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PEER LEARNING ON CLINICAL WARDS: SUPERVISION, STUDENT ACTIVITIES AND THE LEARNING ENVIRONMENT

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Cover illustration: Peer learning on the ward, Anna Dyar

Peer learning on clinical wards: supervision, student activities and the learning environment.
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"The successful teacher is no longer on a height, pumping knowledge at high pressure into passive receptacles"

William Osler 1849 – 1919

ABSTRACT

Introduction: Worldwide, a growing number of healthcare students require clinical environments for learning. Multiple students are placed on clinical wards simultaneously with one supervisor to meet this demand. This can create stress for the supervisor and reduce the quality of learning for students. To ensure continued quality of education, some wards have formally adopted peer learning as a pedagogical framework. Peer learning has been widely shown to have advantages for students, such as developing teaching skills, teamwork, and independence. A deeper understanding is needed of the characteristics of wards that use peer learning as a pedagogical framework, and how these compare to wards that do not. In particular, it is important to explore the nature of supervision in the context of peer learning.

Methods: An observational study (I) was conducted on a ward adapted to student peer learning to describe the learning environment. Student nurses, supervisors and other staff were observed, complemented by audio diaries and informal questioning. Field notes were thematically analysed. The findings on the supervisor's role inspired study II which explored the different ways clinical supervisors view their role in students' peer learning. Semi-structured interviews were performed with 15 supervisors of student nurses from two wards adapted to student peer learning. Transcribed data were coded and analysed using a phenomenographic approach. Study III aimed to explore which of the characteristics and ways of viewing the supervisor role from studies I and II were present in other wards. To investigate this, a questionnaire was developed and psychometrically using the AMEE 7-step guide, and piloted with 46 nurse supervisors. Participants from wards that used peer learning as a pedagogical framework were compared with those that did not. We analysed the pilot results using basic statistics and multivariable discriminant analysis and Variable Importance in Projection.

Results: The observational study (I) identified that a ward adapted to student peer learning had student-led learning; student-dedicated space; peer learning; personalised relationships; an inter-professional approach; and supervisors who were motivated to teach. The questionnaire study (III) found that other wards that used peer learning as a pedagogical framework shared these features, however that only the first three of these characteristics were significantly higher than in wards that did not use peer learning as a pedagogical framework. The interview study (II) found four ways in which the supervisors viewed their role in students' peer learning: the *teacher*; the *facilitator*; the *stimulator*; and the *team player*.

Discussion and conclusions: The observed ward (study I) had a community of practice centred on student learning. Peer learning supervisors' broadest view of their role was as a *team player*, supporting the educational enterprise of the ward community (study II). The pilot questionnaire (study III) found differences between some characteristics of the learning environment on different types of wards. A next step is to conduct the questionnaire on a larger scale to explore further the ways in which the pedagogical framework and peer learning can affect supervision and the learning environment. Using a pedagogical framework on a clinical ward could be a key factor in developing a community of practice centred on student learning.

Keywords: Supervisor; student nurse; clinical learning; clinical education; active learning; peer learning; student ward; learning environment.

LIST OF SCIENTIFIC PAPERS

I. **Dyar A**, Lachmann H, Stenfors T, Kiessling A.
The learning environment on a student ward: an observational study.
Perspect Med Educ. 2019; 8(5):276-283.

II. **Dyar A**, Stenfors T, Lachmann H, Kiessling A.
What about the supervisor? Clinical supervisors' role in student nurses' peer learning: A phenomenographic study.
Med Educ. 2021; 55(6):713-723.

III. **Dyar A**, Henriksson P, Stenfors T, Lachmann H, Kiessling A.
Supervision on peer learning wards is different: the supervisor's perspective.
In manuscript

CONTENTS

LIST OF ABBREVIATIONS

PLW	Peer Learning Wards: Wards that use peer learning as a pedagogical framework
N-PLW	Non- Peer Learning Wards: Wards that do not use peer learning as a pedagogical framework
T3	Term 3
T6	Term 6
PCA	Principal Component Analysis
OPLS-DA	Orthogonal Projections to Latent Structures Discriminant Analysis
VIP	Variable Importance in Projection

1 PREFACE

When I first started working as a doctor over a decade ago, my enthusiasm to teach was perhaps greater than my abilities. I was eager to re-create my most profound learning experiences for the next cohort of students, but at the same time I felt a need to wait until I had accumulated enough experience. In the end, the realities of an understaffed and overstressed healthcare system were decisive. On the second day of my placement on a new ward in a new specialty, two medical students were left with nobody else to supervise them. I half-heartedly volunteered, and so began my own journey of near-peer learning.

I started studying peer learning during my master's degree in Medical Education, and have observed peer learning increase in research as well as in practice. In Sweden, I discovered whole wards adapted to peer learning, which formed the basis for this PhD. Nowadays, there are few healthcare professionals I meet who don't have "peer learning" on the tip of their tongues, and many have firm opinions on the matter.

My research has deeply influenced my own clinical practice. I am a lifelong learner, and my colleagues are my greatest influencers and sources of knowledge and understanding. I often supervise multiple medical students together in primary care. It often starts slowly and stiffly, but when they start working together, helping one another, and solving problems themselves, I often see the spark of enthusiasm in them that I recognise from myself. They will be supervisors themselves soon, but unlike me, they will be prepared.

Stockholm, 28th October 2022

2 INTRODUCTION

The nature of learning in the clinical setting is changing. The World Health Organisation (WHO) predicts the need for the creation of 40 million new health and social care jobs globally by 2030[1], and training healthcare education students is an integral part of reaching that aim. Estimates indicate that 620 000 nurses and 149 000 doctors graduated in 2019 in Organisation for Economic Co-operation and Development (OECD) countries, an increase of 19% and 32%, respectively, over a decade[2]. The increase in student numbers requires not only increased capacity in higher education settings but also in clinical placements.

While in the past a typical clinical placement could involve one student per supervisor, now it is increasingly common to find multiple students on a ward with a single supervisor. This could be due to economic demands on healthcare systems and training programmes, resulting in a reduction in the availability of clinical placements and clinical supervisors[3–5]. In many countries, healthcare staff face increased pressures from the medical complexities of an aging population and an increase in administrative tasks. Healthcare staff that also supervise students are challenged with simultaneously providing quality education for the next generation of healthcare workers.

Our understanding of how learning occurs is also developing. As the importance of active participation in clinical learning is increasingly recognised, models of the student as a spectator are being replaced. Social theories of learning highlight the importance of educational interactions between students[6]. The current generation of students have been raised in a technologically connected world and are accustomed to searching for information, sharing it, and discussing it online[7]. These aptitudes can be harnessed offline by providing learning activities in clinical practice that allow them to seek out answers independently, collaborate and discuss[8].

Peer learning, where students learn together from one another, is increasingly used with students of many healthcare professions. It is not surprising that interest in peer learning is increasing, due to its ability to increase student capacity and to offer learning aligned with understanding of social theories. The proportion of articles on peer learning in the medical literature has increased radically over the past decade[9]. Peer learning in clinical practice has become more prominent worldwide[10–13], and some wards have adopted peer learning as a pedagogical framework to cater to multiple students learning together[14,15]. This holds much promise for both enhancing student learning and making better use of limited educational resources[11,16,17]. Moreover, there are unique benefits of peer learning for students, such as learning to teach, which can otherwise go unaddressed during students' clinical education despite it being a requirement of qualified professionals[18,19]. For these reasons, peer learning can play an important role in future student learning[20,21]. However, knowledge about what it means to supervise peer learning in clinical settings has not caught up with the rapid expansion in its practical use in clinical contexts.

3 BACKGROUND

The research in this thesis is approached from an epistemological standpoint of social constructivism. Based on Vygotsky's Sociocultural Theory[22] and Wegner's communities of practice[6,23], the epistemology (i.e. understanding of the nature of knowledge), is that learning is a social phenomenon rather than solely an individual process. These theories emphasise that students are active participants and co-constructors of learning, and students' interactions, relationships and collaborations are central to the learning process. This paradigm is appropriate in the context of clinical education, where learning is tied to its context (the environment of the ward, the patients, the staff) and embedded in the social aspects of their activities[24]. The chosen methodologies in this thesis work within this paradigm, where the ontology is relativism, with multiple and sometimes conflicting realities[25], and knowledge consists of those constructions where there is relative consensus[26]. Moreover, if learning is embedded in what the learner thinks and does, then investigating the thoughts and activities of the students and supervisors is an appropriate way to investigate learning[27].

3.1 COMMUNITIES OF PRACTICE

3.1.1 The ward as a community of practice

A *community of practice* according to Wenger involves three dimensions: the *joint enterprise* of its members, the *mutual engagements and relationships* through the community's activities, and the *shared repertoire* of communal resources that they have developed together[6]. Clinical wards have the potential to have a pervading community of practice through a joint enterprise of patient care. Their relationships form through teamwork in their clinical and other ward-related activities. Their shared repertoire and communal resources include their daily routines and their role or identity within the healthcare system. For students, it is in these communities that clinical learning occurs[28].

Healthcare students have clinical placements in many settings during their education. Their participation in a community of practice during their placement on a single ward is affected by their other placements. Therefore it is useful to expand on the theory of the ward as a community of practice, to viewing the *landscape of practice*[29,30] within which a student navigates during their professional education. The *landscape of practice* describes the arrangement of many different communities of practice, for example different clinical wards. Learning in a landscape of practice involves crossing boundaries between different communities. It acknowledges the complexity of the knowledge and competence needed to establish a professional identity outside the immediate community of practice[29,30].

The communities of practice can be explored by studying the learning environment[31], which includes the physical space; psychosocial and interaction factors; the organisational culture and teaching and learning components, which have important effects on the achievement of learning outcomes[32–34]. Social cognitive theories particularly recognise the influence of the

environment on learning, proposing a dynamic relationship between the learner, the environment and behaviour[35].

3.1.2 The student's role in the community

The student's role in the ward's community begins as a newcomer. Over time, their *peripheral participation* can progress to fuller participation through having *legitimate access*[36], which implies being allowed to participate by the full members of the community. Participation is viewed as essential for learning to occur. To gain legitimate access to participation, certain conditions need to be met, concerning both the individual students and the community of practice itself. When the student negotiates their own place within the community, it leads to *alignment*, where there is a sense of belonging and connectedness[36].

From the student, *active engagement* is needed in order to produce meaning[37]. Active engagement on a ward could involve being active in both the clinical activities and active in their own learning. Learning and participation can be viewed as inseparable, occurring at the interplay between the learning opportunities afforded by the workplace and how learners actively engage with them[38].

The role of the community of practice in students' participation includes the staff granting *legitimate access* to the student, for example by welcoming the students[39], allowing students to play an active role in daily clinical tasks, and seeing students' errors as learning opportunities[39]. The supervisors are accountable for students' actions and the effects of students' mistakes are limited by supervisors' guidance, in contrast with a full member's errors for which the member themselves would be accountable[39]. While wards that have taken on students might be assumed to give *access* to their students, in many cases students are far from explicitly accepted, and can sometimes feel actively unwelcome[40].

3.2 SUPERVISION

3.2.1 The supervisor's role

The definition of the clinical supervisor used in this thesis is: a healthcare professional in a clinical workplace setting who is responsible for one or more students during their placement. There are many other related terms, so the *supervisor* for the purpose of this thesis is viewed as synonymous with "clinical educator", "preceptor", and "clinical teacher".

There is a broad range of views on the role of the clinical supervisor in student learning in the medical literature, including: conveyor of knowledge[41]; protector, evaluator, educator, and facilitator[42]; information provider, role model, mentor, assessor, planner, and resource creator[43]. A good clinical supervisor has been described as being student-centred, focusing on students' growth and professional development, and being a role model[41].

Supervisor roles depend on a wide variety of factors such as clinical knowledge, clinical skills, communication skills, relationships with students and enthusiasm[44]. Supervisors' identities are influenced by their image of themselves as teachers, their familiarity with adult

learning principles, the perceived benefits and drawbacks of teaching, and humanitarianism[45]. The supervisor's relationship with the student is also key, with the bond they form and mutual trust being important in the supervisor-student relationship[46].

Supervisors in healthcare most often simultaneously work clinically, and some view their supervisory role as secondary, leading to variations in the extent to which their teaching role is prioritised[47]. While in the past students were expected to learn by spectating while the supervisor cared for patients[48], recent approaches highlight that being active is required for deep learning[28,49]. This requires greater engagement of the clinical supervisor to identify and support learning situations for the students. In addition, allocating dedicated time for supervision in order for the supervisor to be fully focussed and available results in high quality student learning[50].

3.2.2 The supervisor's own learning

While students' learning is an important goal of clinical education on the ward, a focus for the research in this thesis is the supervisor's own learning about how to supervise, situated in their clinical workplace. Healthcare staff learn in the workplace, both explicitly, such as keeping up to date on new advances in their field[51], or tacit, such as the understanding of people and situations, routinised actions, and intuition[52]. Knowledge of teaching skills is a fundamental requirement of being a healthcare professional and a clinical supervisor[18,19,53], yet supervisors have often had little training for their teaching roles[54]. Training teachers through classroom-based approaches has often had problems with low attendance, teacher resistance and inadequate knowledge transfer[55]. Initiatives for supervisor development situated in the workplace are hindered by a lack of knowledge about the specific processes of becoming a teacher in their clinical contexts[56,57].

Social theories of learning apply even to supervisors' learning, where there is a dominant social component as well as a teacher's knowledge construction based on personal insight and experiences[55]. Indeed, participation in workplace social networks have a greater effect on development as a supervisor than training outside of the workplace[58]. Therefore, the *community of practice* can be used also to explore supervisors' own learning about how to supervise and develop their professional identity.

3.3 PEER LEARNING

3.3.1 What is peer learning

Peer learning can be defined as "people of similar social groupings who are not professional teachers, helping each other to learn and learning themselves by teaching"[59]. There are many related concepts in the literature. These include *team-based learning*, "an active learning strategy that builds on individuals' strengths by allowing them to collaborate and work as a team to achieve a common learning objective"[60]; *interprofessional learning,* "two or more professions learn with, from and about each other to improve collaboration and quality of care"[61]; *cooperative learning,* "the use of small groups so that students work together to

maximise their own and each other's learning"[62]. These terms are not interchangeable, and the key distinction of *peer learning* is that a peer takes on a teaching role. In this thesis, this role is referred to as a *peer tutor*, and the students that the peer is tutoring are referred to as *peer learners*. The teaching role may be as transient as a single exchange where the peer tutor recalls a previous experience and shares it with the peer learners, who can learn from it. The peer tutor simultaneously learns themselves through the act of recalling, reflecting, and presenting. Alternatively, the peer tutor role could be a scheduled, formalised practice requiring preparation in advance. Although peer tutor and peer learner roles are not assumed in other collaborative learning techniques, the nature of learning in practice may be very similar.

