing created reactions, emotions and reflection.

> P34: Yeah, because at least I felt I got a lot out of that day. P29: In terms of… the Caesarean delivery in the simulation? P27: Yeah, I thought a lot about that simulation the first time I attended a Caesarean delivery in clinical practice.

5.3.2 | Gaining valuable non-technical and technical skills

Participants reported learning outcomes that provided valuable competences in terms of non-technical and technical skills and prepared them for clinical practice. The physical reactions they experienced during an acute interprofessional simulation case gave them an insight into those reactions and how they could be managed in a stressful situation. They also learned how to communicate and work together in an interprofessional team, acquiring insights into each other's tasks and how best to prioritise those tasks.

> P34: Yeah, I learned … a little bit about other people's tasks. In that situation, you learn what they are going to do, and what should we do? And when can you do what? So yes, it was very helpful.

They said that this built greater mutual understanding and respect for each other as different professions working together. They also noted that they learned technical skills and developed more independence in their perioperative nursing practice by working independently in a simulation case than would have been possible in clinical practice because ISBL allowed them to make decisions in a safe environment where the patient could not be harmed.

6 | DISCUSSION

We have explored perioperative nursing students' experiences of interprofessional simulation-based learning in order to gain a deeper understanding of how this tool can be used to promote learning processes and support intended learning outcomes. Our results confirm that customised ISBL enhances participants' learning processes and outcomes and providing a realistic prior experience that influences how prepared they feel for clinical practice.

Participants expressed a wish for more frequent and regular SBL during their education in order to become familiar with this learning approach and to gain experience of acute situations. Kelly et al. (2019) claimed that first-time simulation participants would require more assistance than those who had done it several times before. Implementing SBL throughout perioperative nursing education can therefore be expected to develop perioperative nursing students' simulation competence, making it easier for them to participate.

In our study, participants who found the content and learning objectives too challenging did not feel mentally prepared for ISBL. They found it strenuous to perform in the simulation session, and their concern about technical issues meant they were unable to focus on non-technical skills in an acute ISBL. In Vygotsky's terms, the ZPD became too extended because the content and learning objects were too demanding, even with guidance from a facilitator. While they found it motivating to face challenges in an environment where they could not harm the patient, this was only the case up to a certain level of complexity. This accords with Vygotsky's idea (Vygotsky, 1978) of the ZPD and the individual's potential for gradual mastery of ISBL with the guidance of professional facilitators. Therefore, customised ISBL should be based on the perioperative nursing programme and on content and learning objectives that reflect the participant's level of skill and competence. This aligns with earlier evidence that the design and implementation of SBL should reflect the educational programme to support the gradual preparation of perioperative nurses for practice (Herrington & Schneidereith, 2017). Furthermore, our findings show that it is important that educators from the different educational backgrounds collaborate in customising ISBL scenarios, ensuring that the content is relevant for all participants, helping them to fulfil their role and function. Some participants reported that there was too much focus on students from another profession, and they felt that their own professional position was less valued. According to Dahlgren et al. (2014), the development of professional identity is influenced by perceived future responsibilities, and it is essential that learning relates to situations that students consider relevant to their future career. ISBL offers a promising means of preparing students for future interprofessional collaboration (Murdoch et al., 2014). This sense of professionalism is grounded in group and individual interactions that involve active participation, negotiation and reflection (Dahlgren et al., 2014), and ISBL can help to shape the perioperative nursing student's professional identity through interaction with other professionals. According to the moral philosopher Larry May (May, 1996), professional integrity relates to how a group of people self-evaluates in a social context and to how society perceives that group. On this view, professional responsibility is part of the collective and individual sense of professional identity created and shaped by prevailing social attitudes and norms. In the present case,

the perception that their profession was less valued may have had a negative impact on the professional identity of those participants.

The findings showed that customised ISBL has to create structure between the elements (briefing, simulation session and debriefing), to promote order and less chaos for the participants. To do this, participants emphasised the need for facilitators who take responsibility, creating a feeling of being safe, and guide them through all the elements in an ISBL. The International Nursing Association for Clinical Simulation and Learning (INACSL) Standards of Best Practice: Simulation[SM] Operations (2017) says that instructions from a facilitator are one essential element of ISBL and may be the key to participant learning. To create structure and effective ISBL processes that stimulate reflection, facilitators need to have competence in simulation pedagogy (INACSL, 2016a), which is in line with our study. Our findings show that a customised ISBL also has to provide information to participants and that this should be relevant for their profession and interprofessional teamwork. To ensure specific profession-oriented information, facilitators need to be competent within the field of perioperative nursing and the context of the simulation case to reflect clinical practice, enabling participants to learn from professionals in this area. Our findings are in line with Creutzfeldt et al. (2016), who support that increasing the number of professions involved poses challenges in terms of engagement and experience. Therefore, it is essential to include representatives from all professions to ensure practical relevance for all participants. There is a need to educate more facilitators for the increased use of ISBL in educating perioperative nurses (Kaldheim et al., 2019).

A structured briefing should provide participants with enough information to feel mentally prepared for ISBL, so reducing unnecessary stress and making it easier for them to focus on essential learning objectives. This made ISBL less scary and reassured them that they could master the required tasks, in turn enhancing their learning processes and outcomes. These findings align with earlier studies which suggested that briefing and clear learning objectives improve learner knowledge, self-confidence, clinical judgement and performance, reducing anxiety and making it easier to immerse oneself in the SBL experience (Tyerman et al., 2019). Yoo and Kim (2018) has described 'flow' as an optimal mental state in which people engage in 'a short period of immersive experiences while doing activities'. They suggested that to increase the effectiveness of learning, educators should reflect on the factors that influence flow experiences when customising SBL, and one way of improving flow is to orient learners to what is similar to clinical practice and what differs from it. This view was echoed by participants in our study, who said that briefing information about missing equipment enabled them to improvise if necessary. Without this information, participants said they became distracted and lost focus. Participants also said they needed more time for briefing, and this aligns with an earlier suggestion that briefing time should be doubled to enable participants to ask questions, to improve the learning experience (Morrison & Catanzaro, 2010).

Findings in our study confirm that which role participants are assign in the simulation session affects their learning processes and outcomes. In an active role, participants experienced their learning process as active: performing tasks, reflecting and acting, making their own experiences. They reported physiological and psychological reactions and increased adrenaline as their body became stressed. In this way, they gained insights into their reactions and how to work in a stressful situation. According to deliberate practice theory, learners must experience practice as active if learning is to be effective (Lai et al., 2016). In SBL, active participants also engage actively in the learning process (Tyerman et al., 2019), but concerns have been expressed about observers' learning process, and Lai et al. (2016) found that learning was a little better when learners were active participants rather than observers in a simulated scenario followed by debriefing. In the present study, participants expressed the view that being assigned a role in the briefing initiated a thinking process of reflection before action, which prepared them for the task to be performed in the simulation session. Embo et al. (2014) concluded that SBL learners in their study focused on directed improvement of specific actions when adequately supported by reflection in action. In our study, participants said that being inactive made it hard to know whether they had achieved learning outcomes, as they had not tested this themselves, as they could not reflect on their own activities (performance) and could only observe the performance of other participants. While an active role and an observer role both encourage reflection, this takes two distinct forms. In an active role, reflection commonly relates to performance, including team performance. In an observer role, however, reflection cannot be linked directly to action—in other words, observation enables reflection *on* action but not reflection *in* (or during) action. Deep learning, which promotes understanding and critical thinking, is known to be linked to better learning outcomes (Entwistle & Ramsden, 1983). Observational learning is also an essential component of social learning theory, emphasising outcomes that involve attention, memory and motivation (Tolsgaard et al., 2016). Participants indicated that the observer role can provide valuable learning outcomes by offering a different view of non-technical skills as opposed to the focus on technical skills in an active role. Learning through observation is considered useful for learning complex skills but less effective than physical practice, which provides important information on useful strategies, coordination patterns, and how to identify and correct errors (Wulf et al., 2010). There is also evidence that participants in observer roles experienced a lack of engagement and preferred to be assigned to active roles (Harder et al., 2013). Our findings confirm this, as participants felt more engaged in an active ISBL role. Therefore, it seems crucial to ensure that all participants have an opportunity to play in both as in an active role and in an observer role, and in as those who were assigned roles as another profession or as the voice of the simulator reported less favourable learning processes and outcomes.

Fidelity is often described as to the extent to which a simulator looks like a human patient (Hamstra et al., 2014). Fidelity is also associated with the extent to which the SBL replicates the real event or workplace, including physical, psychological and environmental elements (Lioce et al., 2020), but it is important to note that increasing fidelity does not automatically increase authenticity (Bland et al., 2014). In line with INACSL, Standards of Best Practice Simulation[SM] Simulation Design (2016b), we found that the participants expressed fidelity as their experiences of the reality in an ISBL and that this was about experiencing the relevance of the simulation case and a realistic environment and equipment, in the simulation session. They noted that a simulation's realism or fidelity is closely related to simulation frames that demarcate possible actions during ISBL, affecting learning processes and outcomes. Kelly et al. (2019) agree that fidelity in turn influences learning (Kelly et al., 2019). Those participating in the present study were enrolled in postgraduate perioperative nursing programmes. For them, the environment, simulation case and equipment represented the clinical setting and tasks in a surgical suite. For that reason, it was necessary to incorporate a representative surgical team and an actor who could perform the surgical procedure. It seems that as well as affecting participants' ability to learn authentic technical skills, reality also affected their immersion in the simulation case and their capacity to experience the reactions they would have in an acute clinical situation. Participants who experienced ISBL as realistic found it easier to immerse themselves in the simulation case. They also experienced real stress and subsequently recognised those feelings during similar situations in clinical practice. In contrast, participants who experienced ISBL as unrealistic found it both humorous and stressful and lost focus during the simulation session. Yoo and Kim (2018) reported that fidelity was among the factors most strongly associated with students' experiences of flow during SBL, and those who perceived the simulation as more realistic reported higher levels of flow (Yoo & Kim, 2018). Our findings provide further support for this account. Creating a realistic perioperative environment can be challenging, and there seems to be a shortage of mannequins developed specifically for perioperative nursing contexts (Kaldheim et al., 2019). It seems important to focus more on developing realistic simulators in this field, including a more realistic environment with associated technical equipment, and noted in INACSL (2017).

Participants in our study highlighted the essential role of structured debriefing to support student learning through ISBL, and this aligns with other studies (Hall & Tori, 2017; Tosterud et al., 2020). Tosterud et al. (2020) explored two different forms of structure that can be used for debriefing. The first of these is the Steinwachs structure, which includes the description phase requested by the students in our study. The second is the Critical Response Process, in which the facilitator begins the debriefing by inviting respondents to highlight what particular aspects of the implementation impressed them or seemed like good practice. The Steinwachs structure seems to emphasise the facilitator's frames rather than student involvement (Tosterud et al., 2020). This does not align well with the present findings, as participants reported that the description phase is important to develop a shared understanding of what happened for further exploration of events in the simulation session. Hall and Tori (2017) noted that there are many debrief models, and they were unable to identify an optimal approach. However, they contended that debriefing should be based on a structured framework that includes reaction, analysis, summary and learning objectives that set expectations for the debriefing. This assertion aligns with the present finding in our study saying that a structured debriefing should clarify learning objects to create a red thread that binds together all the elements of the ISBL and fosters reflective thinking. Reflective thinking in debriefing is essential to generate knowledge (Dieckmann et al., 2012), and for the participants in our study, it seems that customised ISBL is crucial to foster reflective thinking. Learning through reflective thinking occurs as a result of social interaction, using a social language to communicate and silent inner speech for self-reflection and problem solving (Vygotsky, 1978). In an ISBL, participants can through reflective thinking develop problem-solving skills and move from shared understanding to individual understanding. This is valuable as society today requires professionals to employ reflective reasoning to make decisions based on professional discretion and situated judgement (Sullivan, 1995), and also for the participants that are perioperative nursing students as they need to develop critical and analytical thinking in order to remain open to continuous quality improvement and professional development (Cuming, 2019).

In our study, most of the participants reported positive outcomes after participating in ISBL, as they felt more prepared to meet the challenges of clinical practice. They gained valuable competence in the form of insight into their reactions, and in terms of task prioritisation, communication and interprofessional collaboration. They also learned technical skills and developed greater independence, and they found they could transfer this expertise to clinical practice. These findings align with earlier studies in the field (Fisher & King, 2013).

Our findings confirm that ISBL also creates more substantial understanding and respect between professions by providing insights into their respective roles and functions. This aligns with the findings of Dennis et al. (2017), suggesting that ISBL provided the participants with an enhanced understanding of interprofessional team roles and that everyone has an important role in the care of the patient.

6.1 | Limitations

The participants in the present study were recruited by their perioperative teachers, and this may have influenced their decision to participate even if hesitant. For that reason, all candidates were advised that deciding not to participate or dropping out of the study would have no negative consequences for them.

Focus group interviews are an appropriate method of acquiring knowledge in situations where many people interact. The moderator must ensure dynamic interaction between participants to encourage dialogue and knowledge sharing within the group (Krueger & Casey, 2015). However, this approach may be less effective if one or two participants dominate and drive a consensus that neglects the experiences of others in the group. In the present study, the focus groups were led by a moderator, with one assistant moderator. This added value, as the same two individuals performed these roles throughout the study, and their increasing awareness of the issues enabled them to encourage participants to share their experiences.

7 | CONCLUSION

The participating expressed the view that ISBL should support and promote learning processes and enable them to meet intended learning outcomes but does not always meet this requirement. Customising ISBL to ensure mental preparedness and a realistic experience is important in this regard and impacts perioperative nursing students' sense of preparedness for subsequent clinical practice (as a key learning outcome). These critical conditions also affect experiences of flow in the simulation session. As perioperative nursing students who participate in ISBL evaluate themselves in this social context, it is important for them to feel that their profession is valued within the team if they are to develop a strong professional identity as future perioperative nurses. Future research should extend to all professions to further enhance understanding of how ISBL can be customised to ensure good learning processes and outcomes for all participating professions.

8 | RELEVANCE TO CLINICAL PRACTICE

The present findings further expand the potential of SBL and ISBL for perioperative nursing education and the development of professional competence. Using ISBL to educate perioperative nursing students can help to develop their capacity to reflect critically on practice and to generate new insights to enhance practice in this field. In interprofessional simulation contexts, the findings can help to improve the practical relevance of simulation for all participating professions, as well as contributing to the development of a positive professional identity. Interprofessional simulation-based learning helps practitioners from different professions to develop mutual respect when working together in a surgical team. This can be expected to improve interprofessional teamwork and so enhance patient safety in the operating room.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

All authors Hege Kristin Aslaksen Kaldheim, Mariann Fossum, Judy Munday, Kjersti Marie Frivoll Johnsen and Åshild Slettebø fulfil the journal's authorship policy and have approved the final text. Hege Kristin Aslaksen Kaldheim and Kjersti Marie Frivoll Johnsen collected the data. Hege Kristin Aslaksen Kaldheim is transcriber. All authors Hege Kristin Aslaksen Kaldheim, Mariann Fossum, Judy Munday, Kjersti Marie Frivoll Johnsen and Åshild Slettebø analysed the data and prepared the manuscript.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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Paper 2

Use of interprofessional simulation-based learning to develop perioperative nursing students' self-efficacy in responding to acute situations

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Original Article

Use of interprofessional simulation-based learning to develop perioperative nursing students' self-efficacy in responding to acute situations

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ABSTRACT

Self-efficacy is an essential concept regarding academic performance and persistence in higher education. Research indicates that interprofessional simulation-based learning influences participants' self-efficacy and points to a need for more research on self-efficacy and its development. This study describes perioperative nursing students' experiences with how interprofessional simulation-based learning contributes to self-efficacy in communication, interdisciplinary collaboration, and prioritising tasks in acute situations. Six qualitative focus group interviews were conducted with thirty-four perioperative nursing students from four universities and university colleges in Norway. Qualitative directed content analysis was applied in accordance with Bandura's social cognitive theory which specifies four sources influencing self-efficacy. Results showed that well-designed/prepared interprofessional simulation-based learning can develop self-efficacy concerning communication, interdisciplinary collaboration, and prioritising tasks in acute situations.

1. Introduction

The perioperative nurse works in an interprofessional surgical team and provides advanced care for patients in high-dependency situations where the patient's condition can change quickly. To work rationally under stress and ensure safe outcomes for patients requires comprehensive knowledge and team skills Smith (2019). The role description of a perioperative nurse varies across countries. In the present study, perioperative nursing is defined as care delivered by specialists: qualified registered nurses and practitioners known as operating room nurses, scrub nurses, theatre nurses, and circulating nurses Callaghan (2011).

Perioperative nursing requires advanced professional education incorporating emotional, cognitive, and professional development to achieve competence (Chernikova et al., 2020). To respond to these requirements, education incorporates simulation-based learning (SBL) to prepare students for the complexities and challenges of clinical practice. In SBL students learn how to utilize theoretical knowledge in authentic situations in which they deal with tensions concerning theory and practice. SBL includes learning to perform routine tasks, communication techniques, and higher-level learning through analysis and problem-solving (Pilcher et al., 2012). It

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offers affective, cognitive, and psychomotor challenges, incorporating a credible picture of reality where practical and theoretical learning and its complexities are integrated. SBL also allows repetition, feedback, evaluation, and reflection (Bland, Topping & Wood, 2011).

Fidelity in SBL refers to the degree to which participants experience the enactment as authentic. This is associated with the extent to which the real event or workplace is replicated, including physical, psychological, and environmental elements (INACSL, 2016b; Lioce et al., 2020). SBL consists of three parts: (1) briefing, which includes information and orientation regarding the equipment, environment, manikin, roles, learning objectives, and the clinical scenario; (2) participants taking active roles in a scenario; and (3) debriefing, where participants, guided by a facilitator, reflect on the session. In the debriefing, reflective thinking is promoted, feedback is given, and aspects of the fulfilled simulation are discussed (Tyerman, Luctkar-Flude, Graham, Coffey & Olsen-Lynch, 2019).