Peer learning can be practiced between both students and qualified healthcare professionals. It has been investigated among medical[63], nursing[64], physiotherapy[65], and occupational therapy[66] students. A type of peer learning, *near-peer learning*, can occur between students or qualified professionals at slightly different stages of their education or training[67]. Peer learning can occur in clinical workplaces, both wards and outpatient clinics, as well as in non-clinical settings. While the published literature on peer learning demonstrates its growing popularity[9], its prevalence is hard to estimate as in many instances peer learning happens spontaneously without an explicit pedagogy at the workplace or any formal records[17].

3.3.2 Effects of peer learning

Many studies have shown increased student satisfaction with peer learning compared to "traditional" learning approaches[68–71]. Student outcomes for knowledge and skills have been shown to be equivalent if not superior to faculty teaching[72]. Peer learning helps build a professional identity[73] and leadership skills[3]. Through teaching, peer tutors increase and validate their knowledge[74], build confidence[75] and are prepared for their future teaching roles[76–78]. Peer learners have increased learning through social and cognitive congruence[17,74], where the peer tutor and peer learner share a similar knowledge base, allowing the peer tutor to explain concepts at an appropriate level[79]. In peer learning, there is a tendency for students to be granted more participation[80], creating a more authentic experience[81]. There can be positive effects of peer learning communities on students' health and wellbeing[82,83]. Disadvantages of peer learning have also been described, such as that students disliked competition for spending individual time with the supervisor[3]. Although peer learning could save time for the supervisor and increase capacity for service provision, there are conversely reports of an increased time commitment in the initial administrative workload associated with feedback and assessment[65]. Supervisors can also fear problems of student incompatibility and conflict, although this rarely observed in practice[84].

3.4 SUPERVISION OF PEER LEARNING

In peer learning the students assume the roles of both the tutor and the learner, giving rise to the question, what is the role of the supervisor? In much of the literature on peer learning, the focus has been on the students. Sometimes the supervisor is simply not mentioned, even in

instances where quality assurance of teaching is a key factor[85]. In a meta-analysis of how peer learning is implemented in medical students, the supervision of peer learning was not addressed[63]. In cases where the lack of clinical supervisors was the driving factor for using peer learning[11,86,87], supervisor involvement can be even counteractive to the original problem. This lack of attention in the literature to the supervisor could be partly attributed to the lack of clarity of their role. Role clarity is essential in functional student-supervisor relationships[88].

3.4.1 Does peer learning always need to be supervised?

In higher education outside of healthcare, peer learning is becoming increasingly popular in a range of subjects and contexts[89]. While in the higher education literature, peer learning is initiated and administered by teachers, in practice the interactions often happen without the direct intervention of teachers[90]. Even within healthcare education, unsupervised peer learning in non-clinical settings such as classrooms or simulations is used. Quality assurance methods are used such as: teacher training and courses for the peer tutor[91]; selection of peer tutors based on grades; and assessment of the peer tutor[85]. So, does peer learning need to be supervised? Boud et al. have stated that:

> "*The irony of peer learning is that it requires teachers to make it effective*"[89].

The supervisor has a key role in promoting and managing productive peer learning[89,92], and students value supervised interactions more than unsupervised and self-directed learning interactions[93]. This phenomenon is postulated to be due to the authority of the supervisor serving to validate peer learning as a legitimate learning method[92].

3.4.2 Supervision of peer learning in clinical settings

In a clinical setting, the safety of the patient is paramount. Therefore, when peer learning between students pre-qualification occurs in the workplace, ultimate responsibility for patient care lies with the clinical supervisor. Peer learning requires an investment by supervisors, as the peer tutors are not teachers and have no expert knowledge on the subject they are teaching[59]. Many misconceptions exist about peer learning, and lead to inappropriate practices of putting students in the same location and expecting peer learning to just happen by itself[94]. Supervision of peer learning between students in clinical settings is essential from both a patient safety and student learning point of view. An understanding of a different supervisor role in peer learning compared to other ways of supervising is important to support peer learning in clinical practice[94].

3.4.3 Existing literature about supervision of peer learning in clinical practice

A small number of studies have addressed the role of supervisors in peer learning, and have described it as: taking a step back while providing support; creating a structure and acceptance for supervision; encouraging critical thinking; supporting development of independence; dealing with the problems of supervision[15]; supporting the students in solving

any clinical problems[95], facilitating discussions and giving feedback[13], and designing effective educational experiences[84]. Supervising peer learning was described as moving away from simply being someone who prepares learning material, which was seen as a more satisfying educational interaction[13]. To realise the potential of peer learning, studies emphasise the importance that supervisors acknowledge their students, enable them to be independent, and allow them to assume responsibility on their own[14].

3.5   KNOWLEDGE GAP

Within the growing field of peer learning in clinical education, there remain knowledge gaps regarding how to supervise peer learning, what learning environments are like when peer learning is used, and what the implications are for the supervisor of using peer learning. It would be valuable to explore peer learning from the supervisor's perspective to support the increased use of peer learning with students in clinical practice.

3.6   CASE DESCRIPTION

The research in this thesis occurs in the context of student nurse education on inpatient hospital wards in Stockholm, Sweden.

3.6.1   Nurse education

Nurse education in Sweden consists of 3 years of undergraduate study, leading to both an academic Bachelor of Science degree and professional registration as a nurse[96]. The nursing programme is comprised of theoretical studies and clinical placements, the latter of which account for approximately 30% of the total time. Clinical placements are in a variety of clinical settings, including on hospital wards, and outpatient clinics. Clinical placements occur throughout the programme and the length of each placement varies from single days to approximately eight weeks. Clinical placements are extremely valued by students, supervisors and nurses[96–98]. Student nurses have one or more clinical supervisors on every placement, as well as a teacher or lecturer from the university who is an examiner. Nurse competencies expected to be reached at the end of the nursing programme include both clinical and teaching competencies[99].

3.6.2   Student wards

In Sweden, there are some *student wards* that have adapted to multiple students' learning by using peer learning as a pedagogical framework[14,15,100]. Many wards are not named *student wards* but nonetheless use peer learning as a pedagogical framework and have other adaptations to students[101]. However, many wards where supervisors have multiple students simultaneously do not have any specific pedagogical framework. Student wards have an outpatient counterpart of student clinics[102–104]. A separate type of ward in Sweden are interprofessional training wards, which are adapted to students of different professions[105–109]. Internationally there are Dedicated Education Units[4,70,110–115] and Student Training Wards[116] that allow increased numbers of students, although there is no formal peer learning pedagogy on those wards.

8

4 RESEARCH AIMS

The overall aim was to explore the clinical learning environment in peer learning with a particular focus on supervision of peer learning. This was investigated with regard to supervisors of student nurses in hospital inpatient wards. The purpose was to increase understanding of supervision of peer learning with the goal of putting the knowledge into practice to enhance clinical placements for students and their supervisors.

Aim of study I

To describe what characterises the learning environment on a student ward that uses peer learning as a pedagogical framework.

Aim of study II

To explore the different ways clinical supervisors view their role in students' peer learning.

Aim of study III

To develop and pilot test a questionnaire to investigate characteristics of supervisors and supervision, the learning environment and the learning activities on clinical wards, from the nurse supervisors' perspective.

To compare how characteristics differed between wards that use peer learning as a pedagogical framework (PLW), and wards that do not (N-PLW).

5 MATERIALS AND METHODS

5.1 STUDY DESIGN

Although the idea for all studies was considered from the beginning, each study prompted questions and areas of interest that were the basis for the design of each subsequent study. The first study was observational and formed the basis of the research questions used in Study II and III. There was a trajectory in the pathway from the first to the last study in many aspects: the methodology went from qualitative to quantitative. The study setting went from narrow (a single setting) to broad (many wards in different hospitals). The participant types started broad (all people and places on the ward), to focussed (only nurses who supervise students). The idea was to concentrate on a deep exploration of a narrow setting to begin with, to then progress to the exploration of a wider setting with a focus on supervision. A summary of all studies in this thesis is shown in table 1.

Table 1: Summary of studies

	Study I	**Study II**	**Study III**
Topic	Student ward	Supervision of peer learning	Peer learning and non-peer learning wards
Focus of investigation	The characteristics of the learning environment	The different ways supervisors view their role	The differences between ward types Developing and piloting a questionnaire
Study setting	One student ward	Two student wards that use peer learning	10 wards (7 that use peer learning, 3 that do not)
Date	2017-2018	2018-2020	2020-2022
Methodology	Ethnography	Phenomenography	Questionnaire study
Participants	Students, supervisors, other staff	Student nurse supervisors, assistant nurses.	Student nurse supervisors
Methods	Observations Short informal questions Audio diaries	Individual semi-structured interviews (15 interviews)	Online questionnaire (46 completed questionnaires)
Analysis	Thematic	Phenomenographic	Descriptive, inferential and advanced statistics

5.2 STUDY SETTING

The studies all took place on inpatient hospital wards in Stockholm, Sweden (figure 1). Study I participants were from one student ward, Study II participants were from two student wards from two different hospitals, and Study III participants were from ten wards from three hospitals. Study III included participants from different types of wards which were classified as those that use peer learning as a pedagogical framework (PLW) or those that do not (N-PLW). The student wards in study I and II were equivalent to PLW, although not all PLW in study III call themselves student wards. Student nurses from came from several different nursing schools.

Figure 1: Participating hospital wards in all studies
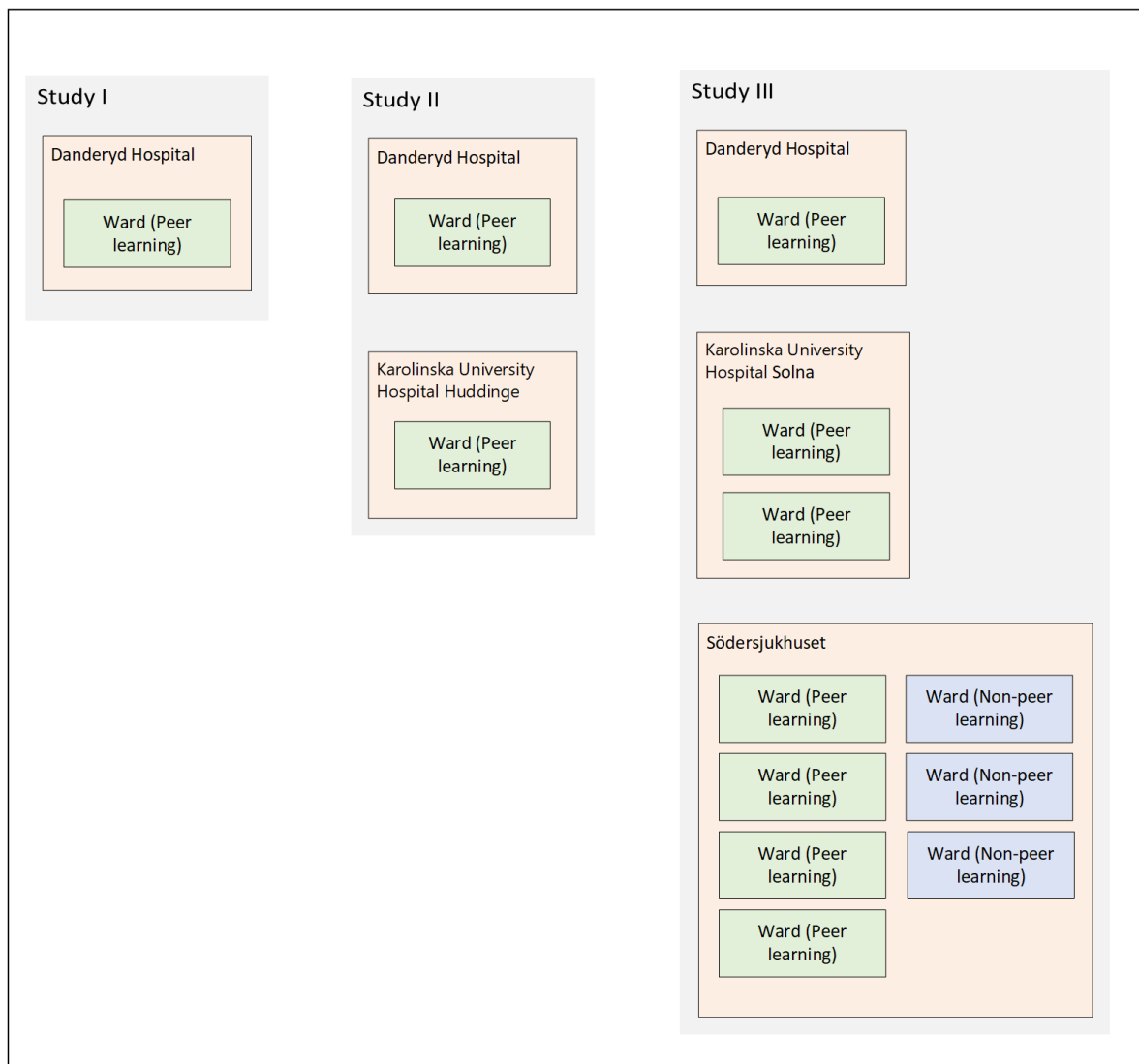
5.3 SUMMARY OF PARTICIPANTS

Participants in all three studies included nurses who supervise students and worked on inpatient wards. In Study III, nurse supervisors were the only participants. In Study II, in addition to nurses, assistant nurses who supervised student nurses were also interviewed. In Study I, as well as the nurses and assistant nurses, students and other staff participated (see figure 2). Some of the nurse supervisor participants from Study I also took part in Study II. None of the participants in Study III had however participated in either of the previous two studies.