Besides SBL, we refer to interprofessional simulation-based learning (ISBL). ISBL is used to deliver collaborative learning in a context that reflects clinical practice without the risk of harming the patient. An interprofessional team defines a set of two or more people of more than one profession who interact together, dynamically, interdependently, and adaptively, toward a common goal (Reeves, Boet, Zierler & Kitto, 2015). In ISBL perioperative nursing students are part of an interprofessional surgical team and learning is directed towards improvement in interprofessional communication and collaboration to ensure quality patient care. The World Health Organisation (WHO) emphasises evidence that programs with an interprofessional approach enable effective collaborative practice WHO (2010).

2. Theoretical framework

Self-efficacy refers to "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" Bandura (1997). Perceived self-efficacy is not a measure of the skills one has, but belief about what one can do under different sets of conditions with whatever skills one possesses (Bandura, Freeman & Lightsey, 1999). Bandura (1997) highlights that self-efficacy relates to an individual's capability and ought to be phrased in terms of "can do" rather than "will do" because it involves an assessment of one's own ability instead of a will that represents an intention. Bandura also describes collective efficacy as "a shared belief in the power to produce effects by collective action" Bandura (2000).

In recent decades educational research has paid growing attention to the development of self-efficacy, and how it influences students' behaviour, learning processes and performance in various situations Bandura (2006). Evidence exists that self-efficacious students take part more readily, work harder, persevere longer, and have fewer inappropriate emotional reactions when they encounter difficulties than those who do not believe in their capabilities Bandura (1997).

2.1. Development of self-efficacy

Bandura proposes that a person's development of self-efficacy beliefs comes from "four principal sources of information" Bandura (1997). The four sources do not operate in isolation from one another, but rather connect and guide one another Bandura (1997). The first and the most powerful source is enactive mastery experiences, in which people judge themselves based on activities which can be experienced as resulting in failure or in success. The second source is where people have gained experiences through observing their peers, also called vicarious experiences. Information regarding one's own capabilities is gained through this observation and subsequent reflection upon one's upcoming performance doing the same task Bandura (1997). The third source is when people obtain information about their capability to perform a task verified through verbal persuasion. Verbal persuasion, social influences, and feedback are more effectual when provided by knowledgeable and reliable persons within their field, and when they are experienced as realistic. The fourth source of development of self-efficacy is through information that is gained from physiological and emotional states, such as anxiety, stress reactions, and tension throughout the performance of tasks. Positive feelings can strengthen self-efficacy, and negative feelings such as dejection can enfeeble it Bandura (1997).

2.2. Self-efficacy in SBL/ISBL

Research indicates that ISBL/SBL influences self-efficacy (Egenberg, Øian, Eggebø, Arsenovic & Bru, 2017; Karabacak et al., 2019). Cant & Cooper (2017) in pretest-posttest studies found that SBL improved participants' self-efficacy. A meta-analysis confirmed that SBL is an effective method to increase self-efficacy amongst novice nurses, in particular when compared to traditional didactic lectures (Franklin & Lee, 2014). One study indicated greater improvement in self-efficacy amongst postgraduate nursing students and physicians participating in ISBL compared to uniprofessional activities (Watters et al., 2015).

2.3. The study aims

There is limited research regarding how to effectively deliver ISBL and provide the optimal support for such learning (Dahlgren, Rystedt, Felländer-Tsai & Nyström, 2019), and concerning how ISBL contributes to the development of self-efficacy. Furthermore, there is little knowledge concerning ISBL in the field of perioperative nursing (Kaldheim et al., 2019). Therefore, this study aims to describe perioperative nursing students' experiences with how interprofessional simulation-based learning contributes to self-efficacy in communication, interdisciplinary collaboration, and prioritising tasks in acute situations.

3. Method

This study employed a qualitative design using directed content analysis. This methodology explores a phenomenon utilizing theory as a guide (Assarroudi, Heshmati Nabavi, Armat, Ebadi & Vaismoradi, 2018;Hsieh & Shannon, 2005). Directed content analysis can be both deductive and inductive. This study first deductively applied Bandura's theory of self-efficacy and its four sources of information that affect self-efficacy beliefs as predetermined categories Bandura (1997). Then an inductive process commenced, developing specific codes within each predetermined category (Humble, Zvonkovic & Walker, 2008).

3.1. Participants

Department managers at six Norwegian universities and university colleges were offered institutional participation in the study. Two universities and two university colleges agreed and subsequently were included. Perioperative nursing students who had enroled in a postgraduate program or a master's degree program in perioperative nursing were approached as potential participants. They were provided information and recruited by their teachers. To avoid bias and ethical conflicts, their teachers were required to inform the perioperative nursing students that their decision to participate would have no consequences on their further studies. To gain data that was open for variation, we did not influence the design and preparation of the ISBL. Still, we had inclusion criteria: Participants were eligible for inclusion if they (1) had experienced ISBL along with other professionals (e.g., anaesthetic nursing students) during their education, (2) the ISBL scenario included an acute situation that focused on learning interprofessional collaboration and communication, and (3) the focus group interviews were conducted within three months after the students had participated in ISBL.

3.2. Data collection

Data collection was conducted between April and October 2019, and it consisted of six focus group interviews, with four to eight participants in each focus group. The first author, the moderator, asked questions. An Assistant Professor from the University of Agder served as assistant moderator and took field notes during all the focus-group interviews. The interview guide contained open questions that targeted the students' experiences with ISBL, linking it to the development of self-efficacy. The first focus group interview was conducted with eight perioperative nursing students who had participated six months earlier in ISBL as a pilot interview in which the interview guide was reviewed for clarity and relevance, and it was suggested whether supplementary questions should be added. This resulted in only minor corrections, e.g. 'Can you discuss?' was changed to 'Can you tell?'. We chose to include the data from the pilot interview in the final analysis. Despite participating in ISBL six months earlier, data from the participants involved in the pilot interview contained abundant information that was relevant for our aim. Furthermore, since these participants distinctly remembered their experiences of ISBL, and because there were only minor corrections in the interview guide, we assumed that this did not add bias to our data set.

All the focus group interviews, which had an overall mean duration of 122 min, took place in group rooms at the students' respective educational institutions, audio-recorded and were transcribed verbatim by the first author.

3.3. Ethical consideration

Institutional approval was received, and the study followed the ethics governed by the World Medical Association Declaration of Helsinki WMA (2013). The Norwegian Centre for Research Data (NSD, ref. 2019/363,692) approved the study. It was emphasized to participants that participation was voluntary and that they had the right to withdraw at any time.

3.4. Analysis

Directed content analysis in accordance with Hsieh & Shannon (2005) and Assarroudi et al. (2018) was utilised (see Fig. 1). Directed content analysis is generally based on an existing theory about a phenomenon (Hsieh & Shannon, 2005; Polit & Beck, 2017; Sandelowski, 1995). After stage one where the first, second, and last authors read all the textual data several times to get a sense of the whole it was experienced data saturation, as no new data were emerging (Sandelowski, 1993). Bandura's theory was scrutinized to

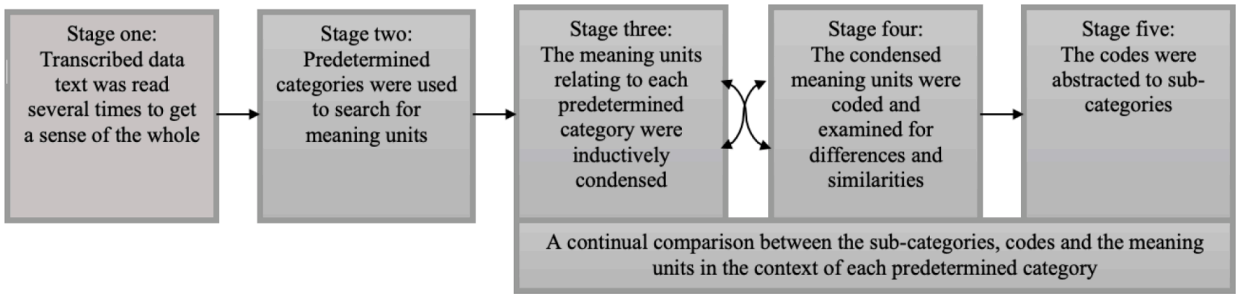

Fig. 1. The analysis processes using directed content analysis.

identify the main concepts. The self-efficacy theory of Bandura and its four sources of information to develop self-efficacy Bandura (1997) were set as four predetermined categories: mastery experience, vicarious experience, verbal persuasion and social influence, and physiological response to performance. In stage two, these predetermined categories were applied to the data, and the first author searched for meaning units that correlated with each of the predetermined categories. In this stage, NVivo[12] was used to structure the text. In stage three, the meaning units were transferred from NVivo[12] to MS Word, and the meaning units relating to each predetermined category were inductively condensed (see Table 1). All authors discussed the condensation. In stage four, the first author coded the condensed meaning units and discussed the codes with all the other authors. During this coding we returned to the text and performed re-analysis to provide an opportunity for identifying texts missing from the predetermined categories and texts which had recently emerged (Assarroudi et al., 2018). In stage five, the codes were abstracted to sub-categories in a back-and-forth process where we examined the codes for differences and similarities, and in the end the sub-categories were abstracted into their representative predetermined categories.

Table 1
Examples of the directed content analysis.

Meaning units	Condensations	Codes	Sub-categories	Predetermined categories
P15: It is a part of the mastery, I'll say. You know that you can get this done in a short time. You can do it. In a short time, you can put on that knife blade without cutting yourself or dropping it. Oh then, there is something about knowing what to find that contributes to that security.	To experience that it is part of the mastery to know that in a short time you can pick up the knife blade and attach it without cutting yourself or dropping it, and to know what to find that contributes to that feeling of security.	The feeling of mastery challenges in an acute situation.	Feeling of mastery.	Mastery experience.
P31: That is probably the benefit I got as an observer. Where you somehow see, and it's kind of nice if you see exactly where communication fails. Or when they give a message and the others do not get this message, or something, if you are aware of such things. Or the other person may have to be a little aware that he received this. That one nods or says yes or confirms something or other. It is a little exciting to see how fast things can go wrong. We say something, and we continue to work, even if they have not confirmed that either. It's a little interesting.	To experience the benefits of being an observer by seeing where the communications fail, or if a message was given and they did not manage to hear, and one becomes aware of these things, or that someone nodded or said yes to affirm. It is exciting to see how fast things can go wrong because then something is said, and they continue working, even if they did not hear it.	To observe others and see what is important in interprofessional communication.	To gain competence through observing.	Vicarious experiences (the experience of observing others).
P14: That review afterward is important in relation to somehow thinking about what you have actually done. Oh, you might be left with some questions afterward that you might need to get answers to. Like why did things go wrong, or why did they go well? Oh, what did I actually do right and what did I do wrong? Oh, it's one thing to say good things about yourself or bad things about yourself, but to hear from the teachers who are observing, I think that's very important.	To experience that the review is important for you to think about what you have done, and you have some questions that you need answers to, such as why things went wrong and why they went well, because it is one thing to say good things about yourself, but it is important to hear this from teachers and observers.	To request feedback from a competent person in a professional manner.	The desire for constructive feedback.	Verbal persuasion and social influences.
P31: I was supposed to be a surgeon once too ("that's right", says one in the room). Once as a doctor, and it's just that silly. I have no idea (several in the room say "no"). Moderator: So, there was also something with the roles there? P31: And this also becomes a moment of stress concerning that.	To feel the experience of being a surgeon, even though that it is silly because you do not understand what it is like at all. This also becomes a stressful moment.	Taking on a role outside their own profession.	Unnecessary stress.	Physiological response to performance.

3.5. Trustworthiness

Using directed content analysis presents challenges, as one approaches the data with an informed albeit strong bias (Hsu, Chang & Hsieh, 2015). Self-efficacy is a complex concept, and the authors believe that a framework is essential to capture its essence. To ensure the trustworthiness of the analysis, we used the four criteria of credibility, dependability, transferability, and confirmation (Lincoln & Guba, 1985). To ensure credibility, all authors were involved in the whole interpretation process, ensuring that the findings were faithful to the participants' experiences and representative of participants' descriptions of their experiences with ISBL. To exclude bias, all authors reflected together and individually on the codes and sub-categories and how well they covered the data. To ensure credibility and variation across the homogenous group, we included a wide sampling of perioperative nursing students from four Universities in Norway Lincoln & Guba (1985). Furthermore, all stages of the research process are described to ensure dependability. ISBL is utilized as an educational approach within different institutions and the results can be transferable to other educational contexts. To ensure confirmation we reflected on our preunderstanding through all stages of this research and focused on remaining open and objective when reading the transcripts.

4. Results

Thirty-six perioperative nursing students signed written informed consent, and thirty-four participated: 31(91%) were females, and 3 (9%) were males. Participants' age ranged between 25 and 50 years (mean: 34.5 and SD: 7.2). Prior to commencing postgraduate studies, they had worked as RN between 2 and 24 years (mean: 9.4 and SD: 6.5). Before entering postgraduate education, six participants had never participated in SBL, whilst 11 had participated 1–5 times; five had participated between 6 and 10 times, five had participated in SBL 11–15 times, and four had participated in SBL between 16 and 20 times.

The findings of how ISBL contributes to perioperative nursing students' development of self-efficacy in communication, interdisciplinary collaboration, and prioritising of tasks in acute situations are reported according to the predetermined categories from the primary sources of self-efficacy. These constitute mastery experience, vicarious experience, verbal persuasion and social influence, and physiological response to performance (see Fig. 2).

4.1. Mastery experience

Participants expressed that they gained mastery experiences through ISBL. This gave them faith that they would be able to master

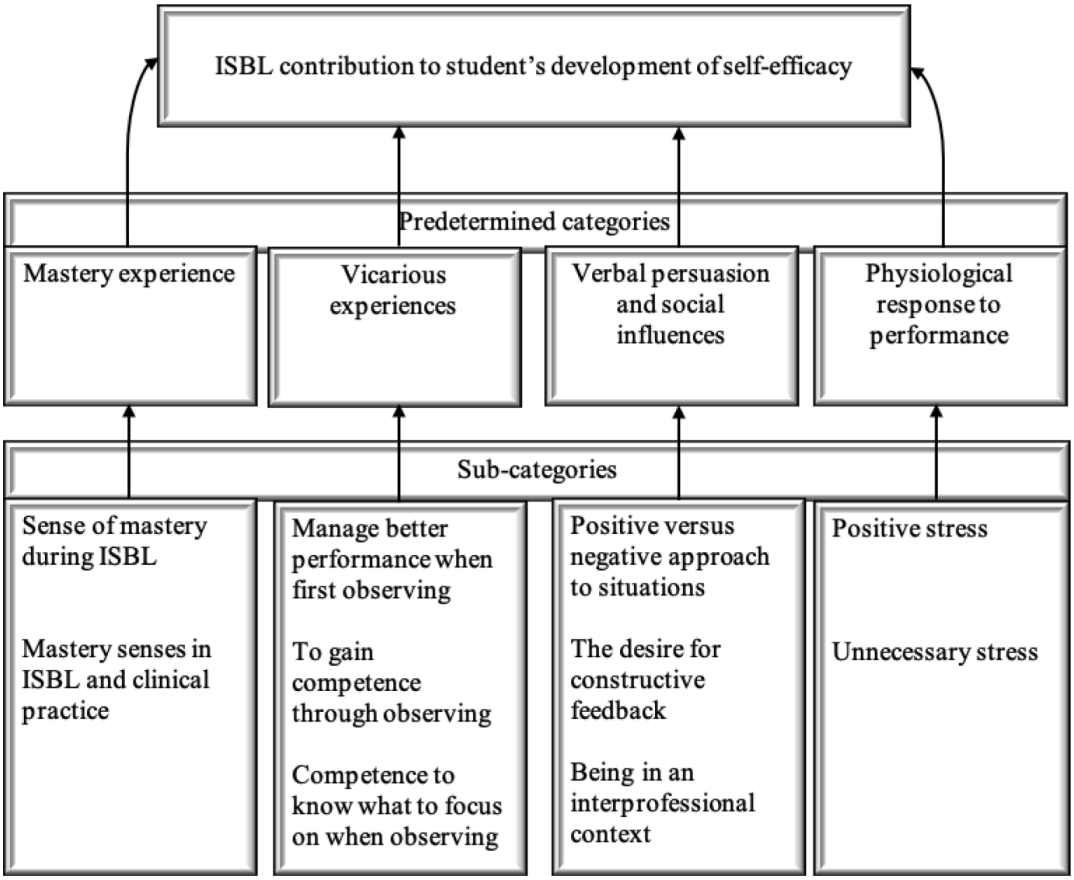

Fig. 2. Overview of predetermined categories and sub-categories.

similar acute situations when they entered clinical practice. They also stated different mastery senses experienced in ISBL and clinical practice.

4.1.1. Sense of mastery during ISBL

The sense of mastery was, for the participants, to succeed in managing tasks during an acute ISBL situation. They sensed mastery by organising the instruments, attaching the knife blade without cutting themselves, and handing the instruments to the surgeon.

> *P31: "It was a bit of mastery to stand there and, in a way knowing what I should hand over, and to give the right instruments and then see that everything was working well."*

Furthermore, participants expressed that they gained valuable competence in communicating, interdisciplinary collaboration, technical skills, and prioritising in acute situations. This contributed to greater confidence that they would master similar situations in clinical practice.

> *P25: "You see that if you manage it in a simulation, then you know that there is a greater chance that you will manage to do it in the real world, as well. So, I think it is important that it* [*ISBL*] *seems real then. Because then you will be more confident* [*that you will manage*]*. Then you think you are mastering it to a greater degree."*

For the participants to gain a sense of mastery, the ISBL case needed to be within a level they could manage.

4.1.2. Mastery senses in ISBL and in clinical practice

Some participants expressed a difference in mastery senses in ISBL and clinical practice, related to experiences of emotions when an acute situation represented a living patient in a life-or-death context. Knowing that one was responsible in an acute situation, where the patient could die, prompted stronger emotional reactions when they mastered than in an ISBL, where the patient was a monitored manikin which they knew could not die.

> *P27: "For my part, I feel that it is one thing to master it in simulation, but it is another thing to master it in real life. They are two different things. But if you experience mastery in the simulation, then it makes you think that you will manage it in clinical practice. Like in a real situation. But I do not think that the real feeling of mastery comes until you do it with a real person."*

Hence, for some, the mastery experience was more intense when experienced in clinical practice than during ISBL.

4.2. Vicarious experience

Participants said that observing others first led to self-reflection over others' performance, and this started a thought process on how they were going to solve the challenges of simulated cases themselves.

4.2.1. Manage better performance when first observing

When participants observed others prior to their ISBL, they found it easier to enter and be active in the scenario themselves. After initial observations, assessments of the performance were experienced more positively.

> *P19: "The second team was much better structured. So, they were simply better prepared than the first. P21: It went a little faster too for our part, and we had more pace. P16: Yes, it was like that for us too."*

Mistakes made in the first simulation session were corrected; the participants further understood what they should focus on and how the simulation was carried out. They found it was easier to focus on the case and the learning objectives. Even when the simulation session had appeared chaotic, they learned from previous mistakes.

> *P14: "I think that simulation…, at the very beginning when you see how chaotic it is, maybe it* [*self-efficacy*] *drops a little. But in the second round, when you also see that you have learned from the mistakes in the first round, the belief in self-efficacy increases considerably."*

In general, they viewed the second simulation team to be more structured and calmer, managing to place greater focus on non-technical skills. Communication in these teams was regarded to be clearer, and those who actively simulated were able to immerse themselves more quickly into the respective roles.

4.2.2. To gain competence through observing

Participants experienced observing others as vital because it resulted in increased competence in prioritising during acute situations. When being active, they did not have this opportunity as they were focusing on their professional roles and tasks. To conclude, the participants identified that it was easier to capture non-technical skills such as communication within the team as an observer.

> *P19: "Yes, I think the second team was more concerned with communication than the first team. So, they communicated better. They talked to each other, didn't they?*
>
> *P20: Clear communication. P19: Much clearer communication, yes. And yes, people went much better into their roles than in the first simulation."*

Participants gained insights into the need for communicating clearly in an acute situation. They also noticed the importance of how communications involved everyone, and how quickly a lack of communication could lead to things going wrong.

4.2.3. Competence to know what to focus on when observing

When participants felt they lacked competence in the context of the simulation, they found it difficult to know what to focus on observing during the session:

> *P30: "Also, it was the observer role then. I was one of those in that section, and I was one of those who had never seen it before. Then you were told to observe the others. We were a couple, but what was it we should observe? It was very challenging. I had no idea what to observe, even with that guidance."*

In the simulated emergency case so much was going on, which was then experienced as messy, making it difficult for the observing participants to decide what to focus on without the appropriate knowledge.

4.3. Verbal persuasion and social influence

The participants discussed the facilitators' approach at the beginning of a debriefing, and their own need for constructive feedback. They also expressed experiences of being students from one profession along with students from other professions participating together in ISBL.

4.3.1. Positive versus negative approach to situations

It was essential for the participants that the facilitator had a positive approach at the beginning of a debriefing by focusing on what had gone well. This created a safe atmosphere to touch on other situations where the participants could have performed tasks more efficiently. Furthermore, having a positive approach strengthened participants' experiences of mastery in ISBL, leading to positive reflection in the debriefing.

> *P8: "You get a better feeling then. P9: Yes, you do. At the same time, you wonder if they have caught everything. Have they* [*the facilitator, observants*] *seen everything that happened in the scenario? They may have turned their backs, but you might go home with a slightly better feeling then. P10: Yes, also that you, perhaps you get a bit of a feeling that you have mastered something then."*

Participants who took an active role during a simulation stated that they wanted to carry it out correctly, and they put high demands on their own performance. They said that they were critical of their own performance, so during the debriefing it was not easy for them to assess themselves in an objective way, see things in a larger perspective, and highlight what they did well. It was important for the active participants to have the support of others to identify what went well.

If a facilitator initially approached a situation negatively and focused on what went wrong, it could lead to a predominantly negative focus. This was experienced as demotivating, and participants felt a lack of psychological safety during the reflection, with little opportunity for further self-reflection on their own practice.

4.3.2. The desire for constructive feedback

Participants expressed they wanted to understand their own performance through constructive feedback and answers to their questions from people with relevant competence.

Furthermore, participants experienced that it was constructive to receive both positive and negative evaluations and constructively discuss them together in a learning environment where everyone could learn from each other.

> *P18: "Using constructive feedback, you do not have to feel bad if you talk about mistakes. When we somehow pull together all the threads and experiences, maybe I do not know what I did well. Maybe you know what I did well? Like this: 'Oh yes, that was true!' That we can pull each other up a bit and figure out what we can do differently next time, I feel that's really an imperative."*

The feedback had to be created together and be descriptive in a non-judgmental way, to create psychological safety for participants to discuss their performance and learn from mistakes, thus establishing a positive learning experience.

4.3.3. Being in an interprofessional context

The participants expressed their experiences of simulating in an interprofessional context. When the whole team was focused on as a unit during ISBL and the different educational professions received equal attention, this gave participants a feeling of being a part of the team.

> *P5: "Also, for me that they focus on the whole team, and also on perioperative nursing. That they do not skip us, no. P4: That everyone is equally important. P5: Yes. They were very interested in the whole team then. So, it's clear that then you feel more like a member of the team."*

When they felt included, a sense of psychological safety was provided, which gave them the courage to speak up in the team, thereby developing the necessary knowledge.

> *P5: "It is like she said … We were two teams then, as she said, and that we had knowledge about things, but we did not dare say it. That might happen when others just stand there, and you just have to say that in reality. You shouldn't be afraid of it then. You might have learned a little about the communication, so you have to dare to speak up. You are not just a little perioperative nurse; you have learned a little and are more capable then. But daring to do this is not something we have experienced in clinical practice. Maybe you can take that away with you then, from the simulation."*

If participants had experienced their profession getting less attention in an ISBL, they felt their professional role in the interprofessional team was not as significant.

The content of the simulation case had to contain tasks that included their future professional roles, and that enabled reflective thinking regarding their future tasks and professional roles.

4.4. Physiological response to performance

Physiological responses were largely linked to feelings of stress during participation in an ISBL. Participants expressed two kinds of stress, described as positive stress and unnecessary stress.

4.4.1. Positive stress

Positive stress provided challenges that could give rise to a feeling of mastery when working in an acute situation. They expressed that this enabled them to get to know themselves better and how they worked in such a situation, and it provided realistic experiences of similar stress that they would have been under in a real acute situation.

> *P21: "Yes, the only thing I knew I should have right in front of me was a knife and a pair of scissors. I forgot all the tweezers. At least I had the knife in place. Yes, I probably learned a lot. I think it is important to learn about yourself then. P17: And to put the knife blade on when your pulse is at 120. P18: It's not easy then. P17: Yes, I was fumbling. P21: Yes, I just forgot the other instruments. P17: Yes, me too. P21: And then I put the knife blade on* [*the knife*] *only with my fingers. All the others held their breath for me when I was doing that."*

To experience positive stress, they needed to 'feel the effects of adrenaline' and participate actively by immersing themselves into the simulation role. This way, they got to perceive how to work under stressful conditions and subsequently experienced this as positive stress. Also, working under stressful situations did not mean that everything went as planned, but it was a good and useful learning experience when it ended positively.

Participants said they needed to feel their pulses racing and to feel stress in order to allay the uncertainty and come to feel safe in emergencies. They wanted to feel more secure and gain greater faith that they would be able to work in an emergency, first by practising in simulation cases, and also having the opportunity to try it out in clinical practice.

4.4.2. Unnecessary stress

The participants perceived some stress that was experienced as unnecessary, and which caused them to lose concentration and focus during ISBL participation, hindering them from immersing themselves into the ISBL.

Situations that generated unnecessary stress were expressed when the participants did not feel that they were well-enough prepared before entering ISBL, were assigned a role outside their professional domain, or when they perceived ISBL as artificial. This made them feel insecure. This raised the stress levels and reduced the participant concentration needed to manage the simulation case's challenges. It also hindered their feelings of mastery.

> *Moderator: "So, you all experienced that you felt you were playacting a little? When you were all entering the simulation? P7: Yes. P11: We do that. And it shouldn't be underestimated that we do. P8: Yes. I experience extreme stress from it. P7: I feel stressed just thinking about it. P10: Right now, I feel that I get stressed by it. P8: Yes, I feel terrible stress. P9: Yes, you get hot and stressed by it."*

Furthermore, ISBL was stressful when participants experienced that they were being assessed, which induced feelings of performance anxiety. Therefore, it was essential to feel secure within the group of simulation participants.

5. Discussion

The aim of this study was to describe perioperative nursing students' experiences with how interprofessional simulation-based learning (ISBL) contributes to self-efficacy in communication, interdisciplinary collaboration, and prioritising tasks in acute situations.

Bandura's four principal sources Bandura (1997) to develop self-efficacy beliefs were used as an analytical framework, and the discussion is structured accordingly.

5.1. Mastery experience as a source for developing self-efficacy

During the ISBL participants gained the belief that they could execute, but not that they would master, the clinical skills. They judged their ability to perform in a similar acute case when entering clinical practice. This aligns with Bandura's proposition (2006) that self-efficacy involves assessing one's ability. ISBL increased the participants' ability and confidence in communication, interdisciplinary collaboration, and prioritisation in an acute situation, which increased their self-efficacy in these areas. The results support Bandura's theory (1997) and other studies on ISBL/SBL (Cant & Cooper, 2017; Egenberg et al., 2017), that participants who have mastery experiences increase their self-efficacy.

In the present study, some of the participants experienced different intensities in the perception of mastery in ISBL compared to clinical practice. Bandura (1997) defines mastery experiences as being context-specific. The patient in our study was a simulator manikin which, unlike patients in clinical practice, could not die. This exemplifies two different contexts connected to the participants' fidelity experiences (INACSL, 2016b; Lioce et al., 2020) which, in turn, could have influenced our participants' ability to immerse themselves into the ISBL scenario. To be immersed in the ISBL scenario, the participants had to experience "as if" they were in a real clinical practice situation. According to Yoo & Kim (2018), such immersion can lead to a 'flow experience' as an optimal mental state. This is created when people sense great pleasure in the activity itself and are strongly involved Csikszentmihalyi (2014), and it is seen as an essential aspect of SBL (Yoo & Kim, 2018). In our study, when the training context appears as being different from clinical

practice, it affects the immersion and flow experience of the participants. This again affects their perception of mastery. This is in line with Yoo and Kim (2018), who contend that fidelity is associated with students' flow experiences during SBL: those who perceived the simulation as being more realistic reported higher flow levels.

In this study, when ISBL was experienced as realistic, replicating real clinical practice, it can be seen as a situation-specific practice that can be used to expose participants to high-risk situations which they might experience within their clinical practice. As such, it offered the participants authentic evidence about their own abilities and capabilities.

Since self-efficacy is closely linked to motivation and learning (Pajares, 2006; Schunk, 2003), educators need to design ISBL that enables participants to achieve mastery experiences. Participants in our study experienced that to gain feelings of mastery, the ISBL case had to be on a level of difficulty they could manage. Stalheim and Nordkvelle (2018) also found that self-efficacy is linked to the difficulty of the ISBL situation. As Bandura (1997) states, failure reduces mastery beliefs, particularly when experiencing failure before a strong belief in self-efficacy has been built. Therefore, it is essential that ISBL/SBL must adjust the level of complexity/difficulty to allow for success in order to build strong beliefs of self-efficacy in perioperative nursing students.

People with high self-efficacy beliefs who judge that they can manage a challenge are more likely to view challenges as something that could be mastered instead of something to avoid Bandura (1997). Using ISBL in a perioperative nursing educational programme to develop participants' self-efficacy can augment perioperative nursing students' performance in ISBL and clinical practice, as well as their academic performance and ability to learn new skills.

5.2. Vicarious experience as a source for developing self-efficacy

Participants in our study noted that when they started by observing other participants in a simulation case, it made them reflect on how they would solve the simulation case's challenges. This is in line with Stalheim & Nordkvelle's (2018) findings that observing other's performances invites students to reflect on the other students' actions. When observing, the tasks and challenges are observed, recognised, reinforced, and repeated. According to Bandura (1997), this leads to an increase in self-efficacy by recognising that one can copy observed action in ISBL (Pajares, 2002).

In the present study, participants identified that it was easier to capture non-technical skills as an observer. Observing others was essential to gain competence in communication, interdisciplinary collaboration, and prioritisation in acute situations. These results are in line with a study by Rogers, Baker & Franklin (2020)), who found that observers have a better opportunity to get an overview and see the larger picture, which can bring about positive learning outcomes concerning knowledge, clinical judgement, teamwork, critical thinking, and conceptual thinking. Also, observers who observed before being active in a simulation case perform the tasks more correctly. For some participants, starting as observers gave them an opportunity for focused observation, reflection, and planning when compared to their peers who started as active scenario participants. Still, building on vicarious experiences not only occurred when observing others performing a task successfully, but also observing others' mistakes and correcting them. This was also found by Stalheim & Nordkvelle (2018), who concluded that observers learn from the mistakes made by active participants in the simulation session. Our participants first perceived the simulation sessions as chaotic. In the second round they noticed that the simulation teams appeared to perform their work more calmly and with more structure, which increased the participants' self-efficacy beliefs.

In order for our participants to accurately judge observed performance against their own capabilities, they needed enough competence germane to the context of the simulation case, and the person being observed had to be on a similar competence level. This finds support in a review by Usher & Pajares (2008) which emphasises that education levels are essential for self-efficacy information. Furthermore, vicarious information obtained from others who are perceived to be on a similar level of ability seems to be the most influential.

5.3. Verbal persuasion as a source for developing self-efficacy

In the present study, participants stressed that it was essential that the facilitator take a positive approach when giving feedback in the debriefing, by focusing on what had gone well. This agrees with Bandura's (1997) theories that point out that feedback must focus on the improvement and performance gains of participants. Then feedback can develop participants' self-efficacy regarding their capabilities to accomplish a task and improve their performance (Bandura, 1997; Schunk, 1989). Hence, a facilitator needs competence in simulation pedagogy (INACSL, 2016a) and awareness of the importance of verbal persuasion for developing self-efficacy. Participants in our study were critical of their own performance and experienced it difficult to self-assess. The difficulty in evaluating one's own performance after a simulation session has also been found by Maibach, Schieber, & Caroll (1996). Therefore, evaluative feedback can develop self-efficacy through the source of verbal persuasion.

Based on this study's findings, participants need constructive feedback and answers to their questions from people with relevant competence. Bandura (1997) also emphasises that it is essential that verbal persuasion be constructive, timely, and honest to encourage or boost self-efficacy. When the facilitators took a positive approach, it contributed to a safe atmosphere for our participants. It enabled them to touch on other situations where they could have performed tasks more efficiently. This way, constructive feedback was positive in tone and provided opportunities to enhance performance and learn from mistakes. This is supported in a study by Van Dinther, Dochy & Segers (2011) concluding that feedback to higher education learners needs to be constructive rather than purely critical, and that constructive feedback fosters self-reflection, which helps learners focus on their improvement. As well, feedback concerning learners' capabilities should come from a credible source (Van Dinther et al., 2011). In the present study, facilitators competent in perioperative nursing provided a credible source for the participants, which developed their self-efficacy in handling acute situations. When self-efficacy beliefs are fostered through verbal persuasion, credibility is of major importance

Bandura (1997).

Another finding of this study is that to create collective efficacy it is imperative to develop ISBL that includes all the professional groups represented in an authentic situation. Furthermore, to pay them equal attention and offer verbal feedback from a team perspective, through engaging facilitators. This is essential since collective efficacy also motivates more robust team member behaviour, affecting the teams' functioning (Tasa, Taggar & Seijts, 2007). This study shows that the perception of equal value boosted participants' collective efficacy and developed professional identity.

5.4. Physiological response as a source for developing self-efficacy

SBL exposes participants to feelings of stress (Kang & Min, 2019), which can influence their performance in ISBL (Al-Ghareeb, Cooper & McKenna, 2017). In our study participants described two kinds of stress: positive stress and unnecessary stress. Stressors deals with challenges or strains we face in various situations. How we deal with these challenges depends on our earlier experiences with similar situations and how we experience the relevant stressors Ursin & Eriksen (2004). Participants' stress reactions and "the effects of adrenaline" helped them immerse themselves in the simulation scenario. Positive stress provided realistic experiences of the stress they would have had in a real acute situation. Self-efficacy theory acknowledges that students' physiological response to stress can influence their learning and capacity to handle a given situation Bandura (1997). The current study suggests that positive stress enabled participants to manage their feelings and handle this stress in an acute situation. This is important for developing self-efficacy beliefs according to Leigh (2008), who stresses that gaining control of emotions in acute situations can develop higher self-efficacy beliefs. When the ISBL gave rise to positive stress (as a positive feeling) amongst the participants, it served as a source to strengthen their self-efficacy beliefs. Theoretical support for this has also been claimed by Pajares (1997), who argues that positive emotions can strengthen self-efficacy.