Figure 2: Participants according to profession in all studies
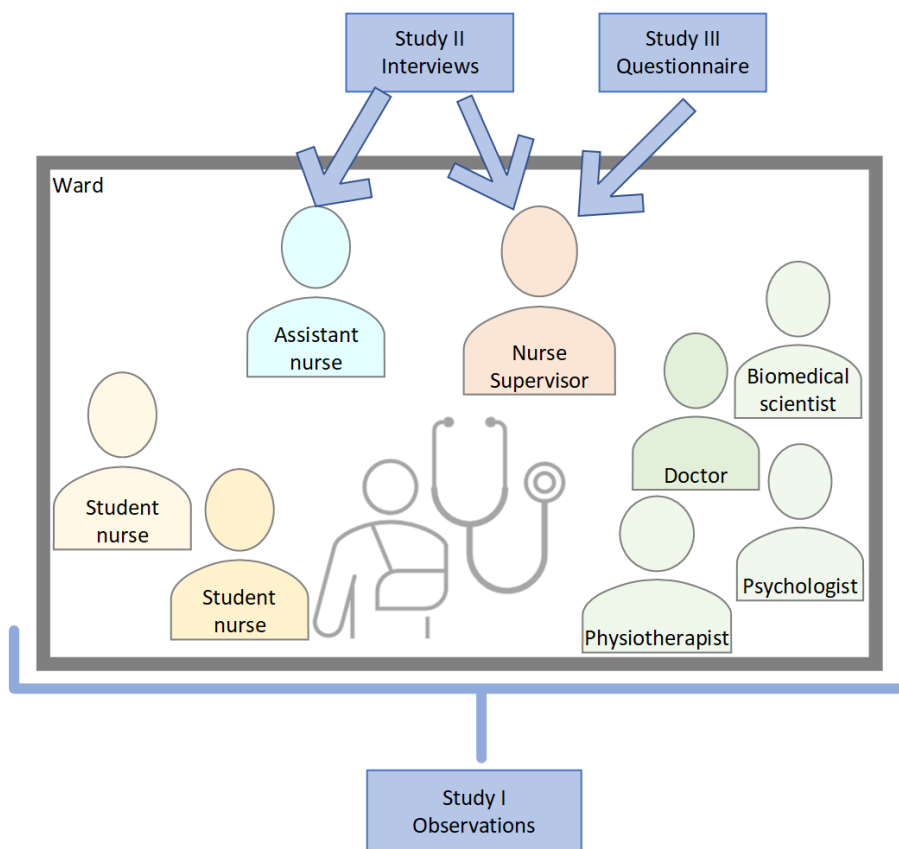
5.4 STUDY I

Ethnography is a type of qualitative research that gathers observations, interviews and documents to produce detailed and comprehensive accounts of different social phenomena[117]. An ethnographic approach was chosen in order to provide a rich and holistic description of the social settings and processes. Ethnography is increasingly used in the field of medical education[117,118].

5.4.1 Participants

The study took place on a ward called a *student ward*. It was a medical ward in a hospital in Stockholm, set up in February 2015 by the ward manager (a nurse) in collaboration with one of the nursing schools. The ward used peer learning as a pedagogical framework with student nurses. Medical students were also present, but did not have a formalised set-up for peer learning. The ward had six patient beds, and another six-bed regular ward adjoined the student ward and shared a staff room. A pair of student nurses and one supervisor cared for the patients during weekday daytime and evening shifts.

The student nurses in term three (T3) and term six (T6) were present for five and six weeks respectively. The participants in this study were nurse supervisors, doctors, assistant nurses, and other healthcare professionals. Patients, relatives, and visitors were also present, but no patient-specific observations were recorded. Everyone who was observed was informed verbally about the study and gave verbal consent.

5.4.2 Data collection

An observation guide was developed (box 1), based on a single pilot observation conducted prior to the start of the main observations. Using the observation guide, field notes were taken contemporaneously and transcribed immediately after the shift. Participant data were anonymised.

Box 1: Observation guide

```
Event description
Time, date, duration
Atmosphere, staffing, conditions
Location of event
Participants present
Diagrams of participant placement, room plans.
What happened?
What was said?
What was done?
Notable things that did not happen
Key direct quotations
Researcher's reflections
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To clarify the thoughts behind the observed actions, informal and spontaneous short informal questions were asked. This was done in quiet locations when there was no other activity taking place and with only the participant(s) present. The answers were recorded as field notes with verbatim quotations.

Student nurses ward were given the opportunity to submit an audio diary at the end of a shift, for as many shifts as they chose. Their guidance was to reflect freely (as they would in a diary) on anything to do with their learning on the student ward that day. Audio recordings were made by students themselves and then submitted securely to the researcher. Audio recordings were transcribed and included in the analysis. Students were given compensation in the form of a gift voucher worth 30 SEK per audio recording submitted.

5.4.3 Data analysis

A preliminary data analysis was performed and discussed with the research team simultaneously with the data collection to refine the observation guide, detect areas needing further investigation and to have a continuous overview. The observations were concluded when the research team felt that the data collected could answer the research question, guided by the richness of the data as determined by the large amount of meaningful, relevant and illuminating data collected during this time and the repetitiveness of the observed phenomena[119]. After all data had been gathered, a thematic analysis was performed according to the description by Braun and Clarke[120], with an inductive approach. Thematic analysis is a qualitative analysis method for identifying, analysing, and reporting patterns in the data, as well as interpreting various aspects. It was chosen because of its flexibility in combining diverse forms of data. After familiarisation with the data by reading the field note transcripts, initial codes were generated and then collated into subthemes and themes. These were discussed among the research group until a consensus was reached and were refined against the initial codes, then defined and named to give a description of the meaning behind them.

The findings of the study were presented to and discussed with the staff at the student ward, and they were given the opportunity to comment and provide other interpretations.

5.5 STUDY II

An interview study with a phenomenographic approach was chosen, as the goal was to capture the variation in ways in which supervisor understand and experience their role, and how these ways of understanding are logically and hierarchically related to each other[121]. Phenomenography has a non-dualistic ontology, which acknowledges that there are multiple, diverse interpretations of reality. The ontological and epistemological assumptions of phenomenography are that meaning is subjective and established by the relationship between a person and their experience of the world[121]. A structural and often hierarchical relationship between the categories (referred to as "outcome space") is one of the core assumptions of phenomenography, where the categories do not necessarily represent certain respondents, instead, the focus is on qualitative differences and critical variations in ways of understanding and the relationships between them. Identifying the internal and structural relationships among the categories in the outcome space is an important additional part of the analysis in phenomenography, which is often not included in other qualitative methods of analysis[121]. Phenomenography is useful in qualitative health research[122,123] and medical education[121], and has been used specifically to conceptualise different teacher roles[41,124]. This methodology was chosen because it is a research approach with epistemological and ontological assumptions that emphasise change and complexity[121], and our aim was to explore the variety of different ways supervisors understand their roles in peer learning.

5.5.1 Participants

Two wards that used peer learning as a pedagogical framework, in two different hospitals in Stockholm, Sweden were selected (see table 2), including the ward from study I. All nurses that supervised students on the selected wards during the study period were invited to participate by e-mail, and participation was voluntary without renumeration. Assistant nurses who formally supervised students were also invited, although their supervision duties differed in that they supervised an introductory period focussing on practical procedures at the beginning of students' placements. Other staff including doctors and physiotherapists that worked on the ward were excluded, as they had no formal supervision duties for student nurses and worked on multiple wards with different pedagogical approaches simultaneously.

Table 2: Characteristics of selected wards on two different hospitals in Stockholm, Sweden

Ward specialty	Cardiology	Infectious diseases
Year started	2015	2005
Number of nurse supervisors per period	6	4
Number of students per period	4	15
Number of students per supervisor	2	3-4
Number of students simultaneously present per shift	2	7-8
Number of supervisors simultaneously present per shift	1	2
Number of patients per shift	6	8
Student nurses' term of nursing education	3 and 6	3, 5 and 6
Length of placement (weeks)	5-6	5-8

5.5.2 Data collection

A semi-structured interview guide (Box 2) was designed with the aim of understanding the supervisors' perception of their role in students' peer learning. The content was based on the findings of Study I. Questions were refined after pilot testing. Individual semi-structured interviews were conducted and audio recorded, then transcribed verbatim and checked for congruency with the audio file.

Box 2: semi-structured interview guide (translated from Swedish)

1. How long have you worked as a nurse (or assistant nurse)?
2. How long have you worked on the ward?
3. Tell me about your role on the ward as a nurse (or assistant nurse) and supervisor. What's your primary role?
4. Describe an instance of supervision of your most recent students that worked well. Why did it work well? How did you supervise the students? Why did you supervise in that way? Do you supervise that way in other situations and why? Have you supervised or seen supervision that was done differently?
5. Describe an instance of supervision of your most recent students that you found difficult. Why? What are your expectations and concerns with supervision? Do you receive support for supervision? What support do you need for your own learning to be a supervisor?
6. How do you see your colleagues' role in supervision of your students?
7. What did the students do during their most recent shift? What are their typical activities? Who plans the student activities? How do you feed back to each other?
8. Describe how your most recent students interacted with one another. Do you perceive they learn from one another? Do they do peer learning? In what way? What is your understanding of peer learning? Do you actively work with peer learning, and how? How do you think peer learning affects student learning? What are the advantages and challenges of using peer learning? Do you supervise in the same way when you supervise peer learning compared to supervising one single student?
9. What is it like to work on a student ward using peer learning? What does it mean to you?
10. What does the ward do to be a student ward? How does the ward as a whole manage peer learning in different situations?

5.5.3 Data analysis

The results were analysed using a phenomenographic method. This involved a seven-step approach[122]: Familiarisation with the transcripts (step 1); condensing key quotations into meaning units that related to a specific phenomenon (step 2); comparisons of meaning units (step 3); grouping meaning units into categories (step 4); analysing the categories and describing the essence (step 5); labelling descriptions (step 6); comparing and sorting the labels within the outcome space, representing ways of understanding of the supervisor's role (step 7). NVivo software[125] was used. The process was iterative, with much interplay and repetition between the various steps. Both consensus and disagreement of the interpretation contributed to a broader understanding, and the meaning of the categories was further explored and refined.

5.6 STUDY III: QUESTIONNAIRE DEVELOPMENT

The aim was to develop and pilot test a questionnaire for supervisors, as there was no suitable instrument used previously that could be adapted. We applied the AMEE 7 step process for development of a questionnaire[126].

Step 1: A **literature review** was conducted to define the construct and to investigate what is known about wards that use peer learning as a pedagogical framework, and their characteristics.

Step 2: **Observations** and **interviews** from study I and study II were reviewed. The verbatim quotations from the participants in the previous studies was used to describe the constructs in their own words was noted to guide the wording of questions during stage 4.

Step 3: The Literature review, observation and interview data were **synthesised** to determine areas of interest to investigate. Satisfaction with the workplace and education questions were added based on validated general performance and satisfaction questionnaires[127,128].

Step 4: An initial **pool of questions** and response options were developed and then discussed and refined among the authors. Where applicable, participants were instructed to answer in relation to specific events during their most recent shift, aiming to capture a more objective picture of their activities. Other questions aimed to elucidate participant's subjective opinions.

Step 5: **Expert validation** was conducted by four content experts. They provided written feedback to semi-structured questions on the web-based questionnaire. The aim was to assess individual items' relevance to the construct, as well as representativeness, clarity, relevance, content validity and distribution. The approach was qualitative rather than quantitative, to enable more detailed feedback from a small number of experts.

Step 6: **Cognitive interviews** were conducted individually with five nurse supervisors to collect evidence of response process validity. Participants received the web-based questionnaire and were interviewed using a combination of the think-aloud technique and immediate retrospective verbal probing, i.e., asking further questions based on the responses. The questions addressed comprehension, retrieval, judgement, and selection. The responses were analysed using basic coding.

Step 7: The questionnaire was constructed using Survey&Report Artologik software[129] accessed using a web browser. Questions are summarised in table 3, see appendix for full paper version. **Pilot testing** was conducted with by members of the target population (nurse supervisors on hospital wards in Stockholm) who completed the web-based questionnaire. Written informed consent was obtained digitally.

Table 3: Summary of questionnaire used in step 7 of study I.

Baseline characteristics	
1	Years since qualifying as a nurse.
2	Experience of supervising students.
3	Length of time working at current workplace
4	Time spent supervising students.
5	Amount of supervisor training
6	Presence of clinical adjunct/ educator nurse
7	Terms of students.
Student-centredness	
8a-e,g	Student-centred clinical tasks.
8f	Student-led unskilled activities.
9	Initiative taking by students.
10a-c	Student-led questions.
11a-d	Supervisors' knowledge of students' individual learning needs
12a-d	Supervisors getting to know the students as people
13	Trust in students learning by doing
Learning interactions between students: Peer learning, near-peer learning, and IPL.	
14*	Number of students on the ward simultaneously
15*	Does the supervisor supervise multiple students?
16*	Number of students supervised simultaneously
17	Do students learn together?
18a-d	Peer learning associated behaviours.
18e	Perceived use of peer learning
19ab	Stress and workload when supervising multiple students.
19cd	Fun (for the supervisor and student) when supervising multiple students.
20*	Students in different terms present?
21a-c	Near-peer learning interactions
22*	Presence of students of other professions
23a-c	Interaction with other students
Interaction with other professions	
24*	Which professions to student nurses meet?
25-30a-c	Level of interaction with staff the student nurses meet.
Physical adaptations	
31a-c	Physical adaptations for students
32	Effects of the student room
Attitudes to work	
33a-c	Managerial support for supervision and training
34a-g	Supervisors' motivation
Satisfaction	
35	Satisfaction with the quality of education on the ward
36	Overall satisfaction on the ward

Asterisk* indicates a qualifying question determining which further questions are relevant.

5.6.1 Participants

The participants involved in the questionnaire development were as follows:

Step 1-4: The members of the research group
Step 5: Four content experts who had published articles in a similar field and/or work with a relevant topic.
Step 6: Five nurses who had previously or currently work as supervisors for student nurses. These were not included in the participant pool.
Step 7: See figure 3.

5.6.2 Data analysis

Psychometric evaluation of the questionnaire was performed based on the pilot test results. The global response rate was calculated. Individual item response rates were not possible to calculate for many questions, as questions were not shown by the online navigation if it was indicated at an earlier stage that the question was irrelevant. For example, questions about interaction with a psychologist were not shown to participants who had indicated that psychologists were not present on their ward. Floor and ceiling effects were analysed for each item.

We performed a multivariable principle component analysis (PCA) using SIMCA software[130] to find out which latent components could explain the results of the questionnaire. This method has been used in questionnaire development in medical education[131]. Eigenvalues were calculated. Cronbach's alpha was calculated for the whole questionnaire to assess reliability.

5.7 STUDY III: PILOT QUESTIONNAIRE

Pilot testing was performed to test and validate the questionnaire, but also to perform a preliminary data analysis.

5.7.1 Participants

Hospital coordinators at four acute hospitals in Stockholm were contacted for permission for the wards to participate and for contact details of ward managers on wards where students are placed. Convenience sampling was used to select wards where the contact details were available, and the ward manager responded (figure 3). The inclusion criteria were adult inpatient wards with undergraduate student nurses present for more than two weeks. The exclusion criteria were wards adapted specifically to interprofessional learning of different professions.

Figure 3: Participating hospitals, wards and nurse supervisors for the pilot questionnaire
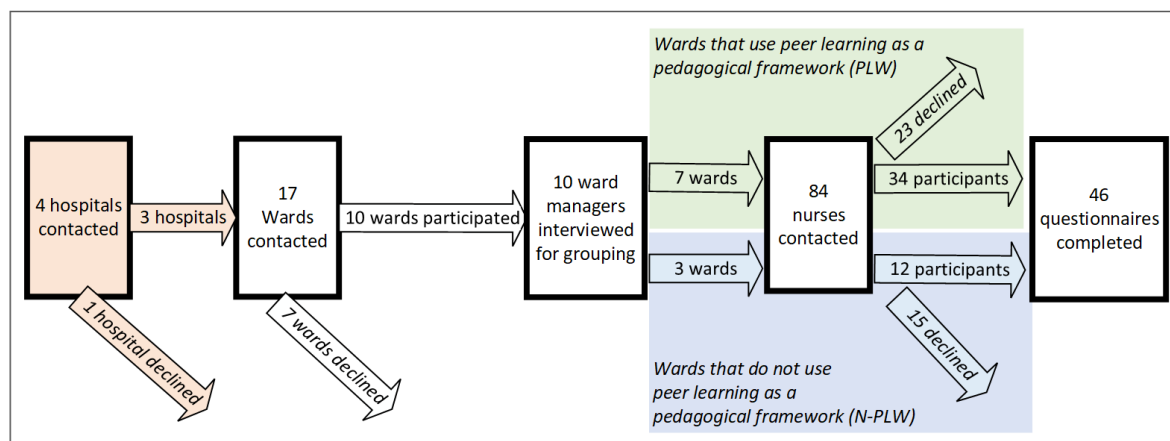
The ward managers were interviewed by telephone to classify them into wards that used peer learning as a pedagogical framework (PLW) and those that did not use peer learning as a pedagogical framework (N-PLW). We did not know whether the wards were PLW or N-PLW prior to the telephone interview. Of note, the grouping referred to the pedagogical framework of the ward, and no questions were asked regarding the use of peer learning of individual supervisors. Additional questions were asked to assess whether the inclusion criteria were met and to verify that the wards were comparable (box 3).

Box 3: Guide to questions asked in telephone interviews with the ward managers

Students: How many student nurses are present, how often, how long for, which terms, which nursing schools, how many students are scheduled simultaneously?
Supervisors: How many nurse supervisors are there?