The opposite was the participants' experience of unnecessary, preventable stress. Unnecessary stress occurred in conjunction with participants' feelings of insecurity and unsafety. Such unnecessary stress generated negative feelings amongst the participants, and according to Pajares (1997) this can weaken self-efficacy. Studies in SBL emphasise the significance of creating a safe simulation environment to ensure participants' psychological safety (Page-Cutrara & Turk, 2017; Rudolph, Raemer & Simon, 2014). Our study found that unnecessary stress affected participants' concentration and detracted focus from the intended learning outcomes. Hence, they did not manage to immerse themselves into the scenario. To create conditions for successful SBL, educators have to ensure that the participants have the prerequisites to entering a learning environment, engaging themselves and immersing themselves (Rudolph et al., 2014). The International Association of Clinical Simulation and Learning (INACSL) Standards Committee has published simulation design criteria where adequate briefing, simulation of the scenario/case, a facilitative approach, and debriefing are described as imperative for successful SBL (INACSL, 2016b). This fits well with our results, where participants said that a high level of unnecessary stress could be reduced by being well-enough prepared, having enough information and competence, and promoting psychological safety and ISBL scenario realism.

In the present study, feeling safe meant not feeling assessed, as that can gave rise to feelings of performance anxiety. Hsiang-Te Tsuei, Lee, Ho, Regehr and Nimmon (2019) arrived at similar findings. They concluded that feeling safe, as in psychological safety, is defined as not feeling judged by other participants and facilitators, which allows participants to focus on engaging in the SBL (Hsiang-Te Tsuei et al., 2019).

5.5. Strengths, limitations, and future directions

None of the researchers were involved in designing the ISBL scenarios in this present study, but they did set the inclusion criteria. This could have led to limitations if we had intended to measure self-efficacy. Still, since we wanted to explore and gain data from a wide variety of experiences and did not want to influence as an external factor, we assume that this strengthens this study's results.

In conducting focus group interviews the moderator has to guide the discussion and establish dynamic interaction amongst the group of participants. This supports a sharing dialogue in the focus group as a suitable method of obtaining knowledge in situations where several people interact, as in an ISBL Krueger & Casey (2015). Since we knew that the moderator's role is demanding and to ensure that the discussion included all the participants in each focus group interview, we included one assistant moderator. The moderator and the assistant moderator were the same two individuals performing these roles throughout the study. This added value increased their alertness and supported them in inspiring participants to share their experiences.

In the present study, the participants were recruited by their teachers. This could have affected their decision to participate. Thus, the participants were informed that their decision would have no negative consequences for them.

Future directions for studies are to explore and measure if self-efficacy development through ISBL in higher education can affect students' learning outcomes when entering their clinical practice.

This is a study of limited size; therefore, findings cannot be generalized. However, they expand the understanding of how inter-professional simulation-based learning contributes to the development of self-efficacy.

6. Conclusions

Our findings confirm that Bandura's four sources, mastery experience, vicarious experience, verbal persuasion and social influence, and physiological response to the performance, are essential in ISBL. These sources can contribute to developing perioperative nursing students' self-efficacy in communication, interdisciplinary collaboration, and prioritisation tasks in acute situations. As we know that

Bandura claimed that the four sources interact with each other, it seems important to promote and include all the sources in an ISBL scenario. Since much of the results reflect not only the scenario but the entire ISBL (preparing, designing, running scenario and debriefing). Furthermore, there are several critical conditions to be considered regarding each of the four sources in order to increase the development of self-efficacy in ISBL. It concerns participants' experience of reality, the level of difficulty in the ISBL case, and whether participants who observe have enough competence in the ISBL context. The facilitator needs competence in simulation pedagogy and in the context of the ISBL case. Furthermore, we need to highlight the importance of equally including all the professional groups that are represented to develop collective efficacy. Positive stress is useful to perceive how they as future perioperative nurses will manage stressful, acute situations in clinical practice. Participants' unnecessary stress has to be prevented through better preparedness, taking a role in the scenario within their profession, experiencing a realistic ISBL situation, and not feeling like they are being assessed. A well-designed and well-prepared ISBL case can contribute to the development of self-efficacy in communication, interdisciplinary collaboration, and prioritising tasks in acute situations .

7. Relevance to clinical practice

The present findings further expand the knowledge regarding Banduras' (1997) theory about self-efficacy beliefs and its significance in an ISBL. Educators and facilitators can use this knowledge and design ISBL to promote learning experiences that increase self-efficacy beliefs. Building up and strengthening self-efficacy beliefs in students can result in more motivated students who work harder, persevere longer, and have fewer unfortunate emotional reactions when they encounter difficulties than those who lack belief in their capabilities Bandura (1997). Additionally, ISBL requires that all relevant professions are included in a team, to create collective efficacy, leading to more motivated and robust team behaviour and functioning.

Authorship

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Paper 3

Professional competence development through interprofessional simulation-based learning assists perioperative nurses in postgraduation acute clinical practice situations: A qualitative study

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ORIGINAL ARTICLE

Professional competence development through interprofessional simulation-based learning assists perioperative nurses in postgraduation acute clinical practice situations: A qualitative study

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Abstract

Aims and objectives: To explore recently graduated perioperative nurses' experiences of interprofessional simulation-based learning during postgraduate education and investigate whether and how this learning approach contributed to the development of their professional competence in meeting acute clinical situations.

Background: Perioperative nursing requires specialised education that offers professional development to ensure high-quality nursing care and patient safety in acute situations. Interprofessional simulation-based learning exposes students to acute situations in a safe environment without the risk of harming the patient, and it prepares postgraduate nursing students for clinical practice. Despite extensive research regarding simulation-based learning, there is a lack of knowledge on what impact such training has on perioperative nursing students after graduation.

Design: An explorative qualitative design was used, and this study is reported in accordance with the COREQ guidelines.

Method: Between March 2019–November 2020, 16 perioperative nurses participated in semi-structured individual interviews three to five months after their graduation from five different educational institutions. During their postgraduate education, they had participated in interprofessional simulation-based learning that included acute clinical situations. A phenomenological hermeneutical analysis was applied to the data involving three steps: naïve reading, structural analysis and comprehensive understanding.

Results: During the naïve reading, three themes emerged: competence in handling acute situations, competence in interprofessional teamwork and professional identity development.

Conclusion: Interprofessional simulation-based learning in perioperative nursing education developed relevant and important competence, including professional identity

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development, among perioperative nursing students. As recent graduates, their professional competence was transferred to clinical practice and developed further.

Relevance to clinical practice: Findings indicate that interprofessional simulation-based learning is an important educational approach in perioperative nursing education. It is essential to use effective learning approaches to develop competencies that are transferable to clinical practice and improve perioperative nurses' performance as recent graduates. Therefore, interprofessional simulation-based learning should be implemented into perioperative nursing education.

KEYWORDS

acute situations, interprofessional simulation-based learning, perioperative nursing, phenomenological hermeneutical method, postgraduate education, professional development, professional identity, recent graduates, student, transfer to practice

1 | INTRODUCTION

Perioperative nurses work closely with other professionals and provide advanced care for patients in acute situations, so they are required to possess highly developed knowledge and skills (Smith, 2019). This requires professional development education (Chernikova et al., 2020) to prepare them for interprofessional teamwork and to ensure high-quality perioperative nursing care and patient safety in acute situations (Beitz, 2019). Preparation for professional practice requires the acquisition of important knowledge and skills and the development of professional identity, including intrinsic dispositions that define the profession and its members (Cruess et al., 2014).

Professional development involves structured professional learning that results in improving perioperative nursing students' learning outcomes and a change in their practices as recent graduates, and it includes development of professional competence. Professional competence has been defined as 'the habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values, and reflection in daily practice for the benefit of the individual and community being served' (Epstein & Hundert, 2002, p. 226). Professional development includes building a professional identity, described as 'how we perceive ourselves as professionals based on our attributes, beliefs, values, motives, and experiences in relation to our profession' (Rees & Monrouxe, 2018, p. 202).

In Norway, perioperative nurses have two primary roles: a sterile executive and a circulating role. The executive role requires an in-depth knowledge of all the steps of surgical procedures, while the circulating role requires that nurses take responsibility for the assessment, planning, coordination, and implementation of an appropriate plan for care for the perioperative patient. In this study, perioperative nursing is defined as a speciality that focuses on care for patients with life-threatening crises, illnesses or injuries undergoing planned or acute surgery, treatment or examination. Perioperative nurses are registered nurses (RNs) who have undertaken dedicated perioperative nursing education; they are also known as theatre nurses, scrub nurses, circulation nurses and operating room nurses.

What does this paper contribute to the wider global community?

- Competencies developed from interprofessional simulation-based learning during education are transferable to the future clinical practice of recently graduated perioperative nurses and may improve performance.
- Transferable competencies including prioritising, coping with stress, contingency planning, communicating and collaborating in an interprofessional team were identified.
- Interprofessional simulation-based learning used in education can support recently graduated perioperative nurses' incipient professional identity and strengthen their courage to speak up when working in interprofessional teams.

2 | BACKGROUND

Preparing perioperative nursing students for acute clinical practice situations requires a learning environment that includes exposure to practice in the professional field and authentic learning experiences (Kaldheim, Fossum, Munday, Johnsen, & Slettebø, 2021). Acute situations are characterised by unexpected events that must be responded to rapidly and where appropriate prioritisation is needed without delay (Gabrielsen, Lindström, & Nåden, 2009). Simulation-based learning (SBL) is a learning process in which participants interact with people, simulators, computers and/or task trainers to accomplish learning goals that represent the learners' real-world responsibilities (Lioce et al., 2020). SBL involves three

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stages, commencing with information provided by the facilitator about the simulation scenario and learning objectives. Participants then undertake active roles in the scenario (Tyerman, Luctkar-Flude, Graham, Coffey, & Olsen-Lynch, 2019). Finally, debriefing facilitates formative feedback and supports participants in reflecting critically, developing clinical reasoning and linking theory to practice (Hall & Tori, 2017).

SBL is an often-used educational approach widely explored in nursing programmes. Systematic reviews communicate that SBL is a useful educational approach to develop knowledge, critical thinking and confidence (Cant & Cooper, 2017; Jeppesen, Christiansen, & Frederiksen, 2017), and it can also improve patient safety by reducing errors (Lamé & Dixon-Woods, 2020).

The World Health Organization (WHO) recommends professional collaboration as an educational approach to enable effective practice and improve patient safety (World Health Organisation, 2010). In this study, the focus is on interprofessional simulation-based learning (ISBL), as it can enhance interprofessional communication, collaboration and appreciation for other professions and promote the contributions of one profession to an entire team (Kaldheim, Fossum, Munday, Johnsen, & Slettebø, 2021). Upon entering professional clinical practice, the capability to successfully collaborate with other disciplines is vital to assure superior patient outcomes (Lamparyk, Williams, Robiner, Bruschwein, & Ward, 2022).

However, there is a need for studies about perioperative nursing students' development of professional competence and to investigate the perceived effectiveness of ISBL (Kaldheim et al., 2019). Furthermore, there is scarce evidence regarding students' transfer of professional competence to clinical practice after graduation and how ISBL influences future practice (Seaton et al., 2019).

3 | THEORETICAL FRAMEWORK

Activity theory was applied as a theoretical framework in this study to understand the development of professional competencies generated through participation and activities during ISBL. Activity theory can help us understand complex systems, such as ISBL (Byerly, Floren, Yukawa, & O'Brien, 2021). This theory is built on Vygotsky's (1978) and other sociocultural theories of learning which view the learning of knowledge and skills as socially constructed through dialogue and interactions and regard individual learning as a product of participation in activities with others (Mylrea, 2018).

It is essential to design and develop learning environments within higher education that support the transfer of students' professional development from education to clinical practice. The word 'transfer' focuses on the progressive re-mediation of object-oriented activity and is grounded in activity theory. Here, 'collective activity' refers to individuals working together towards a common goal. Our experiences are formed 'by the ways that we aim to act in coordination with other people' (Danish, Saleh, Gomoll, Sigley, & Hmelo-Silver, 2021, p. 129).

4 | METHOD

4.1 | Aim and research question

The aim of the research was to explore recently graduated perioperative nurses' experiences of interprofessional simulation-based learning during postgraduate education and investigate whether and how this learning approach contributed to the development of their professional competence in meeting acute clinical situations. Thus, the research question addressed was the following: Do perioperative nurses perceive that ISBL during their education contributed to the development of their professional competence in meeting acute situations in their clinical practice after their recent graduation, and if so, how?

4.2 | Design

The study applied an inductive and qualitative research design, using semi-structured individual interviews to capture lived experiences. A phenomenological hermeneutical method inspired by Ricoeur's (1973) theory was used to interpret the transcribed text from the interviews. While phenomenology centres on how all-important meaning appears through lived experiences, hermeneutics focuses on the necessary conditions for text interpretation (Lindseth & Norberg, 2004, 2021). Ricoeur articulated that interpretation of a text means perceiving something new within that which is already taken as established (Ricoeur, 1973). This method allowed us to gain a deeper understanding of ISBL as a complex phenomenon. The Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist was used for reporting (Tong, Sainsbury, & Craig, 2007; See Appendix S1).

4.3 | Participants

Heads of Departments from five higher educational institutions in Norway agreed to the conduct of the study, and perioperative nursing students received study information from their teachers and provided written informed consent. They enrolled in a postgraduate programme (of 18 months duration) or a master's degree programme (of 2 years duration). In Norway, students taking a postgraduate programme in perioperative nursing follow the same curriculum as those taking a master's degree programme, as regulated by the government. However, students can choose to terminate this programme after 18 months and write a final thesis instead of a master's thesis. Before enrolling in perioperative education in Norway, students must be an RNs.

Between February 2019–May 2019, 31 perioperative nursing students signed written consent forms to participate in this study. Some recruited perioperative nursing students did not graduate before June 2020 and so could not be interviewed as newly graduated perioperative nurses before autumn 2020 as their personal

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situations may have changed during this period. Thus, the number of participants was reduced by six. A further five participants did not respond to the second contact attempt made by the researchers. One interview was not conducted because the participant did not work as a perioperative nurse following graduation. Between March 2019–November 2020, therefore, 19 individual interviews were conducted with recently graduated nurses. Of these, however, three were excluded because of the participants' work situation (their work as newly graduated perioperative nurses did not involve acute situations). As a result, a total of 16 individual interviews with recently graduated perioperative nurses were conducted and transcribed (Table 1).

Based on recommendations (Malterud, Siersma, & Guassora, 2016), this sample size was sufficient to provide rich data. For inclusion, participants needed to have participated in ISBL during their postgraduate education together with students from other specialisations, such as anaesthetic, critical care and paediatric nursing. The simulation context needed to include acute situations, such as an acute caesarean section or a trauma, and include a focus on the development of interprofessional collaboration and communication. The individual interviews were conducted within three to 5 months after graduation.

In this study, 16 of the participants had taken part in an acute caesarean section, four in an acute appendix operation, eight in a trauma, one in a burn injury, 10 in an advanced cardiopulmonary resuscitation and two in a tonsil bleeding scenario. Five of the participants had also taken part in SBL/ISBL after their perioperative nursing education.

4.4 | Data collection

The first author conducted semi-structured interviews asking open questions and follow-up questions. The main topic was the individuals' experiences with ISBL during education and how this had assisted in their professional development in acute clinical practice situations recently after graduation. One question, for example, asked, 'Would you please tell me how you have experienced your involvement in acute situations in clinical practice since your recent graduation?'. The follow-up question to this was 'Can you further elaborate on what experiences you have had for which you were prepared? Please provide an example, if possible' (See Appendix S2).

The design of this study was explorative. This consideration guided our interviews questions, which were semi-structured questions encouraging the participants to tell us about their experiences within different areas in the ISBL context. All interviews were conducted away from the subjects' workplaces, in an undisturbed location, but four were conducted as video meetings using Skype for Business, because of the geographically remote locations of participants ($n = 2$) or because of the COVID-19 situation ($n = 2$). All interviews were audio-recorded and transcribed by the first author. They were between 43–86 minutes in duration (mean 61 min). Recruitment ended when no new data emerged in the interviews, and data saturation was attained.

4.5 | Ethical consideration

Prior institutional ethical approval was obtained, and the study was approved by the Norwegian Centre for Research Data (NSD, ref. 2019/363692). The study followed the ethical principles governed by the World Medical Association Declaration of Helsinki (World Medical Association, 2013). It was emphasised that participation was voluntary and that participants had the right to withdraw at any time.

4.6 | Data analysis

A phenomenological hermeneutical analysis inspired by Ricoeur's theory of interpretation was performed to disclose the underlying meaning of the text. This approach is well-suited for taking life experiences into account when analysing texts, and it has the advantage of moving dialectically between comprehension and explanation. It includes three steps: naïve reading, structural analysis, and critical analysis and discussion (Lindseth & Norberg, 2004, 2021). All authors participated in the analysis.

First, a naïve reading of the interview transcript was conducted with an open mind 'to grasp its meaning as a whole' (Lindseth & Norberg, 2004, p. 149). In this stage, the researchers adopted a

TABLE 1 Participant's demographic characteristics

Gender	Female		Male	
	14 (87%)		2 (13%)	
Age	Mean	Min	Max	SD
	36.1	27	52	7.3
Times	Number of times participation in SBL before entering postgraduate nursing education			
Mean	5.6			
Min	0			
Max	15			
SD	4.6			

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phenomenological attitude, one which involved opening up to the phenomenon described in the text by setting aside any prior assumptions about it—a technique well known as bracketing—to articulate the participants' understanding of the text in a phenomenological context (Lindseth & Norberg, 2004, 2021).