Ward: What specialty is the ward? What kind of patients are present? Is the ward adapted to students in any way? Does the ward as a whole use a pedagogical framework?

5.7.2 Data collection

All the wards who agreed to participate and provided contact details for the nurse supervisors were included. The online questionnaire was sent by e-mail to the participants. The survey was active for seven weeks, with two e-mail reminders during the period.

Numerical scores were allocated to answer alternatives in each sub-question, as in the example in table 4:

Table 4: Example of score allocation for question 8: "Who decided which patient the student is looking after?"

Answer alternative	Score
Always the supervisor	0
Mostly the supervisor, rarely the student	1
Half the time student, half the time supervisor	2
Mostly the student, rarely the supervisor	3
Always the student	4

For analysis with descriptive and inferential statistics, each whole question was analysed and medians and inter-quartile range between PLW and N-PLW were compared. Composite scores were created for questions comprising several sub-questions, by calculating the total of

the component sub-questions. For this purpose, missing values were replaced according to the following protocol:

1. If a free-text comment matched an answer alternative, the missing value was replaced.
2. Fully unanswered questions were left blank.
3. For partially answered questions (where missing values were part of a composite score), the missing value was replaced with the median of the participant's answers for the other sub-questions.

5.7.3 Data analysis

The scores were shown by the Shapiro test to be not normally distributed for almost all questions. Therefore, statistical significance of the difference between the means was tested using non-parametric Mann–Whitney U tests. Some variables of interest were selected to test correlations, using non-parametric Spearman's rank correlation. The significance level was set to $p<0.05$.

Advanced statistical analysis using Orthogonal Projections to Latent Structures Discriminant Analysis (OPLS-DA). This was chosen because of the need for a robust statistical method that allowed analysis of wide data matrices with both quantitative and qualitative data in the initial comprehensive analysis of what differed between the two types of wards, and a method that can handle missing values[132]. OPLS-DA has the advantage of being able to analyse all variables together, which allows pattern recognition and investigation of relationships between all variables in a single context. This means that by using OPLS-DA more variables could be included in the analysis than what is possible in traditional regression models[133]. The non-linear iterative partial least squares (NIPALS) algorithm was used, which allows analysis of wide data matrices, i.e., many variables (items) in comparison to number of subjects. OPLS-DA uses a decline in Q2 (predictive fraction), calculated by cross-validation, to determine number of independent (orthogonal) components to extract to avoid over-fit. The analyses computed the influence of every X-variable on ward characteristic (Y) in the model.

Variable Importance in Projection (VIP) of the discrimination between the wards were calculated. VIP is a weighted sum over all model dimensions of the contributions of the variable influence. A VIP with a value exceeding 1.0 with a confidence interval not including zero was considered to have influence in the projection[134,135]. The statistical software SIMCA[130] was also used for OPLS-DA. SIMCA deals with missing values by letting the NIPALS algorithm interpolate the missing point using a least squares fit that give the missing data no influence on the model.

5.8 ETHICAL CONSIDERATIONS

The ethical considerations of the studies in this thesis are discussed below. The groups of people that could be affected by my research included: patients, relatives, students, and staff. Ethical approval was received from the regional ethical committee in Stockholm (Dnr 2016/2524-31/2) for all studies.

5.8.1 Patients

Patients were involved indirectly only in study I, where they were present on the ward during the observations. I strove to adhere to medical ethics principles based on respect for patient autonomy, beneficence, non-maleficence, and justice. This was done by giving the patient verbal information about the purpose of the research and getting verbal consent. However, in many situations the patient was either too unwell or not competent to fully understand the research project. As the patient was completely anonymous to me as the observer, and never the subject of the observations, the verbal consent was seen to suffice. The observations could be seen to improve patient care as staff and students were more aware of being observed and were more attentive. I was bound by strict patient confidentiality principles, and no data was collected on the individual patients, so the risk to individual patients was low. Benefits resulting from the contributions to knowledge about student supervision and clinical learning are also positive for patients.

5.8.2 Students

Students were directly involved only in study I. Being the subject of observations was potentially stressful for students: it can be seen as encroaching on one's privacy; my role as a clinician could be misinterpreted as them being scrutinised; they could have felt uncomfortable being watched. However, although initially uncomfortable, the prolonged time I spent on the wards ensured that my role was clear, and with time they reported that they forgot I was present. All the data was anonymised and only linked to a learning situation, and not to a particular student. Students could benefit through the improvements made in their own learning environment both on their current ward and future wards as a results of these studies. Reflecting over learning situations and what one has learnt through daily practice has been shown to give benefits for one's own learning, for mentally processing difficult situations, and feeling listened to.

5.8.3 Staff

Nurses were observed in study I, interviewed in study II, and completed questionnaires in study III. Other staff were present on the ward in study I and assistant nurses were also interviewed in study II. The potential risks to them during the observational studies are similar to that of the students. My role as a researcher and not as a clinician was made clear. For the interviews and questionnaires, the risks were minimal. Participants gave written informed consent to participate, and I was physically present for the interviews to address any worries or questions. No individual data (name, date of birth, sex) were collected. All results were combined and presented at a group level.

Answering interview questions demanded a degree of critical self-reflection. Although this had potential to be uncomfortable for the participant, they gave feedback that it was interesting and inspiring to verbalise their reflections and to be asked though-provoking questions in relation to their daily practice. Increased knowledge and understanding of their

workplace and pedagogical model as a result of these studies can help supervisors in their role.

5.8.4 My own ethical dilemmas

Before the observations, I considered that role confusion between research and clinical practice was the greatest ethical challenge. I ensured that I clarified that I was present in the capacity of a researcher, and that I did not work (and had never worked) clinically at any of the wards where the research was conducted. My role as a clinician informed my pre-understanding, but I was fully detached from clinical care and patients. Potential ethical problems that could materialise included: what if I observe a student doing something that could harm the patient? What if there is an emergency on the ward and I should switch from my researcher role to a healthcare provider role? Thankfully, no such situations occurred. I was prepared to act in the same way as I would as a bystander; provide emergency healthcare if needed.

6 RESULTS

6.1 STUDY I

This observational study investigated the learning environment on a student ward that uses peer learning as a pedagogical framework for student nurses, in a hospital in Stockholm.

6.1.1 Participants

The observations covered 17 different shifts, each lasting about five hours, approximately 85 hours in total. These took place over a six-month period (April to September 2017). Approximately 310 events were observed, including ward rounds, handover meetings, board rounds, clinical tasks, procedures, phone calls, case discussions and informal conversations. There were 31 instances of short informal questioning and three audio reflections.

Table 5: Participants in study I

Participants	Number
Nurse supervisors	7
Student nurses: Term 3	5
Student nurses: Term 6	7
Doctors	6
Medical students	3
Assistant nurses	3
Assistant nurse students	4
Other staff: Biomedical scientists Bed coordinator (registered nurse) Psychologist Social worker	5

6.1.2 Findings

Four themes were identified that characterise the learning environment on the student ward: student-led learning, learning together, staff's approach to learning, and student-dedicated space, summarised in table 6.

Table 6: Summary of results from study I, themes, subthemes and example of field notes

| Theme	Sub-theme	Example from observation field notes and short informal questioning
Student-led learning	Students learning by doing	*An assistant nurse asked a T6 student directly about a patient's progress even when the supervisor was present. The student responded: 'He is my patient'.*
	Supervisors' standing-back role	*A student connected a cardiac monitor for the first time. The supervisor described where to put the leads but did not touch the equipment.*
	Students' responsibility for their own learning	*A pair of students divided the patients between themselves according to their learning needs. They reported back to the supervisors, who asked for clarifications but were never observed leading such encounters.*
Learning together	Peer interactions for learning	*Students primarily discussed their questions between themselves before asking their supervisor.* *Questioning T3 students: T3 students described their supervision by T6 students as inspirational, enabling them to see how far T6 students had progressed and get an idea of the level they were expected to reach in three terms' time.*
	Scheduling for near-peer learning	*There were shifts where T3 and T6 students were scheduled simultaneously with the specific intention of T6 practising near-peer supervision. T6 students stated that the student ward was the only place they had ever had teaching practice.*
	Supervising peer interactions	*The supervisor was present but busied herself with another task while observing the T6 students supervising the T3 students preparing an intravenous infusion.* *Supervisor questioning: 'Supervising multiple students is challenging when they have different needs or doing different things, but beneficial when students can support and learn from one another'.*
Staff's approach to learning	Personalised relationships and the build-up of trust between the students and staff	*The students were addressed by their first names by all members of staff, and their names were written above patient beds as key caregivers.* *A student repeatedly questioned the doctor about the reason a patient had been admitted and was only satisfied with the answer after a long exchange: 'I must understand this in order to remember'.* *The supervisor gave feedback to a T6 student that was supervising a T3 student that the T6 student should not have left her student unattended performing a procedure: 'This is not to be interpreted as negative'.*
	Unified inter-professional approach to teaching	*The doctor began the ward round by addressing and questioning the medical and nursing students together by name.* *The biomedical scientist conducted a cardiac ultrasound on the ward, which lasted over one hour, during which she showed and explained every step to the medical students and student nurses.*
	Supervisors' motivation	*Supervisor: 'Supervising is fun, then I am not just a nurse!'* *Questioning the supervisors: when asked about reasons for working at the student ward, supervisors stated that their desire to teach and the ward's reputation for a positive learning environment was the most important factor.*
	Staff's own learning	*Questioning the nurse supervisor: 'When the doctors teach student nurses, the content is often aimed at us nurses also'.*
Student-dedicated space	Empowerment of learning in the student room	*Thinking-out-loud by students was observed almost exclusively in the student room. Students talked less in other locations, and their speech was less spontaneous, they had often rehearsed what they would say in the student room.*
	A meeting point in a busy ward	*Questioning the students: T6 students felt secure knowing that their supervisor would be waiting in the student room for a debrief after an activity, and that they would not need to go searching the ward.*

6.1.2.1 *Student-led learning*

Student nurses actively performed nursing activities, and were expected to be the patients' primary caregivers by their supervisors and other staff. The supervisor was rarely observed carrying out hands-on tasks and was often observed at a distance but listening and watching (figure 4). Students were observed allocating themselves appropriate tasks for their learning needs, such as those they had not yet mastered rather than those with which they were comfortable. Students asked the most questions, while nurse supervisors asked very few

questions (none were asked during the observation period during which the questions were counted, see table 7). However, doctors asked many questions in their interactions with both medical students and student nurses.

Table 7: Summary of questions asked on the observed shifts during a two week period, according to questioner and responder.

Who did the asking?	Who was being asked?	Number of occasions
Student nurse	Student nurse	20
	Nurse supervisor	18
	Doctor	4
	Biomedical scientist	4
	Assistant nurse	1
Doctor	Student nurse and medical student	5
	Medical student only	1
	Student nurse only	1
TOTAL		54

Figure 4: Visual representation of a learning encounter observed in study I
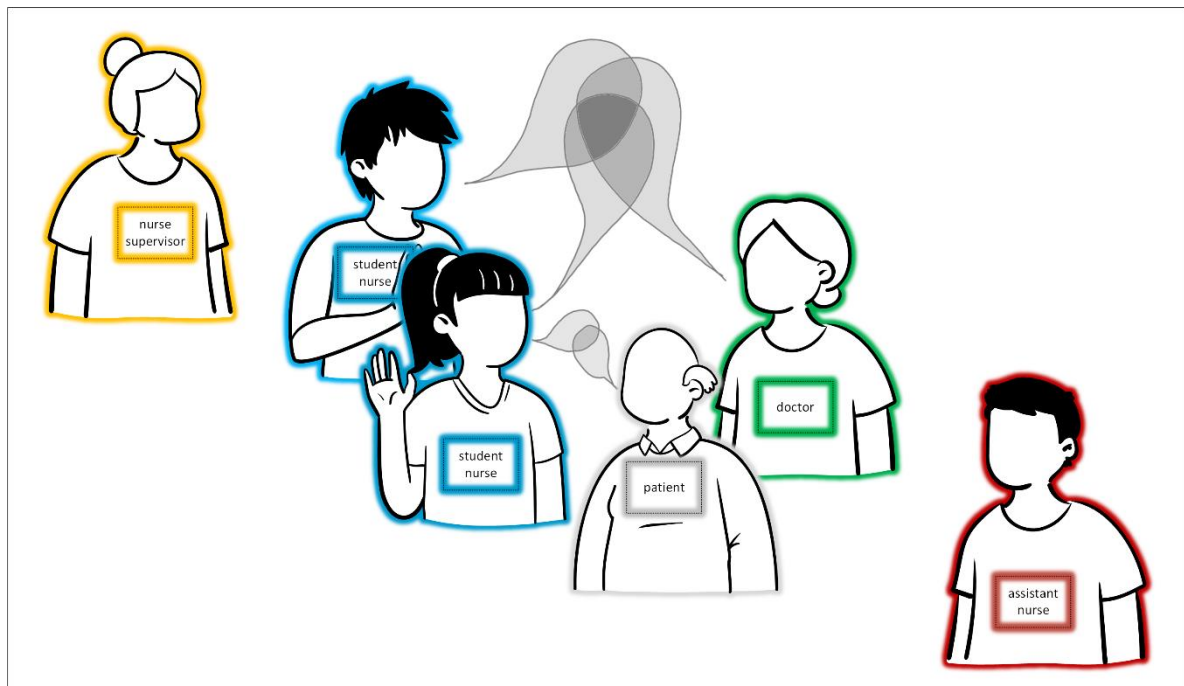
The types of questions asked by student nurses were noted during a two-week period, and classified according to the type of answer that was requested. Questions with binary answers were classified as yes/no. Questions with a single word answer with a multitude of possibilities were classified as which/what. Questions requiring an explanation of at least a sentence or a non-verbal answer (for example by being shown) were classified as how/why (see table 8). The simplest yes/no questions were the least frequent, whilst the deeper questions were more common.

Table 8: Summary of types of question asked by the student nurses, on all the observed shifts during a two-week period.

Type of question	Number of occasions
Yes/ no	10
Which/ what	21
How/ why	16
TOTAL	47

6.1.2.2 Learning together

Peer learning was observed occurring frequently, and peer learning activities ranged from spontaneous to formalised. Student nurses and supervisors showed awareness of the pedagogical framework that they were using and alluded to the term "peer learning" themselves unprompted. Pairs of student nurses shared one supervisor and often shared responsibility for the same patients. Students were often physically located in the same room (patients' rooms, medicines room or student room). Frequent interactions between the student pair occurred in the form of helping each other; asking one another questions before asking the supervisor; seeking information together side by side; giving feedback to one other; teaching one another; and discussing when they needed to ask the supervisor to help.

The nurse supervisors viewed the supervision of multiple students as challenging at the start due to the dynamics of their personalities and interactions as well as to their different strengths and weaknesses. However, the supervisors felt it was beneficial in the long run for students' learning from one another, their eventual self-sufficiency, and their development of teamwork.