During the naïve reading, the first author read all the transcribed interviews several times, and the second and last authors read three of the interviews several times and discussed them with an open mind to understand the full meaning of each. Then, in the structural analysis, the first author used NVivo[12] when dividing the text into meaning units. This stage included reading the text several times to generate condensed descriptions that revealed its meaning (Table 2). In this stage of the analysis process, all researchers discussed the units of meaning and identified subthemes and themes. The naïve reading established a verification of these themes. To achieve final comprehension, the text was read as a whole, and the naïve understanding and the themes were reflected on, discussed and interpreted in light of the theory and relevant literature (Lindseth & Norberg, 2004, 2021).

5 | RESULTS

During the naïve reading, three themes emerged: competence in handling acute situations, competence in interprofessional teamwork and professional identity development. The themes with entailed subthemes (Figure 1) are presented individually to explore each theme in depth.

5.1 | Competence in handling acute situations

Participants felt they had developed their competence in handling acute clinical practice situations as recent graduates as a result of experiencing ISBL during their postgraduate education. They identified expanded knowledge and work-related skills in their general competence development. Also, they noted increased competence in prioritising, better-developed coping strategies for tolerating stress, and better competence in contingency planning.

5.1.1 | Development of general competence

Participants highlighted that they developed relevant knowledge and skills (general competence) through ISBL, which allowed them to face acute situations with understanding and preparedness as recent graduates.

> P4: If you know the basics and have a good experience [through ISBL], you manage it [basic perioperative nursing tasks]. You manage to handle it a little better and faster then. Because then you do not have to start thinking about the basic things. Then you can concentrate and think in a way about what is a little extraordinary.

They felt that combining theory and practice and linking this through reflection prepared them for clinical practice in a constructive way.

As well, participants identified that ISBL contributed to self-insight into identifying what expertise they further required.

> P17: I think that was very good... Even though it was experienced as chaotic, and you may not have had control when you were in the simulation situations. Then, in practice, will it be these [simulation situations] that you look back on in order to improve, or to reflect on how you could improve.

Participants expressed that they gained knowledge and skills as a basis for continuing learning when entering clinical practice. As newly qualified perioperative nurses, they felt that they further developed their competence every time they faced an acute situation.

> P11: You may not be able to simulate everything, all situations, but you build experience as small stones that, in a way, grow into a large wall. And all this is important!

Participants also said they felt safer when encountering acute situations similar to those they had experienced in ISBL as opposed to those that they had not experienced in ISBL. They also reported that they reflected on their ISBL experience, called upon the knowledge and skills they had gained and applied them in clinical practice as recent graduates.

> P1: The first time I participated in an acute operation as a recent graduate, I thought of the time we simulated a caesarean section... I used this [knowledge] a bit then. In a way, I went into a mode where I watched and didn't say anything to save time, and things had to happen a little faster then. So, I went into this mode where I filtered out some other thoughts to become more attuned to the situation.

5.1.2 | Competence in prioritising

The participants said that ISBL helped them to develop skills in prioritisation in acute situations, providing greater understanding and developing competency in prioritisation as recently graduated perioperative nurses.

> P17: Because you stand there too [in the ISBL], you learn and gradually prioritise what can wait and what cannot. With a caesarean section, you learn that

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TABLE 2 Examples of the structural analysis

Meaning units	Condensed meaning	Subthemes	Theme
P10: Going through simulation [participating in it] so that you are prepared in a way. Because you have to practice CPR, as you cannot start practising in real life, you learn to know what to do when it happens. You learn every time you practice. Then you gain a foundation of what you learned then. At least then you have it in the back of your mind.	Going through it to be prepared. You have to practice and cannot start in real life. Then you know what to do, at least you have it in the back of your head. You learn every time you practice and build a foundation.	Development of general competence	Competence in handling acute situations
P16: In the simulation, you got good guidance and explanation of why you do things in a special order and what's important to prioritise. The most important things were explained to us also, like that it's not so important to have a tidy table when it's about saving the life of a small baby.	In simulation you get guidance, and explanation why you do things in a special order, and what is important to prioritise. It is not so important to have a tidy table, it's about saving a small baby.	Competence in prioritising	Competence in handling acute situations
P14: Because there's a lot of equipment and many things that you can read about, it is [the feeling] to have it in your hands and see how it really works, which is important, and you know that people are waiting for you to do the right thing.	There's a lot of equipment, and you can read about it, but it's [the feeling]to have it in your hands and see how it works, it's important and people are waiting.	Competence in working in stressful situations	Competence in handling acute situations
P1: You have to think of a worst-case scenario. You have to be prepared that if it *can* happen, it *will* happen, and you must be able to do this and that. It's a constructive attitude, in a way. Yes. Hm. In any case, you should not rule out that if there is a potential chance of something happening, you must be able to deal with it then.	You have to think of a worst-case scenario, to be prepared that if it happens, you are able to do this and that. It's a constructive attitude. If there is a potential chance of something happening, you must deal with it.	Contingency-planning competence	Competence in handling acute situations
P5: Yes, I think I saw very clearly for the first time that here we have to talk together. And that communication in the team is important, and all parts of the team depend on having good communication. How far have we come? And how far have you come? When can I start washing? When is the time to cover? So, all the time. That the whole team must work together to reach the goal then, because, before the simulation, I think you are so focused on your own role, you are so focused on the one task you have, and do you think that it's the task that determines whether you have an operation or who will be in control. So, when you simulate, you see that here, there are several people who have to work together and communicate for the surgery to happen.	I saw clearly that here we have to talk together, and that communication in the team is important, that the team depends on good communication all the time, and we work together to reach the goal. Before the simulation, you are focused on your own role and task, and when you simulate, you see that there are several people who work together, and the teamwork and communication.	Interprofessional communication competence	Competence in interprofessional teamwork

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TABLE 2 (Continued)

Meaning units	Condensed meaning	Subthemes	Theme
P17: Because there is something that I like very much about an operations department, we have very different roles but mesh very well together. Practicing it when you are a student to understand the different roles is very useful too. Now I know that not everyone goes to a hospital where the perioperative nurses and anaesthesia nurses work well together. Still, I experience that where I work, it works very, very well. Better than a lot of places in the country. I kind of feel that it was something where we got the basics of it from the simulation. You see that was what they do, and you have a little understanding of what the other professional students were struggling with. They saw what I was struggling with. That together we could solve the tasks, and that were really okay.	I really like it that we have different roles but mesh very well together. When you are a student, practising to understand the different roles is useful. Not everyone goes to a hospital where everyone works well together. I experienced that it was something that you get the basics of by simulation. There was a little understanding of what the students in the other professions were struggling with and what I was struggling with, and together we solved the tasks, and we were okay.	Interprofessional collaboration competence	Competence in interprofessional teamwork
P4: In a way it gives you a little security. That yes, okay, I handled it, actually in a usable way. It wasn't perfect, but I handled it. So, in a way it's security to take with you. Then I think in a way that's what's important with the simulation, that you get to practice under safe conditions, and in a way you can get things in your hands a little, so you feel that you'll actually be a bit prepared when you encounter situations in real life.	It gives you security. I handled it. It wasn't perfect. In a way it's security to take with you. It's important to practice under safe conditions, and you can get things in your hands, so you feel prepared to encounter situations in real life.	Development of self-confidence	Professional identity development
P11: The very roles that people have, and that there is a leader, a surgeon, an orthopaedist, and a bioengineer, so I have got them with me. That all participants in the trauma team must have their place. Everyone is important. Furthermore, I am part of the team, and it has made me very proud that perioperative nursing is a part of this.	The roles that people have, and that I have them with me. That all participants have their place, and everyone is important. I am a part of the team and proud that perioperative nursing is a part of this.	Belonging to a profession in an interprofessional team	Professional identity development

something can wait for a period of time to prioritise having a knife [scalpel] and getting the baby out.

should be fine, but you should save lives and do it as safely and quickly as possible then. Yes, she [the supervisor from the hospital] had a great focus on that.

The participants viewed it as essential that the knowledge-generation occurred simultaneously with the experience in ISBL and that this was guided by competent people within their own profession, thus providing them with relevant knowledge about prioritising in an acute situation.

The relevant knowledge gave the participants an explanation and thus a greater understanding of what and how one should prioritise in an acute situation and then anchored the experience and the knowledge behind it.

P16: I remember having the supervisor [an experienced perioperative nurse] involved from the hospital; she was very good at commenting on what was important to focus on in an acute situation. Often, it's about saving lives. It's not about having the cleanest [table] possible or that it should look the best, or that the instruments

P16: In the simulation, you got good guidance and explanation of why you do things in a special order and what's important to prioritise. The most important things were explained to us also, like that it's not so important to have a tidy table when it's about saving the life of a small baby.

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Additionally, they expressed that observing others prioritise in an acute situation prompted self-reflection concerning what it was wise to prioritise and how. By seeing others determine their priorities, observing participants could reflect on what was best to prioritise in an acute situation.

Some participants expressed that they did not have enough ISBL experience and theoretical knowledge to gain competence in prioritising when they entered clinical practice as recent graduates.

> P18: It's not easy in the beginning, and we didn't simulate enough, I think. Prioritising was and is difficult. It's really difficult to prioritise.

5.1.3 | Competence in working in stressful situations

Participants expressed that it was preferable to experience their own reactions under controlled situations, as in ISBL when facing acute situations.

> P4: It's nice to experience [things] in controlled ways because when you get into a similar situation, you recognise yourself and your reactions. So, you can calm down a bit so that you can see what's happening and get an overview.

They expanded their knowledge regarding how they experienced stress and what coping strategies they could use.

> P4: Actually, a bit like that in general, that in a way what I learned the most from the simulation, was what I said in the beginning, that you have to feel a little of your own adrenaline, a little about how you reacted, a little of it to learn… to try to calm myself down a bit then. If you have a lot of adrenaline in your body, then you become very clumsy. Then you are all thumbs.

Participants expressed that stress was perceived differently in an ISBL as opposed to a real acute situation.

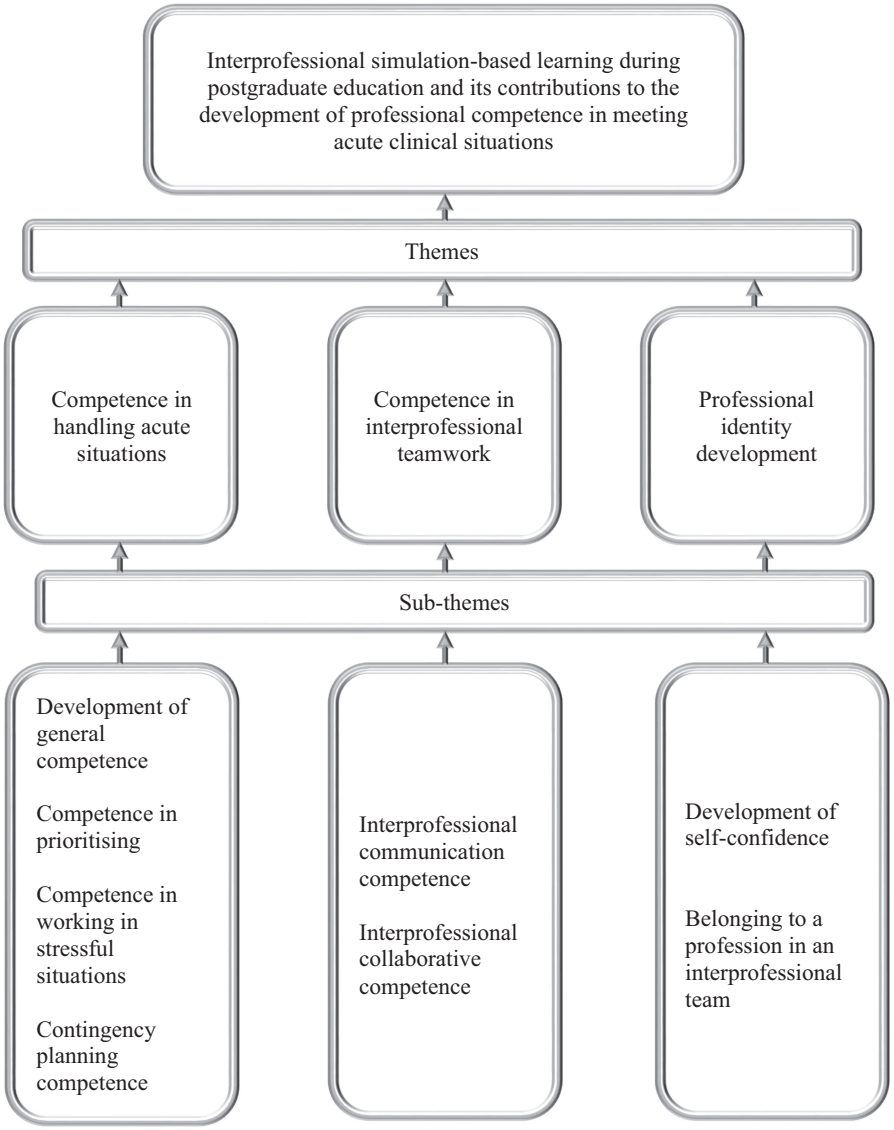

FIGURE 1 Overview of themes and subthemes

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> P18: Yes, the things that occur in real situations [are] more challenging than they would have been in a simulation. Suddenly, a slightly different mindset requires concentration, and there is another form of stress that makes you almost panic. So, it is different in real situations. But it is still good to know how it should be.

Participants also reported that when in an actual stressful situation, such as an acute situation in clinical practice, they experienced having more time to handle it than during ISBL in education. The participants reflected upon the realism of ISBL and the time things take in an ISBL compared to an acute situation in clinical practice.

> P17: You felt that you had more time when we had a simulation because things take longer in reality than when you simulate. Things go very fast because [even] if you just put a central cannula in a doll, for example, now I have to put in a central cannula… it takes ten seconds instead of one minute. I kind of experience that you have a bit more time. Then, there's something about being in a stressful situation before knowing how one reacts. Because, as I said earlier, when you're in a simulation, it becomes real, and you get carried away, at least I do. I stay in that moment and immerse myself in it as if it was real. It's like that for the most part, but of course, it's a bit different with real patients, but it means that you're a little prepared for how you react, and you get to breathe and think about it.

The participants expressed that having experienced working in a stressful situation was important and that this was impossible to read up. Furthermore, it meant a lot to have that experience and competence when facing an acute situation in clinical practice as a new graduate.

> P14: Because there's a lot of equipment and many things that you can read about, it is [the feeling] to have it in your hands and see how it really works, which is important, and you know that people are waiting for you to do the right thing.

Although they experienced different kind of stress in ISBL compared to real acute practice situations, their participation in ISBL had still provided useful experience and knowledge about working in stressful acute situations.

5.1.4 | Contingency-planning competence

Through ISBL, participants stated that they gained increased understanding that, as perioperative nurses, they had to expect the unexpected and develop competence in contingency planning. They stated that things usually went as planned, but that they had to manage to rapidly adapt and act as the situation dictates.

> P1: We had a simulation where we had a patient in the prone position, where we suddenly had to turn the patient over again due to ventilation problems. And it's just like that, such a fantastic, it was actually a fantastic example, because I have experienced it so many times now since I have started working, and anything can happen here. You cannot expect things to go as planned.

As newly graduated perioperative nurses, they described that they continued working to prepare themselves mentally for the worst possible scenarios. They did this in different ways, such as going through the trauma equipment, reading procedures or working as if it was an emergency even when the surgery was planned. They found this to be meaningful because if something suddenly happened, they felt prepared to manage the acute situation.

> P19: And what I actually learned [through ISBL], and it stayed with me, is to find and have the knives [scalpels] and compresses first. Everything else you can find afterward. And I've taken that with me…. So, I find the compresses and knives [scalpels] first, whether it is an acute or a planned [caesarean section]. Then, I find the others afterward. I do this consistently because, yes, because then there won't be any problem when an acute one happens. The compresses and knives [scalpels] are there. Yes.

Furthermore, participants reported that upon graduation they lacked the ability to foresee all the turns a situation could take, because they were not experienced enough and were unequipped to prepare themselves for all eventualities.

> P17: The disadvantage that I experience is that you don't have all the scenarios in your head of what can happen as a recent graduate. You haven't experienced so much, so you invent things, and they run in your head.

They stated that the professional knowledge they had gained resulted in how they eventually acted in acute situations.

> P17: But it's the professional knowledge that you have, that action competence, to be able to do something if something should happen. Oh, what you go through in your head, then the action competence [helps] you manage to handle things when something happens.

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5.2 | Competence in interprofessional teamwork

Through ISBL during their postgraduate education, participants gained knowledge and practical experience that increased their competence in interprofessional teamwork as recently graduated perioperative nurses working in interprofessional teams. They discussed the development of communication and collaborative competence in interprofessional teamwork.

5.2.1 | Interprofessional communication competence

Participants reported that they gained knowledge and understanding of the importance of clear communication, repeated messages, and conciseness in acute situations. They had the opportunity to practise closed-loop communication and experience how useful this was.

> P15: This here with communication. Clear and with repeating messages, and concise. Yes, that with practicing communication. I feel that I have a little of that inside of me and an increased awareness of its importance. Yes, in all situations, really, but especially in acute situations.

Practising communication through ISBL and then reflecting on this while debriefing expanded their knowledge regarding effective communication in acute situations. As recently graduated perioperative nurses, they found this knowledge and skills beneficial for daily communication in interprofessional teams in clinical practice. Also, they gained competence in communication as they reflected further during their clinical practice after graduation.

> P10: I think that was part of it, communicating with each other when we had that simulation. Further on, you got to use it a little more in practice. Let's put it that way. Because then you had more time and room to think about how you're doing it. When a nurse is standing and receiving, when the trauma manager says 'Yes, blood pressure 140 over 70, yes, blood pressure 140,' you confirm it. Oh, that was a role we got to have when we stood there [in the ISBL]. Yes, when we had to be the nurse who was writing it down.

Additionally, the participants expressed that they, through ISBL, experienced and understood how important it was that the leader of a trauma team communicates clearly.

> P16: Yes. In retrospect, I see that I wasn't clear enough myself, on things I was unsure of… Being in trauma reception, I saw the difference between having a clear team leader and not having one. There's a huge difference. As a recent graduate, it's important for everyone, but it's essential to have a clear leader.

5.2.2 | Interprofessional collaborative competence

Participants reported that ISBL during their education had developed their competence in interprofessional collaboration. As members of teams in interprofessional contexts, they experienced and understood each other's professional roles and the importance of team cohesion. They also gained insights into their own professional roles and how that could relate it to other roles in the team.

> P18: It's a little easier when you know what kind of people work together in such a situation…. What are these different people doing? What are their work tasks? A caesarean section situation is one thing, but also in a trauma situation where… there are many people and knowing in advance who they are and what they do…. I have thought afterwards that it has been valuable from the simulation. It improved my handling of acute situations… at least me, in a real situation.

The participants said that ISBL gave them insights into the specific tasks that the different professions performed in the team during an acute practice situation. They also gained insights into how dependent they were on each other as being of different professions, not only as a team but also as individuals, to work coherently together to ensure patient safety. Additionally, they perceived the amount of time needed for tasks undertaken by different professionals, such as patient intubation.

> P17: Of course, we had a slightly different focus. The anaesthesia nursing students had their focus, while we had our own as the perioperative nurses. But there is something [beneficial] about seeing each other work, to see the time spent, for example, intubating a patient before starting to do something more with the patient.

Seeing the roles of each professional performed in this way, they deepened their appreciation and understanding of team dynamics.

The participants said they gained insights into their own professional roles and tasks in acute situations, which increased their knowledge of what to do in such a situation.

> P11: Even though I am a recent graduate, I know what is going to happen. The simulation has given

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> me a greater understanding of these situations. Yes, absolutely, even though I am new, I am not completely unprepared. No, I am not quite that. Because I know the basics, but I cannot control what will happen according to what kind of patient is coming and what condition he is in. I can be unprepared of course. But I understand what is going to happen. I know about my role, and the tasks and what is expected of me. Of course, it [ISBL] helped me a lot. Very much.

Defined roles gave the participants a sense of security, but they could also practise outside of their own roles and help each other after learning how to work together with others in the team.

> P10: Like in a trauma team, for example, then, there are an awful lot of different people in that team. You have bioengineers. You have emergency nurses. You have doctors, so many different roles. Then I feel that it is constructive that the roles are so clear as like when we simulated at school. We have practiced it. It is kind of like, you know, yeah. Everyone does their thing and knows who to talk to and who to ask. You know who the leader is. It kind of slides so easily. In a way.

Through ISBL, participants observed how personal competence affected interprofessional teamwork in acute situations. Calm, confident personalities created a positive atmosphere in interprofessional collaboration.

> P14: I saw that teamwork depends on who you are during acute situations. How the rest of the team handles it. Because there can be a huge difference in the atmosphere when handling such situations, you feel it as soon as you enter, how the stress level is, and how their mood is. Then it could fast spread to the rest of the team. I think it is a bit person dependent. We are a team, so regardless of how I had handled it, one has experienced being affected by the rest then.

The opposite was also experienced, creating stress when people acted without clarity, leading to uncertainty and less security.

5.3 | Professional identity development

Participants described how ISBL may have influenced their self-confidence as recently graduated perioperative nurses. Furthermore, ISBL supported an incipient sense of professional identity when working as part of an interprofessional team, as they experienced increased clarity regarding roles.

5.3.1 | Development of self-confidence

While observing themselves on film and receiving professional feedback, participants reflected on the performances of themselves, the others and the team in the ISBL scenario. This enabled them to gain an incipient understanding regarding the professional demands on a perioperative nurse in acute situations. Gaining a sense of mastery in ISBL, they felt increased self-confidence by perceiving that they too could also handle and face acute situations in clinical practice, which was important as recent graduates in perioperative practice.

> P12: But it [the simulation] has made me realise that [I am able to manage an acute situation] and has given me feelings that I have been able to manage [being in an acute situation]. Call it mastery then because I have managed [being in an acute situation]. I have also been involved in a trauma situation and then…. I managed. I have also been involved in an acute situation and have been up to not exactly maximum speed at the caesarean section…. So, on the whole, that one benefits from being in it [acute situation], absolutely!… I have experienced handling that [manage being in an acute situation].

Participants said that their experiences of increased competence and mastery led to a feeling of security and self-confidence. In ISBL, debriefings were highlighted as essential, as these gave rise to such experiences through reflection and constructive feedback. This promoted increased self-trust in having the required knowledge and skills to manage acute situations. However, ISBL could also result in experiences that led to decreased self-confidence. One participant mentioned an experience during ISBL as a feeling of complete failure, as they had gained no sense of mastery, resulting in a negative experience.

> P2: I was a little put off by that simulation. Thought how should this go? Really. Interviewer: Was that the feeling you went home with at the end of the day? P2: Yes, I was a little stressed then. There was no feeling of mastery at all, and I showed that it was not representative of how I am. And how I usually do things and how I perform and function.

Participants found that the transition from leaving their roles as a student with few responsibilities to perioperative nurses with great responsibilities was difficult. They described gaining enough self-confidence to trust themselves as being challenging but possible. They brought forth experiences from being RNs and felt that this could give them a sense of security that increased self-confidence.

> P1: But I know with myself that I have been in acute situations as a nurse and, so I lean a little on that. If it

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> does not necessarily help me there, it helps to think that I have some experience. I have some, I have solved some situations before, so maybe I'm relying on that too, true.

As recent graduates, the participants explained that they needed time and experience to become more self-confident and to build up enough self-confidence and assertiveness to raise their voices and become full-fledged participants in a team.

> P8: It is more about having to dare to have 'pointed elbows' and taking my place [in the team] or space. That is perhaps more of what I have found challenging. To not dare to take space in the room if you understand. Yes. When cutting clothes, for example [trauma situation]. If you are a little too careful, then it is said [in the room] that you have to get rid of those clothes. Because there are so many people there, and you think that little me should stand in the corner.

5.3.2 | Belonging to a profession in an interprofessional team

Participants noted that through ISBL they had become more aware of their professional role in interprofessional teams. This gave them a sense of belonging to their future profession, and thus an emerging sense of identity.

> P11: I was in a caesarean section team one day, and the other day I was in a trauma team. I have to say that I mostly draw on the simulation of trauma, because I recognised that situation again when I was in trauma, when I was a perioperative nurse on trauma.

Participants also pointed out that they became more aware of their professional roles through debriefing, during which the participants received expert feedback and reflected on their roles as perioperative nurses.

> P1: We got to see afterwards and speak in a safe environment about the simulation situation. I think it was a little scary, as I said, in the beginning before we went through. But I benefited greatly from it. Because I think it was constructive feedback I got, and I felt mastering within things we did in the simulation. We got to see it again. I think that raising awareness of cooperation and prioritisation is very useful.

Also, participants said that it was essential that their profession was included in the ISBL to feel a sense of professional identity and pride.

> P11: The very roles that people have, and that there is a leader, a surgeon, an orthopaedist, and a bioengineer, so I have got them with me. That all participants in the trauma team must have their place. Everyone is important. Furthermore, I am part of the team, and it has made me very proud that perioperative nursing is a part of this.

In their role as perioperative nurses during ISBL, the opposite occurred when they did not receive the same focus and attention as the other students in other professions. Then they felt like extras in the scenario. This gave rise to a sense of being a less important part of the interprofessional team, with reduced professional identity development.

> P14: I remember we had a simulation about caesarean section. Then, I remember that there was a lot of focus on anaesthesia… Yes, so I felt that perioperative nursing came a bit in the background.

6 | DISCUSSION

This study has explored recently graduated perioperative nurses' experiences of interprofessional simulation-based learning during postgraduate education and investigated whether and how this learning approach contributed to the development of their professional competence in meeting acute clinical situations. Our results reveal that the recently graduated perioperative nurses did experience ISBL as having contributed to the development of their professional competence in meeting acute situations in their clinical practice. The benefits included competence in handling acute situations, competence in interprofessional teamwork and professional identity development.

The results of this study highlight the function of ISBL in facilitating the development of relevant knowledge and skills as a general competence, allowing recently graduated perioperative nurses to face acute situations with understanding and preparedness. This was developed through their experience of (simulated) acute situations followed by reflection, which connected clinical and theoretical knowledge for practice and thus contributed to an active and constructive learning process.

Learning through reflection is well known in the literature emphasising that reflection allows students to learn from their experience (Bulman & Schutz, 2013; Schön, 1987). Through reflection, students can gain valuable insights into their practice (Bolg, Dwyer, Doherty, Pignataro, & Renaud, 2020). The study by Barbagallo (2021) further supports this, asserting that reflection promotes the capacity to understand practical performance and substantiate with theory and generates effective professional learning since it is needed to achieve generalisation and application (Barbagallo, 2021).

Our study indicates that the general competence development gained through ISBL augments higher professional development for recent graduates in clinical practice, as participants expressed that

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they developed their competence whenever they faced an acute situation. This aligns with a study by Sterner, Ramstrand, Palmér, and Hagiwara (2021) showing not only that experience is vital but also that the amount of experience of acute situations is an important factor in delivering safe care to patients (Sterner et al., 2021).

The participants in this study developed competence in prioritising in acute situations, which is vital for patient safety (Gabrielsen et al., 2009; Gawronski, 2019). Further, they developed competence for working in stressful situation, which seems essential for perioperative nurses as stress can distract attention and lower performance. Hence, it is important for perioperative nurses (and others) to experience working in stressful situations in ISBL so as to learn how to manage this and enhance their performance (Vincent et al., 2021). Additionally, the participants here learned to expect the unexpected through ISBL, which developed their contingency-planning abilities. This also is imperative for perioperative nurses, who work in situations where the patient's condition can change quickly. Unexpected situations occur during surgeries, and perioperative nurses need to be prepared to adjust their plans (Nyberg, Olofsson, Otten, Haney, & Fagerdahl, 2021).

The World Health Organisation (2010) recommends interprofessional collaborative practice to provide safe, high-quality care to patients in acute situations (Gregory, 2020). In our study, the perioperative students participated in ISBL along with students from other nursing specialisations, such as anaesthetic, critical care and paediatric nursing. From a sociocultural viewpoint, participating in ISBL creates valuable interaction between students, generating knowledge and skills (Mylrea, 2018). This study's results support this view by showing that through ISBL, participants gained an increased understanding of the importance of clear and concise communication in acute situations. Furthermore, they reported improved interprofessional collaboration, as they experienced themselves as members of interprofessional teams and perceived the roles of the others and the importance of team coherence.

Educating perioperative nurses to prepare for interprofessional teamwork is imperative for patient safety in acute situations (Beitz, 2019; Lamparyk et al., 2022). In this study, activity theory was applied to understand the development of professional competence using ISBL, and this theoretical framework expanded our understanding of the results (Byerly et al., 2021). According to activity theory, learning occurs when students participate in collective activities and interact with each other towards a common goal (Mylrea, 2018). This learning also occurred in our study as participants developed deeper understandings of the other professionals' roles in the interprofessional team.

ISBL also assisted participants in becoming professionals, as they increased their understanding of their roles and related these to the team's other professional roles, clarifying professional boundaries. Participants in the present study gained insights into how dependent they were on each other as professionals in an interdisciplinary team. This resulted in an increased understanding of each other's roles and work tasks, team dynamics and positive attitudes towards other professions, which can support the development of more beneficial interactions in team processes (Gregory, 2020). Having a positive attitude regarding each member in the interprofessional team can lead to expanded psychological safety, also defined as how safe a team member feels it is to take interpersonal risks, though, for example, speaking up (Willassen, Jacobsen, & Tveiten, 2018).

The results of this study indicate that participants developed their professional identities through ISBL as they understood their professional roles and the associated demands in acute situations. Bagnasco et al. (2019) stated that building professional identity is an active process leading to an understanding of the context of a professional role, one's practice, and one's commitment to a profession (Bagnasco et al., 2019). Understanding professional identity development has to a large extent been addressed in sociocultural learning theories (Eteläpelto, Vähäsantanen, Hökkä, & Paloniemi, 2014). Johnson, Cowin, Wilson, and Young (2012) concluded that developing professional identity is essential to obtaining knowledge and skills during nursing education. Within a perioperative nursing context, perioperative nursing is described as caregiving in a hierarchical context, one in which speaking up for the patient can be challenging (Willassen et al., 2018). Developing a stronger professional identity and self-confidence can strengthen the courage to speak up in an interprofessional team to ensure patient safety. Rød, Kynø, and Solevåg (2021) supported this, finding that participants experienced this when they became confident through ISBL and found the courage to ask questions and express disagreement.

For our participants, having self-confidence as recent graduates was perceived as valuable, and they described gaining the required self-confidence as challenging but possible. Gaining mastery experiences through ISBL gave participants experiences of increased self-efficacy. This influenced their self-confidence, giving them the perception that they had enough knowledge and skills to manage acute situations in clinical practice as recent graduates.

In previous studies, it was found that ISBL can influence self-efficacy in acute situations (Kaldheim, Fossum, Munday, Creutzfeldt, & Slettebø, 2021), as well as self-confidence (Haddeland et al., 2021). ISBL can also decrease self-efficacy and self-confidence when the experience of failure dominates, as one participant in our study mentioned. Participating in an ISBL scenario, students report experiences of anxiety and stress (Al-Ghareeb, McKenna, & Cooper, 2019), and that these emotions can affect their learning process. Further, how instructors and participants look at poor performance may affect students' willingness to expose themselves and leave their comfort zone (Harland, 2020). Therefore, educators need to provide a psychologically safe ISBL environment, follow ISBL guidelines and devote time during debriefing to reflection and explanations to avoid students leaving ISBL with feelings of unresolved frustration and confusion (Madsgaard, Smith-Strøm, Hunskår, & Røykenes, 2022), and to develop self-efficacy and boost self-confidence.

Experienced-based education like ISBL promotes the development of appropriate self-beliefs in participants, giving rise to changes in self-perception, which can guide them in further training. The participants in this study expressed that their experience as RNs gave

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them a sense of security that bolstered their self-confidence, and that they needed time to build up their self-confidence. It seems that building self-confidence and professional identity is a transformative process that begins when students enter education and continues throughout their work.

In the present study, participants stated that ISBL increased awareness of their professional role, resulting in a feeling of belonging to their profession. Being in a representative context, playing out their future role as a perioperative nurse and reflecting over their performance and future professional role, participants acquired a sense of professional identity. Furthermore, a condition for this was that they were included on the same terms as other professions during ISBL. This is supported by Mylrea (2018) who contend that each profession 'learns to function within a particular society or group by internalising values and norms' (Mylrea, 2018, p. 3). This active process involves transforming students into professionals who recognise their profession's values, attitudes and behaviours (Rees & Monrouxe, 2018).

Participants in our study highlighted the usefulness of previous experience. When facing an acute situation similar to one they had experienced in ISBL during postgraduate education, they called upon the knowledge and skills they had gained and applied them in clinical practice as recent graduates. This is in line with other studies where learners reported that they could transfer their gained learning outcomes from ISBL to clinical practice (Fisher & King, 2013; Marker, Mohr, & Ostergaard, 2019). Marker et al. (2019) found that SBL facilitated the transition from being a medical student to becoming a junior doctor. Transfer of competence from one context to another, in our study from education to clinical practice as recent graduates, is used as a metaphor, and it implies that something is 'moved' from one situation to another. According to activity theory, this does not mean that the effects of a prior task and knowledge remain intact; instead, it is a process where transfer involves active interpreting, modifying and reconstructing (Tuomi-Gröhn, Engeström, & Young, 2003).

6.1 | Study strengths and limitations

The first author conducted and transcribed the interviews to ensure correctly reproduced statements. It can improve the trustworthiness of data when the same person interviews, transcribes and verifies the content's meaning.

Four interviews were conducted using Skype for Business, which could have affected the interactions between the interviewer and the participants providing their answers. These interviews were nonetheless rich in text to analyse and interpret. All the authors were involved in the entire process of interpretation; they discussed the interpretations, which according to Sandelowski (1993) is important to ensure high quality in interpreting the transcribed text. Also, the researchers are of different backgrounds and came with different preunderstandings, giving rise to different views to consider and ensuring good internal consistency of the interpretation (Lindseth & Norberg, 2004, 2021).

Within a phenomenological hermeneutical interpretation, our focus is to reveal truths about a phenomenon. We cannot establish causality but reasonably interpret the possible meaning of lived experiences (Lindseth & Norberg, 2021). To provide transparency in the analysis process, quotes from the data material have been included in the descriptions of the results.

7 | CONCLUSION

During postgraduate education, through ISBL perioperative nurses developed professional competencies to deal with acute situations as recent graduates. ISBL is essential for practising acute situations, as it generates effective professional learning by integrating theoretical knowledge with practice and linking this through reflection. This has allowed recently graduated perioperative nurses to face acute situations with understanding and preparedness. As well, professional identity is developed, as through ISBL participants gain self-confidence and enhanced awareness of their professional role in an interprofessional team.

8 | RELEVANCE TO CLINICAL PRACTICE

Recently graduated perioperative nurses experience ISBL as having increased their self-efficacy and self-confidence, strengthened their belief in their own knowledge and skills in managing acute situations and developed their professional identities. This is essential for patient safety, as it improves competence and enables perioperative nurses to speak up when working in an interprofessional team. As newly graduated perioperative nurses, they transferred the competence development from the ISBL in postgraduate education into clinical practice and improved their performance. This finding is essential and supports the necessity of implementing ISBL into perioperative nursing education to prepare students for clinical practice.