Near-peer learning was formally scheduled, involving a T6 student who acted as the T3 student's supervisor. During these shifts, the T6 students posed many questions to T3 students, gave feedback, and created opportunities for T3 students to practice clinical skills. This opportunity for formal near-peer learning was perceived by both the peer learner and peer tutor as providing unique perspectives and opportunities.

6.1.2.3 Staff's approach to learning

Getting to know the student and developing trust

The supervisors and staff became acquainted with the students over time, adapting their approach according to students' individual learning needs, previous experience, strengths and weaknesses, and learning styles. This personalised approach enabled the development of trust, which was demonstrated by students being given increasing independence in clinical care. The supervisors gave increasingly frank feedback, and even conflict situations between students and disagreements between students and supervisors were perceived as constructive by both parties.

Learning as part of daily life

Learning was a central part of daily life across all professions. Interruptions to the normal flow of activities for educational reasons during multi-professional meetings occurred regularly. Pauses for teaching moments for students were actively created as part of the normal ward activities, both by nurse supervisors and staff without supervisor roles. Learning was not limited to students, and staff regularly paused to explain an aspect of their clinical work to their colleagues beyond what was necessary for their communal care of the patient. The supervisors' own learning was also prioritised by scheduled weekly meetings to discuss students, and to reflect on supervisory issues together. Supervisors also had time allocated to attend courses outside of the ward.

Interprofessional interactions

Student nurses interacted with doctors, assistant nurses, biomedical scientists, as well as with students of other professions (medical students and assistant nurse students). Students were addressed by their first name by both their supervisors and other staff. Students questioned the staff, showing no barriers of hierarchy, even expressing dissatisfaction with their answers.

Motivated by teaching roles

Supervisors described their role in student learning as an important and fun part of their job from which they derived satisfaction, and they stated that teaching was the main motivating factor for them working on a student ward.

6.1.2.4   Student-dedicated space

The student room (figure 5) was regarded as a central place where students and supervisors could meet together on the busy ward. Even though a nurse office was located nearby, other staff would automatically go to the student room to handover to the student nurse rather than their supervisor. Students' medical equipment (blood pressure cuffs, stethoscopes, pulse oximeters, thermometers), and the medicines trolley were located in the students room. As this was students' territory, there was an assumption that it was their responsibility to perform clinical tasks or delegate them. Computers in the student room were exclusively for student use, so students performed all necessary notetaking and looking-up during handover meetings. The students took on more leadership roles, made more decisions, and asked more nuanced questions (see Table 6) in the student room compared to similar meetings in the nurses' office.

Figure 5: Diagram floor plan of the student room on the ward from study I
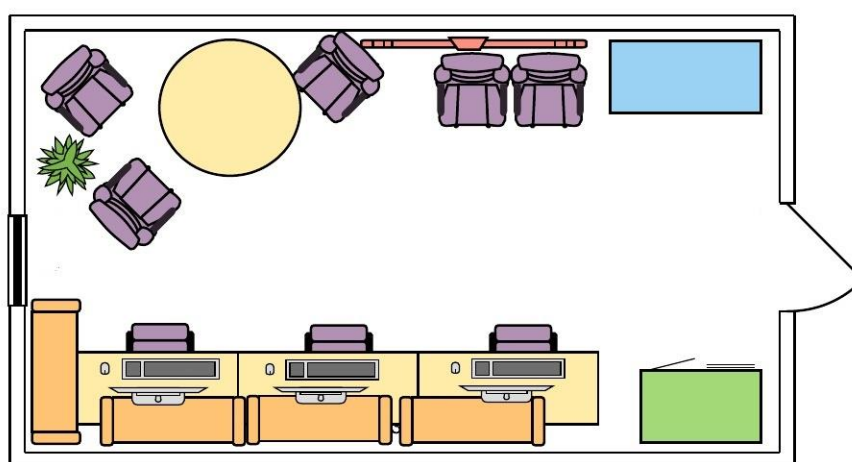
6.2 STUDY II

This interview study was conducted with supervisors of student nurses on two wards that used peer learning as a pedagogical framework in two hospitals in Stockholm.

6.2.1 Participants

15 interviews were conducted with participants from two medical wards, between November 2018 and May 2020. The participants are described in table 9. The interviews lasted a median of 40 minutes (ranging between 17 minutes and 46 minutes).

Table 9: Participants interviewed in study I

Ward	Cardiology (C)	Infectious diseases (I)
Nurse supervisors	6	4
Nurse supervisor ward managers	2	1
Assistant nurses	1	1
TOTAL	9	6

The individual participants are represented in table 9, quotations in the findings section are based on this table. They are denoted by a letter (C or I) representing which ward they participant was from, followed by a number (1-9 for C and 1-6 for I) to distinguish individual participants.

6.2.2 Findings

Four hierarchical levels of the supervisors' understanding of their role in students' peer learning were identified as forming the outcome space: the *teacher*; the *facilitator*; the *stimulator*; and the *team player* (table 10, figure 6). The supervisors' view on their role varied in the breadth of focus among the four categories. The least inclusive or narrowest view was the *teacher*, which represented viewing supervision as a property of the supervisor themselves, and the transfer of knowledge flowed from supervisor to student. The *facilitator* broadened this view and included the interaction between the supervisor and the student in defining the supervisor's role, and viewed the students as able to impart knowledge to one another and even to other staff. The *stimulator* broadened this view even more, and

recognised the role of the students' interactions between themselves, and with the patients as forming and defining the supervisor's role. The broadest view was the of *team player*, who viewed a wide variety of factors, not just their own actions, as all contributing to the community of peer learning. These included actions and attitudes of other staff, and the clinical environment as a whole. These factors were seen as interrelated and dynamic, constantly re-defining the role of the supervisor. The team player's role in peer learning was not what they directly say or do with the students, but of the of the role they had in upholding the community on the ward as a whole, which indirectly impacted students' peer learning.

Table 10: Categories of ways in which supervisors understand their role in student peer learning in study II.

	Teacher	**Facilitator**	**Stimulator**	**Team player**
The supervisor	Teaches students who learn passively	Takes actions that enable students to learn by doing	Steps back to allow space for students to take initiative to learn by doing	Contributes to the learning environment that facilitates students to become part of the team
The focus was	Teacher-led	Student-led	Patient-led	Community-led
Peer learning happened by	Multiple students being present simultaneously with one supervisor	Supervisors getting the students to do peer learning by what they say	Supervisors getting the students to do peer learning by what they do	Supervisors contributing to a community of peer learning so that it happens automatically
The student was	A dependent learner	An independent learner	A caregiver, can be entrusted with clinical tasks	A future colleague, a key member of the workplace
Clinical workload was	Alternated and balanced with supervision	Managed by the supervisor simultaneously with supervision	Shared between the students and supervisors and learning happens alongside	Shared between all staff and students on the ward and was the key component in student learning

The different levels of understanding were dynamically interrelated rather than static, and were all expressed, to varying extents, by each participant, and between the different occupational roles alike (nurses with managerial roles, supervising nurses, and assistant nurses). There was a degree of temporal flow, where supervision was adapted as students matured over time and the trust between student and supervisor developed. There was a tendency for staff who had worked for longer on the ward to give more answers reflecting the broader views. However, even the staff with least experience on a student ward gave viewpoints in all categories. The majority of answers fell within the three broadest categories, where the distribution was quite even.

6.2.2.1 Teacher

The *teacher* represented the view of the supervisor as the imparter of knowledge, and the students as multiple individual learners who received that knowledge. The transfer of

knowledge was unidirectional from teacher to student. The *teacher* focused on the importance of what they themselves did to enable the students to learn, and this role was most often relevant when they or the students were new on the ward.

"At first, I show them what we do here on our ward" (C7)

The *teacher* represented the view that the dual role of supervisors and clinician is conflicting, and the balance was described as a challenge.

"Sometimes I feel split, and that I'm not enough" (C6)

However, the supervisors viewed the *teacher* role as not aligned with their desired practices.

"I've maybe happened to just serve them the answer sometimes" (C4)

6.2.2.2   Facilitator

The *facilitator* represented the view of the supervisor as enabling the students to learn between themselves. They encouraged peer learning by handing over responsibility to the students for their own learning. Peer learning was viewed as a process that happened automatically when students are scheduled to look after the same patients, and by being told to work together.

"It is the student that stands in front and does things with the patient" (I4)

The *facilitator* represents the view of the roles of clinician and supervisor co-existing without undertones of conflict or imbalance.

"We play the role of both the nurse and the supervisor." (I4)

6.2.2.3   Stimulator

Like the *facilitator,* the *stimulator* also enabled students to learn from one another but did this by their passive supervision style rather than by giving direct instructions. The focus shifted from what the student or teacher did, to patient care. The student was viewed as a caregiver in whom the supervisor developed trust.

"They say, 'We'll go and check the patient first, and then dispense medicines", and I just say "OK". (C4)

"I sit on my hands and bite my tongue" (I5)

"It's hard, but we need to get to know an individual [student] really deeply… to know what they need to work on, what they don't need to work on" (I1)

The *stimulator's* clinical and supervisory roles were seen as not only simultaneous but also integrated.

"Being a nurse and supervisor, they go hand in hand" (C9)

6.2.2.4   Team player

The *team player* viewed their role as upholding the community of peer learning on the ward and viewed other staff members as crucial in students' learning. Developing supervision skills and supporting one another was a part of daily life for the staff and students alike.

> *"We [nurse supervisors] talk the whole time. There are formal meetings, there are informal meetings, we have time for reflection, we have a continuous dialogue" (C9)*

> *"Peer learning can happen between colleagues, can't it?" (C3)*

The *team player* represented the view of the student as an independent learner and future colleague. While the *facilitator* delegated, and the *stimulator* entrusted, the *team player* viewed clinical work as a joint ownership to begin with, where students are empowered to be initiative takers.

> *"We give them a place in the team, so that they feel they are worthwhile team members, as it is really important to try out how it feels to really be listened to" (C9)*

The view represented by the *team players* was that their clinical role was integrated not only with their supervisory role but indivisible from the roles of the all the staff on the unit, the leadership of the unit and the work environment as a whole.

> *"A large part of teamwork is about interprofessional learning." (C9)*

> *"When you have an educational ward where everything is about learning, the way of supervision does not conflict with what happens on the ward. What needs to be done on the ward is done by the students and supervisors, it assumes that patient care and learning go hand in hand" (I6)*

Figure 6: Interactions on the ward according to different views of the supervisor's role
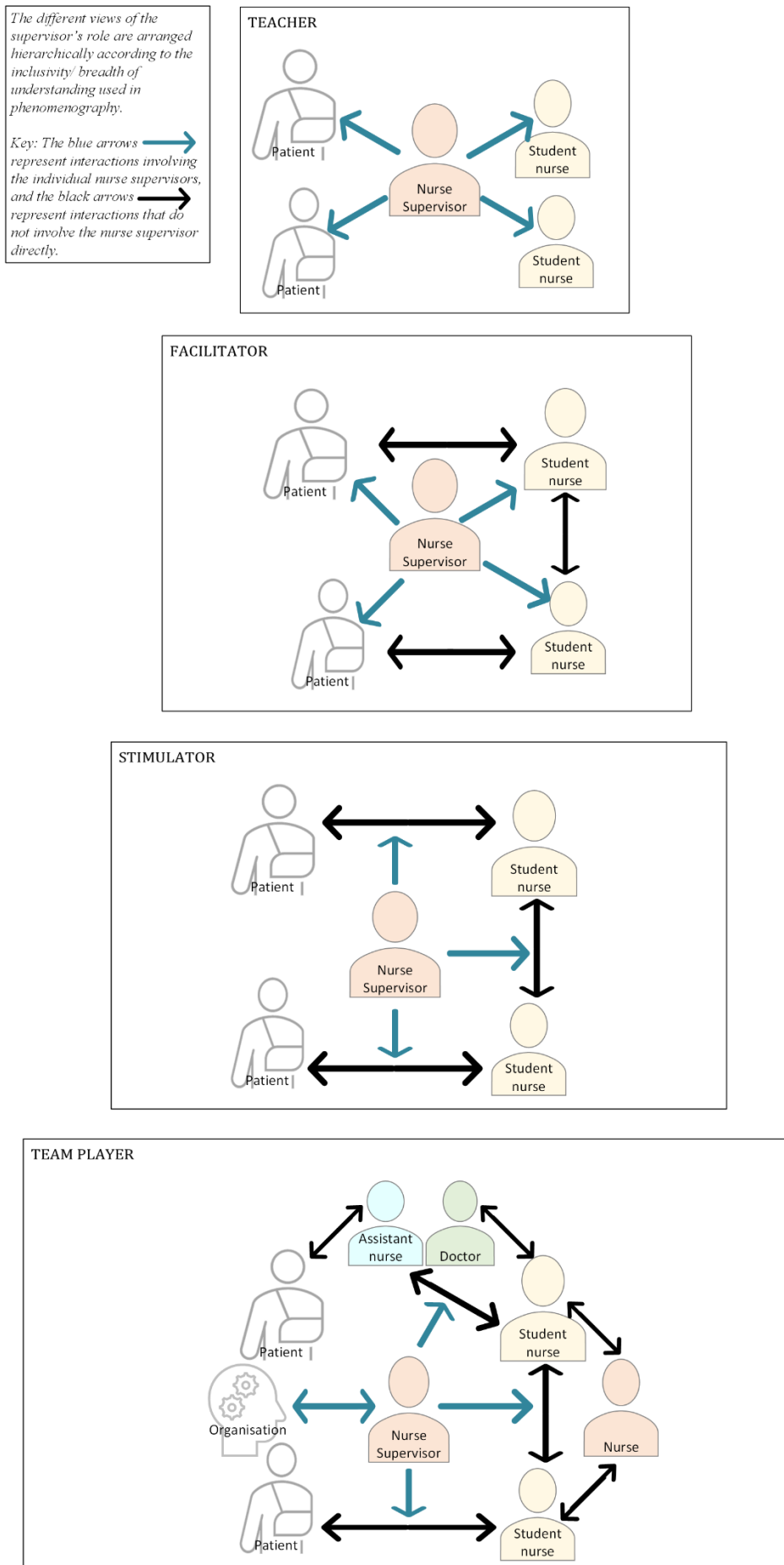
6.3 STUDY III

This study involved the development and pilot testing of a questionnaire intended to investigate the characteristics of supervision, the learning environment, and the learning activities on clinical wards, from nurse supervisors' perspectives, at three hospitals in Stockholm.

6.3.1 Participants

The pilot questionnaire consisted of 46 responses, including 34 participants from seven wards that used peer learning as a pedagogical framework (PLW) and 12 participants from three wards that did not use peer learning as a pedagogical framework (N-PLW) see figure 3. The overall response rate was 55% (60% for PLW and 44% for N-PLW). There were no statistically significant differences between the baseline characteristics of the two groups. All wards had multiple student nurses present simultaneously, and 83% of participants reported supervising multiple student nurses simultaneously.

Table 11: Characteristics of the ten wards included in study III

Pedagogical framework	7 wards with a peer learning framework 3 wards with no framework
Ward specialty	6 medical wards 4 surgical wards
Multiple student nurses present simultaneously	10 wards
Term of students	3, 4, 5, 6
Length of student placement	3-6 weeks
Number of students per period	2-11 students
Number of supervisors on ward	6-14 supervisors
Number of students per supervisor	2-4 students

Of the seven wards that used peer learning as a pedagogical framework, there was considerable variation in the practicalities. Two wards used peer learning in every situation and called themselves student wards. Of the five that used peer learning but did not call themselves student wards, two wards only used peer learning with students in specific terms but not others. Two wards used peer learning with all students, but some supervisors opted to have only one student, so there could be several supervisors present simultaneously. One ward used peer learning whenever there were multiple students, but the scheduling meant that this was not always the case. The number of students present simultaneously was most often two, but could be up to four. The three wards that did not use peer learning as a pedagogical framework (N-PLW) all had multiple students present simultaneously, most often two.

6.3.2 Findings: Questionnaire development

Steps 1-4: Creating the questionnaire

See table 3 for details of questions constructed during the initial steps.

Step 5: Content validity

Content validity was not measured quantitatively but instead was validated through qualitative feedback from the content experts and removal/addition of relevant items according to the responses. Changes at this stage included:

- Combining similar questions about motivation and peer learning behaviours into one.
- Simplifying certain questions by changing the answer alternatives from a Likert-scale to a tick-box.
- Changing the wording and shortened the phrasing of different answer alternatives.
- Changing the order of questions

6.3.2.1 Step 6:

Response process validity found that the questions were understood and interpreted by the participants as intended by the authors, and that the answer alternatives were appropriate for participants' intended answers. Questions that did not meet these criteria were changed or removed. Changes at this stage included:

- Adding introductory questions about percentage of time spent supervising students and presence of clinical adjunct nurses with educational roles.
- Replacing a question asking participants to define peer learning with a sub-question asking about whether they perceive their students use peer learning.
- Combining two questions about trust into one.
- Re-defined inclusion criteria for participating wards (excluding intensive care and emergency department).

6.3.2.2 Step 7: Pilot testing

Despite the previous steps, after the pilot testing, there remained questions which were invalid and therefore excluded from the analysis:

- Q4: supervisor's percentage of time spent supervising students was answered in relation to a temporary pandemic situation, as indicated by free-text comments specifying that their answer did not reflect their usual amount of supervision.