AUTHOR CONTRIBUTIONS

All authors, Hege Kristin Aslaksen Kaldheim, Mariann Fossum, Judy Munday, Johan Creutzfeldt and Åshild Slettebø, fulfil the journal's authorship policy and have approved the final text. Hege Kristin Aslaksen Kaldheim involved in collection data and performed as transcriber. All authors Hege Kristin Aslaksen Kaldheim, Mariann Fossum, Judy Munday, Johan Creutzfeldt and Åshild Slettebø analysed and prepared manuscript.

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CONFLICT OF INTEREST

The authors declared no conflict of interest.

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DATA AVAILABILITY STATEMENT

Research data are not shared.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

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Appendix 1

Approval from the Research Ethics Committee of the University of Agder

17/12/2018 12:44:43 CET – Anne Valen-Sendstad Skisland
Vi informerer om at din søknad er ferdig behandlet og godkjent.

Kommentar fra godkjenner:
Godkjent under forutsetning av gjennomføring som beskrevet i søknaden og godkjenning av NSD.

Vennligst benytt Tjenesteportalen for oppdateringer på din henvendelse/bestilling.

Med vennlig hilsen
Universitetet i Agder

Ref:MSG1669551

Appendix 2

Approval from the Norwegian Centre for Research Data (NSD)

Vurdering

Skriv ut
11.01.2019

Referansenummer
363692

Type
Standard

Dato
11.01.2019

Prosjekttittel
High-fidelity simulation as a pedagogical approach in perioperative education of nurses- developing professional competence

Behandlingsansvarlig institusjon
Universitetet i Agder / Fakultet for helse- og idrettsvitenskap / Institutt for helse- og sykepleievitenskap

Prosjektansvarlig
Hege Kristin Aslaksen Kaldheim

Prosjektperiode
04.12.2018 - 31.12.2023

Kategorier personopplysninger

- Alminnelige

Rettslig grunnlag

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

Behandlingen av personopplysningene kan starte så fremt den gjennomføres som oppgitt i meldeskjemaet. Det rettslige grunnlaget gjelder til 31.12.2023.

Meldeskjema

Kommentar
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 11.1.2019. 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 31.12.2023.

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).

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 (hvert annet år) og ved planlagt avslutning for å avklare status for behandlingen av personopplysninger.

Lykke til med prosjektet!

Kontaktperson hos NSD: Lasse Raa Tlf. personverntjenester: 55 58 21 17 (tast 1)

b5d90908a

Appendix 3

Letter to the department managers of educational institutions

Grimstad xx. xxxxx 2019

Til Instituttleder/dekan ved _____

Jeg søker herved om godkjenning til å samle inn forskningsdata ved _____ , videreutdanning/masterutdanning av operasjonssykepleiere xxx, våren 2019, til og med høsten 2020. Søknaden er i forbindelse med min doktoravhandling om simulering som pedagogisk metode i utdanning av operasjonssykepleiere.

Jeg ønsker å forespørre operasjonssykepleiestudenter som deltar/har deltatt på fullskalasimulering som inkluderer en akutt situasjon. Det vil være aktuelt å forespørre operasjonssykepleiestudenter som er i utdanningsforløp hos dere våren 2019 til og med høsten 2020. Antall studenter vil være de, som nå er inne i studieforløpet og de som kommer inn i neste studieforløp 2020. Informering og rekruttering med utdeling og innhenting av samtykkeskjemaene, vil jeg gjerne at deres lærer gjennomfører.

Jeg ønsker å intervjue operasjonssykepleiestudentene så raskt som mulig etter at de har deltatt i simuleringen, slik at de har det friskt i minne (helst innen to uker etter simuleringen). Studentene vil rekrutteres til fokusgruppeintervju (5-8 studenter i hver gruppe).
Videre ønsker jeg å intervjue samme gruppen når de er ferdige med studieforløpet sitt og er kommet ut i klinisk praksis som operasjonssykepleiere (helst 3 – 4 måneder etter). Dette vil være individuelle intervju. De vil få forespørsel om å delta i denne delen av forskningsprosjektet mens de er i studieforløpet sitt. Deltagerne kan samtykke til et eller begge intervjuene (de trenger ikke å delta i begge studiene hvis de ikke ønsker det).

Prosjektet har tittelen: Perioperative nursing students' experiences of simulation teaching and learning used to prepare for complex situations in clinical practice as newly graduated.

Prosjektleder/PhD-stipendiat: Hege Kristin Aslaksen Kaldheim

Hovedveileder: Professor Åshild Slettebø Universitetet i Agder

Medveiledere: Professor Mariann Fossum Universitetet i Agder og Førsteamanuensis Judy Munday Universitetet for teknologi Brisbane Queensland Australia

Forskningsprosjektet er godkjent av Norsk Senter for Forskningsdata, NSD, nummer 363692 og Fakultetets Etiske Komité Universitetet i Agder, FEK.

_____
(sted/dato)

_____
Godkjenning er gitt av instituttleder for Helsevitenskap xxxxx. xxxxxx

Appendix 4

Letter to the privacy representatives of hospitals

Universitetet i Agder 03.03.2019

Til personvernombud ved_____

Mitt navn er Hege Kristin Aslaksen Kaldheim og jeg er stipendiat ved Universitetet i Agder, Institutt for helse- og sykepleievitenskap. PhD- prosjektet som jeg jobber med, heter «Perioperative nursing students' experiences of simulation teaching and learning used to prepare for complex situations in clinical practice as newly graduated". Prosjektet består av tre delstudier og deltagerne som er operasjonssykepleiestudenter vil bli rekruttert via utdanningsinstitusjonen som de er tilknyttet, mens de gjennomfører sin utdanning. Her har vi fått godkjenning i fra hver enkelt utdanningsinstitusjon, til å kunne gjennomføre studien.

Prosjektet er godkjent av Norsk Senter for Forskningsdata, NSD, nummer 363692 og av Fakultetets Etiske Komite Universitetet i Agder, FEK. Datainnsamlingen vil foregå i perioden 2019 til 2021.

Prosjektleder/PhD-stipendiat er Hege Kristin Aslaksen Kaldheim. Hovedveileder er Professor Åshild Slettebø, Universitetet i Agder, medveiledere er Professor Mariann Fossum, Universitetet i Agder og Førsteamanuensis Judy Munday, University of Technology, Brisbane Queensland, Australia/ professor II Universitetet i Agder.

I delstudie 3 skal vi intervjue (individuelle intervju) operasjonssykepleiestudentene tre til fem måneder etter at de er ferdig utdannet operasjonssykepleiere. De informantene som har sagt ja, (gjennom rekruttering mens de var i sitt utdanningsforløp), vil bli intervjuet på sin fritid. Hensikten er å få deres erfaringer som nyutdannet operasjonssykepleier i møte med klinisk praksis og videre om den simuleringen som de deltok på under operasjonssykepleie-utdanningen kan ha bidratt inn i deres møte med akutte og komplekse situasjoner i klinisk praksis. Operasjonssykepleiestudentene er rekruttert i fra fem forskjellige utdannings-institusjoner i Norge og vil være ansatt ved flere sykehus i Norge.

Intervjuene vil finne sted utenfor sykehusets lokaler, og noen intervjuer vil bli gjennomført på Skype.

Vi har testet ut intervjuguiden og ser at det kan fremkomme informasjon som er knyttet til informantenes arbeidsted, som omhandler deres møte med praksis som nyutdannet operasjonssykepleiere.

Vi ber om at personvernombudet ved sykehus vurderer om prosjektet er søknadspliktig. Tilbakemelding kan sendes til Hege Kristin Aslaksen Kaldheim, e-post hege.kaldheim@uia.no, telefon 91007380. Hører vi ikke noe innen 3. april 2019, regner vi med det er greit med informasjonen som er gitt.

Med vennlig hilsen Hege Kristin Aslaksen Kaldheim.

Appendix 5

NSD change, notification and approval

Melding fra Lasse Andre Raa
15.03.2019 13:09

Hei

Ettersom prosjektet ikke behandler sensitive opplysninger eller på annet vis medfører høy personvernulempe, har vi ingen innvendinger mot at intervjuene gjennomføres via Skype. Det er heller ikke nødvendig å legge dette inn som en endring i meldeskjemaet.

Dersom mulig, anbefaler vi imidlertid at det benyttes tjenester som befinner seg innenfor Universitetet i Agders kontroll, eksempelvis ved bruk av Skype for Business, som Universitetet etter hva vi forstår tilbyr til alle studenter.

Melding fra Hege Kristin Aslaksen Kaldheim
12.03.2019 18:34

Hei igjen.

Noen av de som har samtykket til å delta i de individuelle intervjuene, har spurt meg om jeg kan gjennomføre intervjuet ved å bruke Skype. Hva tenker dere om dette? Må jeg sende inn forandrings melding til dere, eller er det greit å gjennomføre individuelle intervju ved å bruke Skype? Vil ikke ta det opp på telefon eller Mac, men bruke tape rekorder på samme måte som om vi var i samme rom? Mange av deltagerne bor på forskjellige kanter av landet.

Melding fra Lasse Andre Raa
22.03.2019 12:45

Hei

Nei, dette påvirker ikke vår vurdering, og er ikke nødvendig å melde som endring.

Melding fra Hege Kristin Aslaksen Kaldheim
22.03.2019 10:45

Hei,
Vi har endret tittelen på prosjektet. Må jeg sende endringsmelding på dette. Den nye tittelen er: «Perioperative nursing students´ experiences of simulation teaching and learning used to prepare for complex situations in clinical practice as newly graduated»

Appendix 6

Information about Studies1 and 2 and the participants' informed consent forms

Vil du delta i forskningsprosjektet

«Operasjonssykepleiestudenters erfaringer med bruk av simulering i undervisning og læring for å forberede seg på komplekse situasjoner i klinisk praksis»

Dette er et spørsmål til deg om å delta i et forskningsprosjekt hvor formålet er å få kunnskap om operasjonssykepleiestudenters læring og utvikling av profesjonell kompetanse gjennom bruk av full-skalasimulering som læringsmetode. I dette skrivet gir vi deg informasjon om målene for prosjektet og hva deltakelse vil innebære for deg.

Formål

- Formålet med forskningsprosjektet, er å få økt kunnskap og innsikt i hvordan operasjonssykepleiestudenter lærer og oppnår læringsutbytte, gjennom bruk av fullskala-simulering som læringsmetode.
- Videre er formålet å få økt kunnskap og innsikt i operasjonssykepleiestudenters utvikling av mestringstro gjennom bruk av fullskalasimulering (mestringstro er egen tro på å mestre en bestemt oppgave/situasjon).

Prosjektet er en doktorgradsstudie og opplysninger og data som fremkommer i dette forskningsprosjektet skal kun brukes til de formålene som det er opplyst om i dette informasjonsskrivet.

Hvem er ansvarlig for forskningsprosjektet?
Universitetet i Agder er ansvarlig for prosjektet.

Hvorfor får du spørsmål om å delta?
Du får denne forespørselen fordi du er operasjonssykepleiestudent ved en utdanning i Norge, og for at du skal delta på fullskalasimulering. Operasjonssykepleiestudenter fra flere utdanningsinstitusjoner i Norge, vil få spørsmål om å delta i dette forskningsprosjektet, og det vil være ca. 30-40 operasjons-sykepleiestudenter som får denne forespørselen.

Hva innebærer det for deg å delta?

- Hvis du velger å delta i forskningsprosjektet innebærer det at du sier ja til å delta på et fokusgruppeintervju, sammen med 5-8 andre studenter som har deltatt på samme simulering som deg og som er operasjons-sykepleiestudenter i fra din utdanningsinstitusjon. Fokusgruppeintervjuet vil bli gjennomført ved din utdanningsinstitusjon innen en uke etter at du deltok på simuleringen, og vil vare i fra 1 til 1,5 time. Det vil bli ledet av to forskere: PhD student Hege Kristin Aslaksen Kaldheim og en av hennes veiledere. Her vil det bli stilt spørsmål om dine erfaringer med simuleringen som du deltok på.

Intervjuet vil bli tatt opp på lydbånd for senere å bli skrevet ut på papir. Etter at intervjuene er skrevet ut og analysen av datamaterialet er ferdig, vil lydfilene bli slettet. Alle opplysninger som kan føre til gjenkjenning av deg vil bli fjernet.

Det er frivillig å delta
Det er frivillig å delta i prosjektet. Hvis du velger å delta, kan du når som helst trekke samtykke tilbake uten å oppgi noen grunn. Alle opplysninger om deg vil da bli anonymisert. Det vil ikke ha noen negative konsekvenser for deg og det vil ikke påvirke ditt studieforhold til din utdanningsinstitusjon eller senere til arbeidsgiver eller arbeidssted hvis du ikke vil delta eller senere velger å trekke deg. Dersom du ønsker å trekke deg i fra forskningsprosjektet, kan du kreve å få slettet innsamlede opplysninger med mindre opplysningene allerede er inngått i analyser eller brukt i vitenskapelige publikasjoner.

Dersom du senere ønsker å trekke deg eller har spørsmål til forskningsprosjektet, kan du kontakte Hege Kristin Aslaksen Kaldheim, e-post hege.kaldheim@uia.no telefon 91007380 eller veileder, professor Åshild Slettebø, e-post ashild.slettebo@uia.no telefon 37233787.

Ditt personvern – hvordan vi oppbevarer og bruker dine opplysninger
Vi vil bare bruke opplysningene om deg til formålene vi har fortalt om i dette skrivet. Vi behandler opplysningene konfidensielt og i samsvar med personvernregelverket. En kode knytter deg til dine opplysninger gjennom en navneliste, og det er kun PhD student Hege Kristin Aslaksen Kaldheim som har adgang til navnelisten og kan finne tilbake til deg. Denne navnlisten vil være innelåst i et skap adskilt fra øvrige data, hvor Hege Kristin Aslaksen Kaldheim er den eneste som har nøkkel, kontoret hvor dette skapet står, vil være låst. Forskeren har taushetsplikt. Datamateriale i fra intervjuene, vil bli lagret på en datamaskin (tilhørende Universitetet i Agder), hvor det er kun PhD student Hege Kristin Aslaksen Kaldheim som har kode for å komme inn.

Resultatene vil bli publisert i vitenskapelige artikler. Datamaterialet vil bli anonymisert slik at det ikke er mulig å identifisere enkeltpersoner.

Hva skjer med opplysningene dine når vi avslutter forskningsprosjektet?
Forskningsprosjektet skal etter planen avsluttes 31. desember 2023. Informasjonen om deg vil da bli slettet når forskningsprosjektet avsluttes.

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), og
- å sende klage til personvernombudet eller Datatilsynet om behandlingen av dine personopplysninger.

Hva gir oss rett til å behandle personopplysninger om deg?
Vi behandler opplysninger om deg basert på ditt samtykke.
På oppdrag fra Universitet 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?
Hvis du har spørsmål til studien, eller ønsker å benytte deg av dine rettigheter, ta kontakt med:

- Universitetet i Agder (UiA) ved Hege Kristin Aslaksen Kaldheim, e-post hege.kaldheim@uia.no, telefon 91007380
- UiAs personvernombud: Ina Danielsen, e-post ina.danielsen@uia.no, telefon 45254401
- NSD – Norsk senter for forskningsdata AS, på epost (personverntjenester@nsd.no) eller telefon: 55 58 21 17.

Med vennlig hilsen
Hege Kristin Aslaksen Kaldheim
Prosjektansvarlig/PhD-student

Samtykkeerklæring

Jeg har mottatt og forstått informasjon om prosjektet Fullskalasimulering som en pedagogisk tilnærming i utdanning av operasjonssykepleiere for å utvikle profesjonell kompetanse og har fått anledning til å stille spørsmål. Jeg samtykker til:

- Å delta i dette forskningsprosjektet som innebærer å delta i et fokusgruppe intervju som beskrevet i informasjonsskrivet.

Jeg samtykker til at mine opplysninger behandles frem til prosjektet er avsluttet, ca. 31.12.2023

(Signert av prosjektdeltaker, dato)

Appendix 7

Interview guide for Studies 1 and 2

«Perioperative nursing students´ experiences of simulation teaching and learning used to prepare for complex situations in clinical practice as newly graduated»

Intervjuguide fokusgruppeintervju med 4-8 studenter innen 6 uker etter deltagelse i simulering

Tema:

Bruk av fullskala simulering som læringsmetode i utdanning av operasjonssykepleiere.

Hensikt:

Å få økt kunnskap om operasjonssykepleiestudenter sin læring og utvikling av profesjonell kompetanse ved å bruke fullskalasimulering som læringsmetode i deres utdanning.

Spesifikke hensikter er:

1. Fokusgruppe intervju
    - Utforske og beskrive hvordan elementene (brifing, simuleringsøkten og debrifingen) i simuleringen bidrar i operasjonssykepleiestudenter sin læringsprosess.
    - Utforske og beskrive hvordan elementene i simuleringen bidrar i operasjonssykepleiestudenter sitt læringsutbytte.
        - Som kommunikasjon og samarbeid i det kirurgiske teamet, prioritering av oppgaver, innsikt i deres egne reaksjoner i akutte situasjoner.
    - Utforske hvordan operasjonssykepleiestudenter opplever at simuleringen påvirker deres mestringstro til å kommunisere, samarbeide, prioritere oppgaver i akutt situasjoner.

Gjennomføring:

Varighet: 60-90 minutter

1: Felles introduksjon:

- Presentasjon av moderator og en assistent moderator under intervjuet.
- Lydopptak.
- Taushetsplikt for hverandre.
- Om en skal snakke om andre mennesker, så skal en ikke bruke navn, for å bevare anonymitet til de det snakkes om.
- Gå åpent ut, og følge opp med utdypende spørsmål/oppfølgingsspørsmål.