- Q13: participants were able to fill in "contradictory" answer alternatives where several mutually exclusive actions were performed "most often".
- Q32: Comments expressed confusion about the question and were often left blank.
- Q34a-c: The item range and variance showed ceiling effects for three sub-questions.

Internal validity was checked by calculating the correlation using Spearman's rank correlation between items that measured similar variables ($p<0.05$): There was a strong positive correlation between peer learning activities and perceived peer learning (Rho 0.64, $p<0.001$), and a strong positive correlation between the two outcome variables about satisfaction (Rho 0.71, $p<0.001$).

Two components of the PCA analysis explained 24% of the variance, using a cut-off of 0.15 in the loading score. The first component concerned the development of trust in the student's competence and ability to integrate independently, and explained 13% (Eigenvalue 5.92). The second was about trust in the supervisor's own competence and abilities as a nurse, team

player and supervisor of multiple students, and explained 11% of the variance (Eigenvalue 4.96). The PCA scores were uniformly distributed within the Hotelling's T2 ellipse, with one potential outlier, who had very little experience as a nurse. Cronbach's alpha was 0.84 for the whole questionnaire, showing internal consistency and reliability of the item scores.

6.3.3 Findings: Pilot questionnaire

6.3.3.1 Descriptive statistics and basic comparisons

According to the pilot questionnaire results, PLW had statistically significant higher levels of student-led learning, student-centred questions, peer learning activities, perceived peer learning, physical adaptations for students, support for the supervisor (figure 7), satisfaction with the education, and overall satisfaction (figure 8). There were no near-peer interactions possible in any of the N-PLW because there were never students of different terms present simultaneously. A summary is presented in table 12.

Table 12: Summary of comparisons of composite scores for each question.

Q	Theme	Max. score	PLW		N-PLW		p-value
			Median	(IQR)	Median	IQR	
8a-e,g	**Student-led clinical activities**	**24**	**13.0**	**(4.8)**	**9.5**	**(4.3)**	**0.008**
8f	Unskilled tasks student-led	4	3.0	(1.0)	2.0	(1.0)	0.249
9	Student-led initiative	4	2.0	(1.0)	1.0	(1.0)	0.113
10a-c	**Student-led questions**	**12**	**7.0**	**(1.8)**	**6.0**	**(1.8)**	**0.043**
11a-d	Supervisor knowing learning needs	16	14.0	(3.0)	13.5	(3.0)	0.575
12a-d	Supervisor's knowledge of students	16	13.0	(2.5)	13.0	(2.0)	0.817
18a-d	**Peer learning activities**	**16**	**10.0**	**(3.5)**	**8.0**	**(1.5)**	**0.015**
18e	**Perceived use of peer learning**	**4**	**3.0**	**(1.0)**	**1.0**	**(1.5)**	**0.005**
19ab	Stress/workload in peer learning	8	4.0	(2.0)	4.0	(1.5)	0.182
19cd	**Fun for supervisor/student in peer learning**	**8**	**5.0**	**(2.0)**	**4.0**	**(2.0)**	**0.027**
21a-c	Near-peer learning	6	1.0	(4.5)	N/A	N/A	N/A
23a-c	Interprofessional learning	6	3.0	(1.0)	3.0	(2.0)	0.878
25a-c	Interaction with Doctors	6	4.0	(3.3)	3.0	(5.0)	0.248
26a-c	Interaction with Occupational therapists	6	1.0	(2.0)	1.5	(3.0)	0.767
27a-c	Interaction with Physiotherapists	6	3.0	(3.0)	3.0	(1.8)	0.472
28a-c	Interaction with Psychologists	6	1.0	(2.3)	1.0	(1.0)	0.412
29a-c	Interaction with Assistant nurses	6	6.0	(2.0)	5.0	(3.0)	0.138
31a-c	**Physical adaptations**	**6**	**4.0**	**(4.0)**	**0.5**	**(1.0)**	**<0.001**
33a-c	**Support for the supervisor on the ward**	**6**	**3.0**	**(3.0)**	**1.0**	**(0.5)**	**0.007**
34d	Motivated by interprofessional interactions	4	3.0	(1.0)	4.0	(1.0)	0.129
34e	Motivated by interactions with students	4	3.0	(1.8)	3.0	(1.3)	0.437
34f	Motivated by administrative tasks	4	3.0	(1.0)	3.0	(1.3)	0.683
34g	Motivated by quality improvement	4	3.0	(1.0)	3.0	(1.0)	0.736
35	**Satisfaction with education quality**	**10**	**8.0**	**(1.0)**	**7.0**	**(1.8)**	**0.026**
36	**Overall satisfaction**	**10**	**7.0**	**(2.0)**	**5.5**	**(2.3)**	**0.006**

Median and interquartile range (IQR), p-value for the Mann-Whitney U tests for the statistical significance of the difference peer learning wards (PLW) and non-peer learning wards (N-PLW) are shown. Analysis was based on composite scores for the whole question or individual sub-questions when they measure different aspects. Questions in bold have a statistically significant difference.

Figure 7: Differences between PLW (green) and N-PLW (blue) in terms of the percentage of participants from each ward type that answered that the characteristics of student-led learning, support for the supervisors, adaptions for the students and peer learning activities occurred most often (more than half the time).
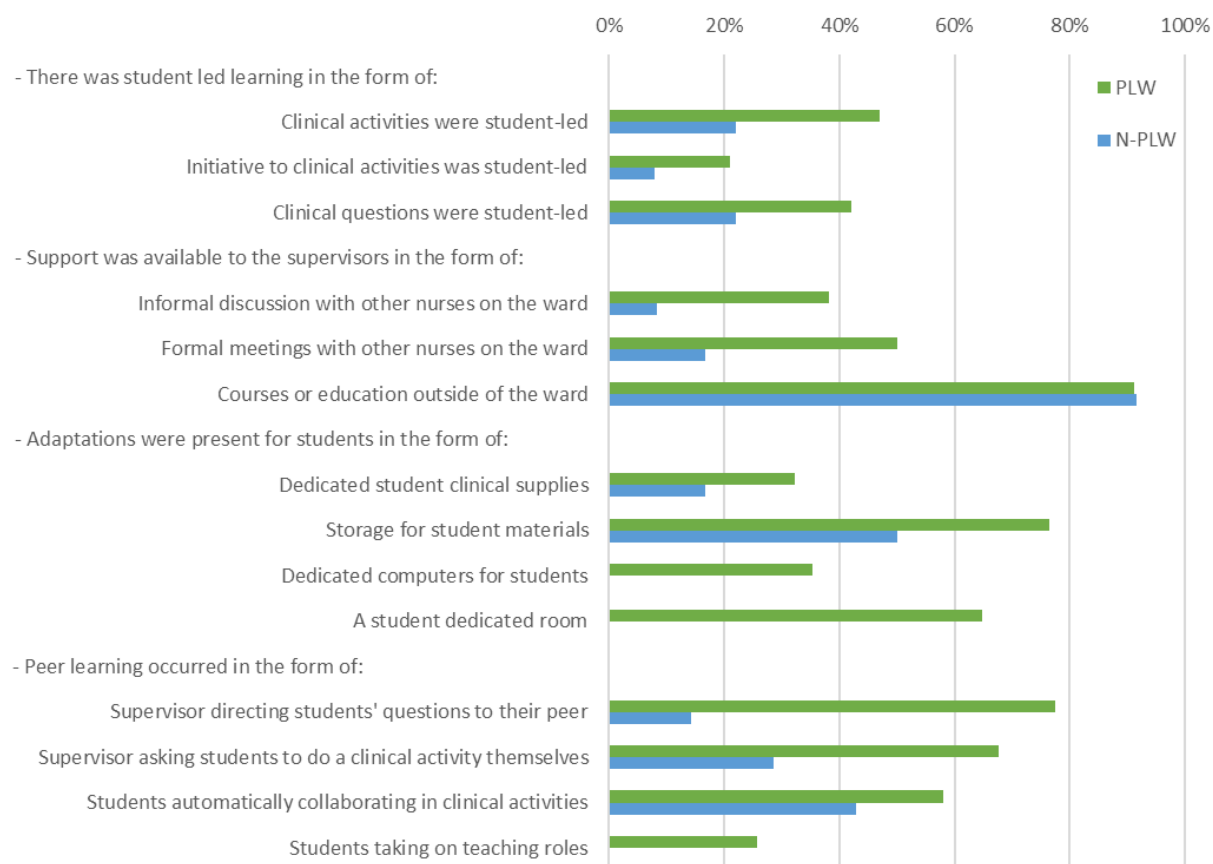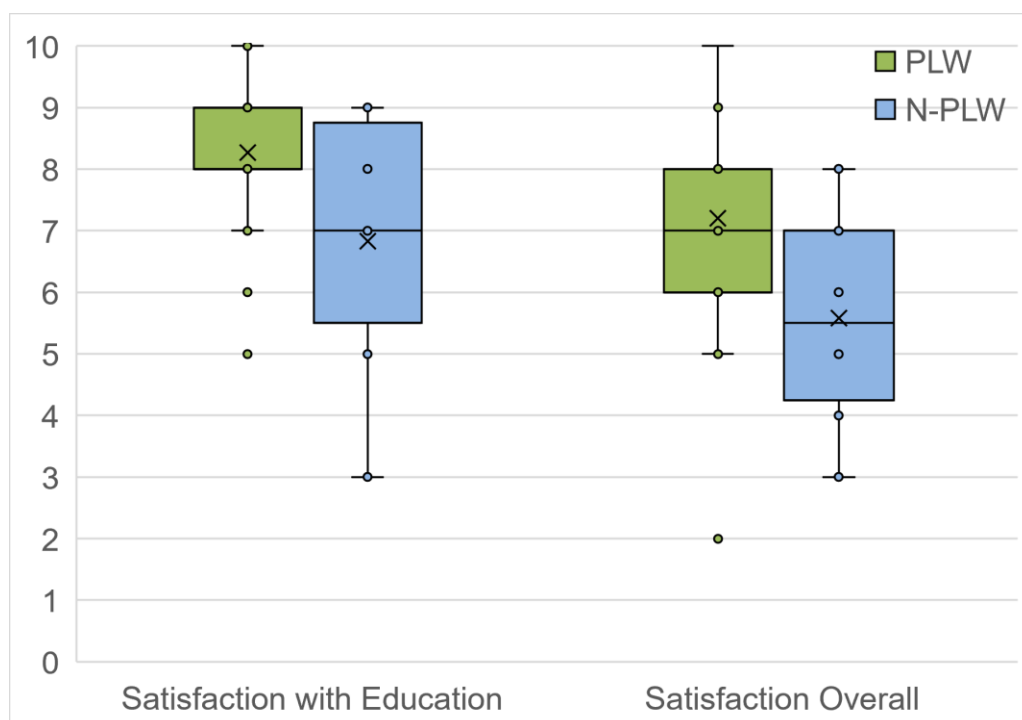

Figure 8: Box and whisker plot showing satisfaction with the quality of education and overall satisfaction on PLW and N-PLW

6.3.3.2 Correlations

There was a positive correlation between higher frequency of peer learning activities and a lower perceived workload. There was also a weak positive correlation between a high frequency of peer learning activities and peer learning perceived to be fun for both the supervisor and student.

There was no correlation between the frequency of or perceived use of peer learning and satisfaction outcomes. Satisfaction with education and overall satisfaction was higher when supervisors felt it was important to supervise students. There was a positive correlation between physical adaptations for students and satisfaction with education, but not with overall satisfaction. There was a positive correlation between support for supervisors and both satisfaction with education and overall satisfaction.

Table 13: Correlations between selected questions as calculated by Spearman's rank correlation.

Questions compared			Rho	p-value
18	19a	Peer learning activities and stress	0.03	0.87
	19b	**Peer learning activities and lower workload**	**0.61**	**<0.01**
	19c	**Peer learning activities and fun for the supervisor**	**0.37**	**0.02**
	19d	**Peer learning activities and fun for the student**	**0.33**	**0.04**
18	35	Peer learning activities and satisfaction with education	-0.01	0.97
18	36	Peer learning activities and satisfaction overall	0.19	0.25
18e	35	Peer learning perception and satisfaction with education	0.24	0.15
18e	36	**Peer learning perception and satisfaction overall**	**0.35**	**0.03**
31	35	**Adaptations for students and satisfaction with education**	**0.43**	**<0.01**
31	36	Adaptations for students and satisfaction overall	0.26	0.08
33	35	**Support for the supervisor and satisfaction with education**	**0.36**	**0.01**
33	36	**Support for the supervisor and satisfaction overall**	**0.46**	**0.00**

6.3.3.3 Advanced statistics

OPLS-DA (figure 9) found that PLW and N-PLW were different according to their answers (ANOVA p=0.0034), with the PLW group answers to the left and N-PLW group to the right.

Figure 9: OPLS-DA plot representing scores of the participants from PLW and N-PLW.
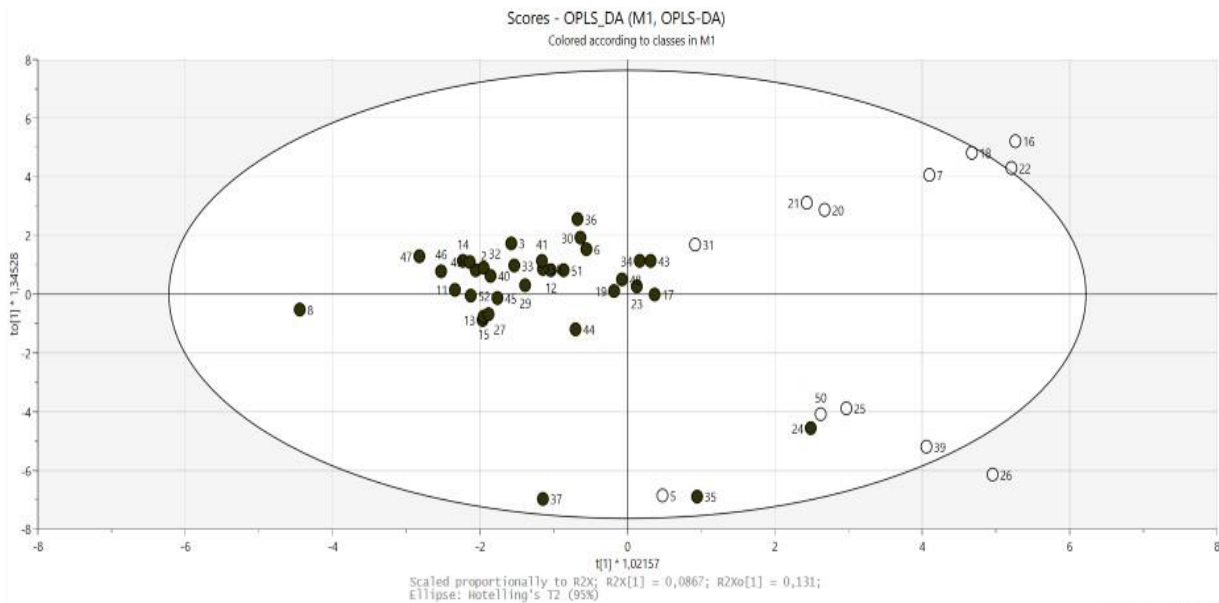
Participants represented by circles, from PLW (black) and N-PLW (white). The horizontal axis denotes the predictive component (score) of each individual answer to discriminate between the PLW and the N-PLW group. The vertical axis denotes systematic differences within each group that were orthogonal (i. e. independent to the predictive component).

The VIP plot (figure 10) demonstrates that the variables that had the greatest influence on the discrimination of the wards were physical adaptations, variables related to peer learning, and student-led activities. These variables were components of the questions that were also shown in univariate inferential statistics to significantly differ between the two groups.

Figure 10: Variable Importance in Projection (VIP) with a value greater than 1.0. VIP value on the x-axis with confidence intervals in black.
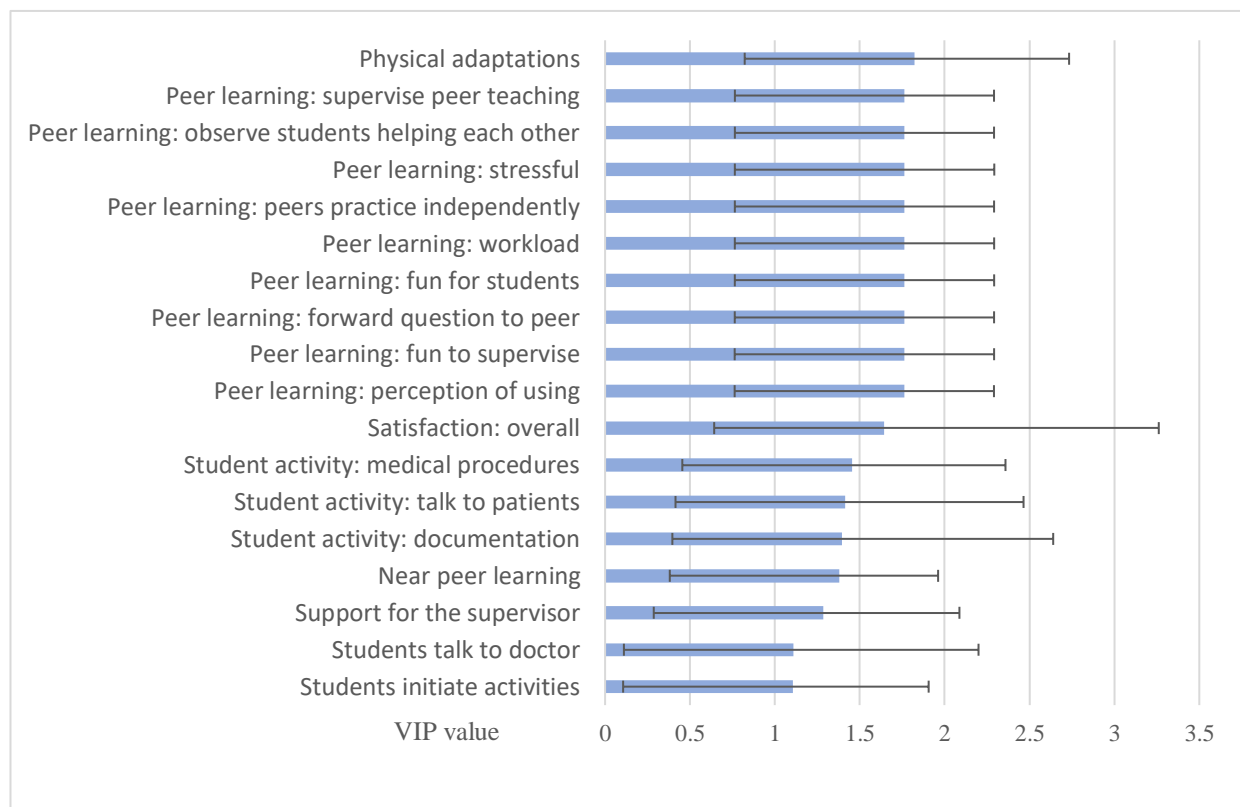
7 DISCUSSION

The studies in this thesis have begun to address knowledge gaps concerning the real world implementations of peer learning on clinical wards, by describing the characteristics of a student ward that uses peer learning as a pedagogical framework (study I); finding that many of these characteristics were present on other wards that used peer learning as a pedagogical framework (study III); and that some of these characteristics were significantly different from wards that did not use peer learning as a pedagogical framework (study III); and finally by describing different views of the role of the supervisor in peer learning (study II). After an initial discussion of these findings, the implications are contextualised into what it means to have a community of practice centred around student learning.

7.1 WHO USED PEER LEARNING?

7.1.1 Peer learning was used by supervisors on different types of wards

Study III found, unsurprisingly, that peer learning was used by supervisors more often on wards that used peer learning as a pedagogical framework (PLW) than on wards that did not (N-PLW). However, peer learning was even used by supervisors on N-PLW. This could be because some supervisors found it intuitive to use peer learning when multiple students were present, even without a pedagogical framework. Another reason could be that interactions between supervisors outside of their wards where they shared experiences of peer learning leads to its gradual incorporation into supervisor's repertoires. Peer learning was not used all the time even on PLW. This could have been due to a lack of adherence to the pedagogical framework, or that the implementation of the framework allowed flexibility, and supervisors had insight into selecting situations where peer learning was inappropriate[94].

7.1.2 Supervisors on PLW were aware that they used peer learning

Not all instances of learning together are peer learning, however, it may occur without the students or supervisor being familiar with the term *peer learning*. In studies I and II, supervisors on PLW were familiar with the definition of peer learning and could identify instances where they used it in practice. Study III found that supervisors on N-PLW had more dispersed perceptions of how much peer learning they used compared with supervisors on PLW. This could reflect the varying frequency of its use on different N-PLW, but also could indicate that supervisors on N-PLW were less familiar with what peer learning involves. All N-PLW supervisors answered that they perceived that their students learnt together, which highlights potential difficulties in identifying when learning together qualifies as peer learning. Potential differences in awareness of the concept of peer learning between PLW and N-PLW could also have affected the answers given by the participants in the questionnaire (see methodological considerations).

7.2 HOW WAS SUPERVISION DIFFERENT WITH A PEER LEARNING FRAMEWORK?

7.2.1 Supervision was more student-led

In study I, students were observed being active in both patient care and in their own learning. Students performed nursing tasks and selected activities that were aligned with their learning needs. In the literature, supervisors described setting goals jointly with students as important for a student-centred approach[136], and student-led supervision was viewed as part of being a good clinical supervisor[41]. Study II shed further light on how supervisors were student-led, such as having a *facilitator* role. The *facilitator* focused on the students (rather than on themselves as a supervisor) and empowered the students' learning activities. Similar supervisor roles in peer learning have been described in the literature: encouraging critical thinking and supporting development of independence[15,86]; giving students acknowledgment and confirmation[14]; supporting the students in solving clinical problems[95]; taking a step back while providing support[15]; promoting student interaction by developing activities encouraging collaboration[88]; and, simply, facilitating[107]. In a student-run clinic in an outpatient setting, supervisors facilitated student participation by allowing medical students control of the consultation room and giving them a mandate to independently perform parts of a consultation[49]. The questionnaire results (study III) found activities such as administering medicines and discussing patients with the doctor, were more student-led on PLW, while on N-PLW the same activities were more often supervisor-led. There were no differences in students doing unskilled tasks between PLW and N-PLW, such as helping the patients dress or eat. This suggests that the student-led approach applied to learning activities, and not to practices of utilising students for service provision without alignment with learning outcomes[11].

Student-centredness has parallels with active learning, where student engage actively in acquiring knowledge and understanding, leading to deep learning[48]. Active learning has been described as giving an authentic experience that forms the core of student learning[81]. Active learning was a component of questions in study III on student-led clinical activities, student initiative and student-led questions, which were found more frequently on PLW. Active learning has also been found in wards that use other pedagogical frameworks such as problem-based learning[137] and transformative learning[107], which although different from peer learning, have similar focuses on active learning.

7.2.2 A broader view of the supervisor role was common

The view of the supervisor as a *teacher*, conveying knowledge[41] and being an educator[42] is common in the literature. However in study II the *teacher* role was seen as difficult or stressful due to supervising multiple students simultaneously, a finding which was echoed in previous studies[86]. Supervisors in study II described examples of their *teacher* role when they answered students' questions directly, but they viewed this as a mistake. Although the *teacher* represented the narrowest category of the view of the supervisor's role in peer learning, it could have been necessary as part of a supervisor's repertoire. Broader views of

the supervisor's role found in study II, such as the *facilitator,* who focused on the students, and the *stimulator,* who focused on patient care, are also found in the literature on non-peer learning, but to a lesser extent. Such descriptions include enabling students to be independent, allowing them to assume responsibility for their own learning[14,42], and having a hands-off role[80].

The broadest views of the supervisor role in study II was a *team player*, which has not previously been alluded to in the literature. The *team player* saw themselves as equal parties with other people on the ward in enabling student peer learning. This was the dominating view expressed by participants from both wards in study II. This points to an underlying unified approach, in concordance with the theory that members of a community of practice seek to align their identities with the practices and activities within their community[6]. The influence of the community of practice on how clinicians become teachers has previously been described, where clinical supervisors reproduced teacher identities and practice that were congruent with the community of practice's regimes of competence in order to gain recognition and legitimacy[55].

7.2.3 Development of trust between the student and supervisor was needed