2: Temaer: Gå igjennom elementene i simuleringen kort.

A. Briefing
B. Selve simuleringen
C. Debrifing

D. Mestringstro

3: Begrepsavklaring:

Læringsprosess: Si litt først om læringsprosess som begrep. Ha dette på en tavle/skjerm

Læringsutbytte: Presenter læringsutbyttene på en tavle/skjerm og si noe om dem

Mestringstro: Ha betydningen på en tavle/skjerm

A. BRIFING

1. **Kan dere fortelle om deres erfaringer med det å ha brifing før selve simuleringen?**

Oppfølgingsspørsmål:

- På hvilken måte opplevde dere at brifingen bidro til læring i simuleringen? (ikke bidro)?
- På hvilken måte opplevde dere at brifingen bidro til læringsutbytte i simuleringen? (ikke bidro)? (I det å skulle kommunisere i en slik akutt situasjon? I det å skulle samarbeide med andre i en slik akutt situasjon? I det å skulle prioritere oppgaver i en slik akutt situasjon? I det å få innsikt i egne reaksjoner i en slik akutt situasjon?).
- Er det noe som dere opplevde kunne vært gjort annerledes i briefingen, for å fremme læring og øke læringsutbytte? Kom gjerne med eksempel.

B. SIMULERINGS ØKT (SELVE SIMULERINGEN)

2. **Kan dere fortelle om deres erfaringer med simuleringsøkten (selve simuleringen)?**

Oppfølgingsspørsmål:

- På hvilken måte opplevde dere at simuleringsøkten bidro til læring? (Ikke bidro)?
- På hvilken måte opplevde dere at simuleringsøkten bidro til læringsutbytte? (Ikke bidro?) (I det å skulle kommunisere i en slik akutt situasjon? I det å skulle samarbeide med andre i en slik akutt situasjon? I det å skulle prioritere oppgaver i en slik akutt situasjon? I det å få innsikt i egne reaksjoner i en slik akutt situasjon?).
- Er det noe som dere opplevde kunne vært gjort annerledes i selve simuleringen, for å fremme læring og øke læringsutbytte? Kom gjerne med eksempel.

C. DEBRIFING

3. **Kan dere fortelle om hvilke erfaringer dere har med debrifingen?**

Oppfølgingsspørsmål:

- På hvilken måte opplevde dere at debrifingen bidro til læring? (Ikke bidro)?
- På hvilken måte opplevde dere at debrifingen bidro til læringsutbytte? (Ikke bidro)? (I det å skulle kommunisere i en slik akutt situasjon? I det å skulle samarbeide med andre i en slik akutt situasjon? I det å skulle prioritere oppgaver i en slik akutt situasjon? I det å få innsikt i egne reaksjoner i en slik akutt situasjon?).
- Er det noe som dere opplevde kunne vært gjort annerledes i debrifingen, for å fremme læring og øke læringsutbytte? Kom gjerne med eksempel.

D. MESTRINGSTRO: Si litt om begrepet mestringstro

4. **Fortell om deres erfaringer med hvordan simuleringen påvirker deres tro på å kunne mestre/klare det som forventes av dere i en akutt/kritisk situasjon?**

Oppfølgingsspørsmål:

- På det å kunne kommunisere i et tverrfaglig team, i en akutt situasjon?
- På det å kunne samarbeide tverrfaglig i en akutt situasjon?
- På det å kunne prioritere oppgaver i en akutt situasjon?
- Er det noe som dere opplevde kunne vært gjort annerledes i simuleringen, for å fremme troen på det å kunne mestre? Kom gjerne med eksempel.

Avslutningsspørsmål:

5. **Hvordan opplever dere at det å delta i simulering i deres utdannelse kan forberede dere for klinisk praksis?**
    - På hvilken måte?

Tilbakeblikk (ca.5-10.min)

1: Oppsummering

- Moderator oppsummerer muntlig og går gjennom de viktige punktene som kom frem i intervjuet.

2: Avklaring: Avklare misforståelser, spørre om man har forstått riktig dersom noe er uklart.

3:» Er det noe mer som dere ønsker å legge til?»

4: Lydopptak stoppes.

Appendix 8

Demographic data collection for Studies 1 and 2

Personopplysninger tilknyttet forskningsprosjekt:

«Operasjonssykepleiestudenters erfaringer med bruk av simulering i undervisning og læring for å forberede seg på komplekse situasjoner i klinisk praksis»

Deltager nummer:

Dato:

Alder:					
Kjønn:					
Hvor mange år har du jobbet som sykepleier før du begynte på utdanning i operasjonssykepleie?					
Hvor mange ganger har du deltatt på simulering før du begynte på utdanning i operasjonssykepleie?	0	1-5	6-10	11-15	16-20
Hvilke simuleringer(situasjoner/caser) har du deltatt i under din utdanning i operasjonssykepleie?					

Appendix 9

Information about Study 3 and the participants' informed consent forms

Vil du delta i forskningsprosjektet

«Operasjonssykepleiestudenters erfaring med bruk av simulering i undervisning og læring for å forberede seg på komplekse situasjoner i klinisk praksis»

Dette er et spørsmål til deg om å delta i et forskningsprosjekt hvor formålet er å få økt kunnskap om operasjonssykepleiestudenters læring og utvikling av profesjonell kompetanse gjennom bruk av fullskalasimulering som læringsmetode. I dette skrivet gir vi deg informasjon om målene for prosjektet og hva deltakelse vil innebære for deg.

Formål

- Formålet med forskningsprosjektet, er å få økt kunnskap og innsikt i hvordan du som ferdig utdannet operasjons-sykepleiere opplever at den fullskalasimulering du deltok på under din operasjonssykepleieutdanning, kan ha bidratt inn i ditt møte med akutte og komplekse situasjoner i klinisk praksis.

Dette prosjektet er en doktorgradsstudie og opplysninger og data som fremkommer i dette forsknings-prosjektet skal kun brukes til de formålene som det er opplyst om i dette informasjonsskrivet.

Hvem er ansvarlig for forskningsprosjektet?
Universitetet i Agder er ansvarlig for prosjektet.

Hvorfor får du spørsmål om å delta?
Du får denne forespørselen fordi du er operasjonssykepleiestudent ved en utdanning i Norge, og for at du skal delta på fullskalasimulering. Operasjonssykepleiestudenter fra flere utdanningsinstitusjoner i Norge, vil få spørsmål om å delta i dette forskningsprosjektet, og det vil være ca. 15-20 operasjons-sykepleiestudenter som får denne forespørselen.

Hva innebærer det for deg å delta?

- Hvis du velger å delta i forskningsprosjektet innebærer det at du sier ja til å delta på et individuelt intervju, ca. 3 til 4 måneder etter at du er ferdig utdannet og har jobbet en periode som operasjonssykepleier. Intervjuet vil bli gjennomført på det stedet som passer best for deg, og vil vare i fra 50 - 60 minutter. Vi vil stille deg spørsmål om dine erfaringer som nyutdannet operasjonssykepleier i møte med klinisk praksis og videre om den simuleringen som deltok på under operasjonssykepleieutdanningen kan ha bidratt inn i ditt møte med akutte og komplekse situasjoner i klinisk praksis.

Intervjuet vil bli tatt opp på lydbånd for senere å bli skrevet ut på papir. Etter at intervjuene er skrevet ut og analysen av datamaterialet er ferdig, vil lydfilene bli slettet. Alle opplysninger som kan føre til gjenkjenning av deg vil bli fjernet.

Det er frivillig å delta
Det er frivillig å delta i prosjektet. Hvis du velger å delta, kan du når som helst trekke samtykke tilbake uten å oppgi noen grunn. Alle opplysninger om deg vil da bli anonymisert. Det vil ikke ha noen negative konsekvenser for deg og det vil ikke påvirke ditt studieforhold til din utdanningsinstitusjon eller senere til arbeidsgiver eller arbeidssted hvis du ikke vil delta eller senere velger å trekke deg. Dersom du ønsker å trekke deg i fra forskningsprosjektet, kan du kreve å få slettet innsamlede opplysninger med mindre opplysningene allerede er inngått i analyser eller brukt i vitenskapelige publikasjoner.

Dersom du senere ønsker å trekke deg eller har spørsmål til forskningsprosjektet, kan du kontakte Hege Kristin Aslaksen Kaldheim, e-post hege.kaldheim@uia.no telefon 91007380 eller veileder, professor Åshild Slettebø, e-post ashild.slettebo@uia.no telefon 37233787.

Ditt personvern – hvordan vi oppbevarer og bruker dine opplysninger
Vi vil bare bruke opplysningene om deg til formålene vi har fortalt om i dette skrivet. Vi behandler opplysningene konfidensielt og i samsvar med personvernregelverket. En kode knytter deg til dine opplysninger gjennom en navneliste, og det er kun PhD student Hege Kristin Aslaksen Kaldheim som har adgang til navnelisten og kan finne tilbake til deg. Denne navnlisten vil være innelåst i et skap adskilt fra øvrige data, hvor Hege Kristin Aslaksen Kaldheim er den eneste som har nøkkel, kontoret hvor dette skapet står, vil være låst. Forskeren har taushetsplikt. Datamateriale i fra intervjuene, vil bli lagret på en datamaskin (tilhørende Universitetet i Agder), hvor det er kun PhD student Hege Kristin Aslaksen Kaldheim som har kode for å komme inn.

Resultatene vil bli publisert i vitenskapelige artikler. Datamaterialet vil bli anonymisert slik at det ikke er mulig å identifisere enkeltpersoner.

Hva skjer med opplysningene dine når vi avslutter forskningsprosjektet?
Forskningsprosjektet skal etter planen avsluttes 31. desember 2023. Informasjonen om deg vil da bli slettet når forskningsprosjektet avsluttes.

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), og
- å sende klage til personvernombudet eller Datatilsynet om behandlingen av dine personopplysninger.

Hva gir oss rett til å behandle personopplysninger om deg?
Vi behandler opplysninger om deg basert på ditt samtykke.

På oppdrag fra Universitet 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?
Hvis du har spørsmål til studien, eller ønsker å benytte deg av dine rettigheter, ta kontakt med:

- Universitetet i Agder (UiA) ved Hege Kristin Aslaksen Kaldheim, e-post hege.kaldheim@uia.no, telefon 91007380
- UiAs personvernombud: Ina Danielsen, e-post ina.danielsen@uia.no, telefon 45254401
- NSD – Norsk senter for forskningsdata AS, på epost (personverntjenester@nsd.no) eller telefon: 55 58 21 17.

Med vennlig hilsen
Hege Kristin Aslaksen Kaldheim
Prosjektansvarlig/PhD-student

Samtykkeerklæring

Jeg har mottatt og forstått informasjon om prosjektet Fullskalasimulering som en pedagogisk tilnærming i utdanning av operasjonssykepleiere for å utvikle profesjonell kompetanse og har fått anledning til å stille spørsmål. Jeg samtykker til:

- Å delta i dette forskningsprosjektet som innebærer å delta i et individuelt intervju som beskrevet i informasjonsskrivet.

Jeg samtykker til at mine opplysninger behandles frem til prosjektet er avsluttet, ca. 31.12.2023

(Signert av prosjektdeltaker, dato)

Appendix 10

Interview guide for Study 3

«Perioperative nursing students´ experiences of simulation teaching and learning used to prepare for complex situations in clinical practice as newly graduated»

Intervjuguide for individuelle intervju med 15-20 studenter 3-4 måneder etter avsluttet utdanning og som nå er ute i praksis som operasjonssykepleiere

(Individuelle intervju med semistrukturerte spørsmål)

Tema

Bruk av fullskala simulering som læringsmetode i utdanning av operasjonssykepleiere.

Hensikt

Å få økt kunnskap om operasjonssykepleiestudenter sin læring og utvikling av profesjonell kompetanse ved å bruke fullskala simulering som læringsmetode i deres utdanning.

Spesifikke hensikter er:

Individuelle intervju

- Utforske hvordan simulering i utdanning av operasjonssykepleiere kan være med på å utvikle profesjonell kompetanse i å møte akutte og komplekse situasjoner i klinisk praksis?

Gjennomføring

Varighet: 30-60 minutter

1. Introduksjon
    - Lydopptak.
    - Taushetsplikt for hverandre.
    - Om en skal snakke om andre mennesker så skal en ikke bruke navn, for å bevare anonymiteten til de som det snakkes om.
    - Gå åpent ut, og følg opp med utdypende spørsmål/oppfølgingsspørsmål.
2. Temaer:
    A. Simuleringserfaring.
    B. Møte med klinisk praksis etter endt utdanning.
    C. Møte med akutte og komplekse situasjoner.

«Perioperative nursing students´ experiences of simulation teaching and learning used to prepare for complex situations in clinical practice as newly graduated»

A. Simuleringserfaring

1. **Kan du fortelle om hvilke erfaringer du har i fra simulering som du deltok på under din utdanning i operasjonssykepleie?**

Oppfølgingsspørsmål:

- Fortell om hva du opplevde i simuleringen som viktig for deg, som fremtidig operasjonssykepleier? Si gjerne litt mer… Kan du utdype.....
- Er det noe som du kan fortelle om som du husker spesielt at du har tatt med deg videre i møte med klinisk praksis ... Gi gjerne eksempel.

2. **Kan du fortelle om dine erfaringer med simulering etter at du var ferdig utdannet operasjonssykepleier?**

B. Møte med klinisk praksis etter endt utdanning

3. **Kan du fortelle om dine opplevelser av det å være nyutdannet operasjonssykepleier i møte med klinisk praksis?**

Oppfølgingsspørsmål:

- Kan du gi et eksempel på et godt møte med praksis som nyutdannet operasjonssykepleier?
    - Kan du utdype/si litt mer om hvorfor dette opplevdes som et godt møte?
- Kan du gi et eksempel på et mindre godt møte med praksis som nyutdannet operasjonssykepleier?
    - Kan du utdype/si litt mer om hvorfor dette opplevdes som et mindre godt møte?

C. Møte med akutte og komplekse situasjoner

4. **Kan du fortelle om hvordan du opplevde ditt møte med akutte/komplekse situasjoner som nyutdannet operasjonssykepleier?**

Oppfølgingsspørsmål:

- Kan du si mer om hvordan du opplevde at du var forberedt?
    - Gi gjerne et eksempel
- Kan du si litt mer om hvordan du opplevde at du ikke var forberedt?
    - Gi gjerne et eksempel

5. **Kan du fortelle om hvordan du opplevde det å kommunisere med de andre i det tverrfaglige teamet i et møte med en akutt/kompleks situasjon?**

Oppfølgingsspørsmål:

- Opplevde du at du var forberedt på det å kommunisere med de andre i det tverrfaglige teamet?
    - Gi gjerne eksempel
- Opplevde du at du ikke var forberedt på å kommunisere med de andre i det tverrfaglige teamet?
    - Gi gjerne eksempel

6. **Kan du fortelle om hvordan du opplevde det å samarbeide med de andre i det tverrfaglige teamet i møte med en akutt/kompleks situasjon?**

Oppfølgingsspørsmål:

- Opplevde du at du var forberedt på det å samarbeide med de andre i det tverrfaglige teamet?
    - Gi gjerne eksempel
- Opplevde du at du ikke var forberedt på det å samarbeide med de andre i det tverrfaglige teamet?
    - Gi gjerne eksempel?

7. **Kan du fortelle om hvordan du opplevde det å skulle prioritere rekkefølgen av oppgaver i møte med en akutt/kompleks situasjon?**

Oppfølgingsspørsmål:

- Opplevde du at du var forberedt på det å skulle prioritere rekkefølgen av oppgaver?
    - Gi gjerne eksempel
- Opplevde du at du ikke var forberedt på det å skulle prioritere rekkefølgen av oppgaver?
    - Gi gjerne eksempel?

8. **Kan du fortelle om hvordan du opplevde det å arbeide under press i møte med en akutt/kompleks situasjon?**

Oppfølgingsspørsmål:

- Opplevde du at du var forberedt på det det å arbeide under press i møte med en akutt/kompleks situasjon?
    - Gi gjerne eksempel
- Opplevde du at du ikke var forberedt på det å arbeide under press i møte med en akutt/kompleks situasjon?
    - Gi gjerne eksempel?

9. **Fortell om hvordan du opplever at simuleringen som du deltok på i din utdanningen av operasjonssykepleie, kan ha påvirket/hatt innflytelse på din evne til å håndtere akutte og komplekse pasient situasjoner på operasjonsstua?**

Oppfølgingsspørsmål:

- På hvilken måte kan det ha påvirket deg?
- Gi gjerne eksempel? Fortell om en situasjon der...
  - Positivt?
  - Negativt?

Tilbakeblikk (ca. 5-10.min)

1. Oppsummering:
   - Intervjuer oppsummerer muntlig og går gjennom de viktige punktene som kom frem i intervjuet.
2. Avklaring:
   - Avklare misforståelser, spørre om man har forstått riktig dersom noe er uklart.
3. ”Er det noe mer du ønsker å legge til?”
4. Lydopptak stoppes.

Appendix 11

Demographic data collection form for Study 3

Personopplysninger tilknyttet forskningsprosjekt:

«Operasjonssykepleiestudenters erfaringer med bruk av simulering i undervisning og læring for å forberede seg på komplekse situasjoner i klinisk praksis»

Deltager nummer:

Dato:

Alder:					
Kjønn:					
Hvor mange år har du jobbet som sykepleier før du begynte på utdanning i operasjonssykepleie?					
Hvor mange ganger har du deltatt på simulering før du begynte på utdanning i operasjonssykepleie?	0	1-5	6-10	11-15	16-20
Hvilke simuleringer(situasjoner/caser) har du deltatt i under din utdanning i operasjonssykepleie?					
Har du deltatt på simulering etter at du ble ferdig utdannet operasjonssykepleier?					