Intuitively, trust between the student and supervisor is vital for peer learning from the supervisor's perspective (to feel comfortable with students being active in patient care) and the student's perspective (trusting that the supervisor will ensure patient safety and support them when needed). The importance of the supervisor developing trust in the student has been shown previously in the context of regular supervision[46], and trust has been described as a precondition for the independent provision of care and team functioning[138]. Supervisors building up personal knowledge of the students as individuals and their learning needs was observed in study I and was interpreted as a way of developing trust. In study II, supervisors viewed trust in the student as necessary for them to step back and allow them to care for patients. Supervisors described trust developing over time through getting to know the students as people, which is reflected in descriptions in the literature of trust formation as a dynamic process[139]. Trust development proved difficult to evaluate through a questionnaire, and the question directly addressing trust development in study III was ultimately removed during pilot testing due to diverse interpretations leading to invalidity. Study III found supervisors had high levels of perceived personal knowledge of the student and their learning needs in both PLW and N-PLW, with no significant differences. This suggests that knowledge about their students was needed in all learning settings, and that the trust needed specifically for peer learning might be developed in other ways. Some examples of other ways of trust development in the literature include supervisor's direct observations of students as care providers and input from other staff and patients[138].

As well as the supervisor developing trust in the student, the student needed to develop trust in the supervisor. Trust between the student and supervisor has been described as mutual and interrelated, and a process that can be actively influenced through supervision[139]. In study II, the view of the supervisor's role as a *stimulator* shifted the focus to patient care, positioning

both the students and supervisors as caregivers, reducing power imbalance. Creating a non-hierarchical relationship between student and supervisor has previously been shown to foster constructive supervisor-student relationships[46,140]. Supervisors creating a safe learning environment could increase students' trust in the supervisor and facilitate their learning, for example enabling students to handle criticism and respond effectively to feedback[139]. This was observed in study I, where a supervisor gave feedback to a student about their mistake, but stated that this was not necessarily negative (see table 6). The relationship between the student and supervisor could represent the *mutual engagement and relationships* needed in a community of practice[6].

7.2.4 Supervisors had similar educational training and motivations

Study III found no difference in the baseline level of educational training between participants on PLW and N-PLW, reflecting that any recruitment bias to highly trained supervisors was unlikely to account for any differences found between the wards. In contrast, there were significant differences in the amount of support situated on the ward for supervisors between PLW and N-PLW. Situated learning in the clinical workplace has been shown to be more influential in embracing changes in teaching practice than education outside of the ward[58], suggesting that differences between PLW and N-PLW are more likely to be affected by educational initiatives on the wards themselves than any underlying differences in the supervisors.

The student ward in study I was set up by the ward manager who was interested in supporting student education, and recruitment bias of nurse supervisors with higher levels of internal motivation could have been an important precondition for the student ward to maintain a community of practice that supports student learning. Studies I and II found that supervisors viewed supervision as integrated and inseparable from clinical work, which is consistent with previous findings on a student ward[107]. This is in contrast to reports from other countries on wards with no pedagogical framework where supervision has sometimes been perceived as an inconvenient add-on that must be squeezed in around clinical duties[47,55]. However, study III found no significant differences in the extent to which supervisors from PLW and N-PLW reported being motivated by supervision, although the ceiling effect for this question could have masked more subtle differences. Neither was there any difference between PLW and N-PLW in terms of other aspects of supervisors' daily practice that they considered motivating.

7.3 HOW WAS THE LEARNING ENVIRONMENT DIFFERENT WITH A PEER LEARNING FRAMEWORK?

Many aspects of the learning environment related to supervision have been discussed above. Other components of the learning environment are further discussed below, including the physical adaptations of the ward and organisational adaptations for supervisor development.

7.3.1 Adaptations of the physical space for student learning

The student room in study I was an important component of the clinical learning environment, both its physical space and the atmosphere in the room. Study III found that physical adaptations were more common on PLW, and student-dedicated rooms were exclusively present on PLW. This could be because creating a united pedagogical approach to students, regardless of the specific framework, led to general investments in education. The permanency of the student room, and its explicit purpose could have been seen as a statement of its commitment to students.

Aside from the physical characteristics of the student room, its atmosphere of empowerment for the students was described in study I. Observations of students' questions and actions suggested deeper learning occurred in the student room compared to in other locations on the ward. Although the presence of the room alone was most likely insufficient to create a facilitating atmosphere for learning, its effects on feelings of ownership of clinical tasks in specific locations proved difficult to examine in study III. While the presence of physical adaptations was studied, questions regarding the effects of the student room were interpreted differently by each participant and were therefore removed from the analysis. This could be because it was supervisors responding to the questionnaire, rather than students answering about their own learning, but it could also reflect a difficulty in gathering quantitative data on such a nuanced phenomenon.

7.3.2 Support and education

Studies I and II found that staff on PLW had both formal and informal meetings situated on the ward for the purpose of their development as supervisors. Study III found that support for their supervisory role was significantly higher on PLW. This could be in part due to needing increased training for supervisors who are expected to adopt a specific educational model. However, another explanation could be that the organisation prioritised the supervisor's role in student education and thus invested more in supporting this. Moreover, satisfaction scores were positively correlated with the extent of support for the supervisor, implying that this support had effects beyond developing teaching competencies. Supervisors' dedicated meetings for supervision could form part of their *shared repertoire*[6], thus including students and their supervision in the community of practice.

7.3.3 Satisfaction with the ward

Studies I and II gave the impression that supervisors were satisfied with their ward as a workplace. This was further studied in study III, where participants from PLW scored higher than N-PLW on satisfaction, both with the quality of education for students, and with the ward as a whole. However, satisfaction was not correlated with the extent of peer learning activities or with perceived levels of peer learning. This suggests that peer learning itself does not lead to increased satisfaction. It could be that the learning environment as a whole was different when using a pedagogical framework, which is discussed below.

7.3.4 A pedagogical framework and the community of practice

Clinical wards often form a *community of practice* centred around the *joint enterprise* of clinical care. A pedagogical framework could contribute to the inclusion of student supervision in the *joint enterprise* of the ward, especially on wards with multiple students. This joint enterprise could involve the supervision of students itself, as well as supervisors' collaboration through formal and informal meetings about supervision. Including student supervision in the joint enterprise explicitly involves students in the *community of practice*, who do not always have *full participation* in patient care and are sometimes never fully included in wards with no pedagogical framework. In study I, using a pedagogical framework helped shape the community of practice centred on student learning. The students and staff, including those who were not supervisors, had a shared view of learning as a priority. This approach was also described in study II, where the supervisor viewed their role as a team player, supporting student peer learning jointly with other staff. More interaction between the student nurses and other non-supervisory staff could be expected on wards with a pedagogical framework as they could have a *shared repertoire* of a team approach to students. However, study III did not indicate significant differences between PLW and N-PLW in terms of frequency or type of interactions, although these measures do not necessarily determine the extent to which other staff contribute to the community of practice.

7.4 LANDSCAPE OF PRACTICE OF MANY DIFFERENT TYPES OF WARDS

The studies in this thesis investigated supervisors and students in the context of the single ward on which they worked at the time. However, an individual student is placed on many different wards during their education, and the supervisors may have also had experiences from previous workplaces or even their own student placements. Learning is thought to happen at the boundaries of different communities, and when individuals encounter other communities, both their learning and their community are enriched[30]. One study suggests that clinical educators shift over time from belonging to different communities to focusing on those that mattered most to them[141]. Therefore, both the similarities and differences between the different wards in the studies in this thesis are essential for both the student and supervisor's learning. That is to say that variation in pedagogical frameworks, supervision or participation for the students can be seen as enriching their overall education and can be the basis of identity formation as a supervisor.

8 METHODOLOGIOCAL CONSIDERATIONS

8.1 TRUSTWORTHINESS

Qualitative studies are often assessed by criteria of credibility, dependability, transferability[142], which are discussed below.

8.1.1 Credibility

Credibility describes the confidence that the findings reflect a reality. The research in this thesis comes from a theoretical viewpoint that there is no objective truth and that multiple realities are possible. Credibility in this context can be supported through the selection of participants that are appropriate for the research questions. In studies I and II, the research questions concerned supervision and learning environments on wards that used peer learning, therefore the selection of participants with experience on a student ward and who work consistently with peer learning supported credibility. Credibility in Study I was supported by prolonged engagement and member checking. Credibility in study II was supported by iterative discussion among authors from different professional backgrounds, and member checking with the participants. Feasibility and availability limited other possible ways of increasing credibility such as observing another ward (study I), and interviewing participants from more wards (study II).

8.1.2 Dependability

Dependability describes the consistency of the findings. The specific research questions were different among the studies but the common overall findings regarding characteristics of wards that used peer learning as a pedagogical framework and their supervision are coherent using the studies' different methods (observations, audio diaries, informal questioning, interviews, questionnaires). There were similar findings on different wards in different hospitals in studies II and III.

8.1.3 Confirmability

The confirmability can be seen as the degree of neutrality, and the extent to which the findings of a study are shaped by the participants. This is difficult to assess, and to address this I have reflected over reflexivity in studies I and II (see "reflexivity" heading below), as well as the role of the mixed professional backgrounds in our research group.

8.1.4 Transferability

The study settings were described in detail to aid assessing transferability to other similar settings. This is especially important in the context of student wards, which do not have a definition, and similar wards internationally may have a very different set-up. The transferability of the findings to supervisors of other healthcare professions is an area of further investigation as a previous study emphasised that the learning environment for students of different professions is different even if they are present simultaneously on the

same ward[143]. In study II, the doctor was observed asking many questions to the medical students and student nurses, in contrast to the infrequent questions asked by the nurse supervisor. This could reflect different views on the supervisor role and different teaching practices between different healthcare professionals.

The findings could be transferred to wards in different hospitals and cities. However, transferability to other countries could be largely affected by the cultural views of the role of the supervisor, for example by a tendency to view roles more hierarchically. The prioritising or marginalising of certain teaching activities by institutions[55] could have a large influence on supervision and supervisor roles. The role of the supervisor in peer learning could even be relevant in higher education contexts outside of healthcare.

8.2   REFLEXIVITY

Wenger's social theories of learning[6] illuminate my role as the researcher, where my interaction with the participants is an essential component of making meaning. I view my own role as a researcher as a balance between having pre-understanding of the context, that is, the nature of clinical practice and of teaching and learning in a clinical workplace, while also maintaining distance from the participants. My own clinical practice is mostly in primary care, I teach medical students, and I am not a nurse. However, I have spent many years working as a doctor with nurses in different hospital settings in different countries. Having experienced peer learning both as a student and as a supervisor, I have tried to approach the research from a standpoint of curiosity to explore the "how" and the "why" rather than evaluating "how good".

I have reflected on the influence of my own views on the research. Most liable to my own personal understandings was the observational study, where my interpretations were the basis for the results. In the epistemology of this type of research, such personal insights are inevitable, and rather than being seen as a drawback, are essential for making meaning. In the interview and questionnaire study, although the questions and verbatim transcribed or written answers provided concrete data, the reading of the tacit information remained an important component of the results.

The reflexivity of not only myself but our research group as a whole is an important consideration. I consider the variety of backgrounds (doctors, nurse, non-clinical) as an enlightening combination providing a range of viewpoints.

8.3   STUDY I

My clinical experience inherently involved a substantial pre-understanding that is normally not present in a naïve observer in traditional ethnographic research[144]. However, I had no previous connection to the participants or the ward. The nurses and students were reassured by my not being a nurse, as it was clear that I did not have the profession-specific knowledge to have an evaluating role.

The effect of my presence on the participants' behaviours was initially observed as a slight awkwardness, and the participants made eye contact and small talk with me. However, by acting neutrally (keeping out of the way, not initiating questioning during activities, not making comments), I noticed that these behaviours soon stopped, and participants reported that they had forgotten I was there. The long period of 6 months during which I observed the ward meant that most participants knew me, and those that did not took their cues to ignore me from others around them. Although the effect of the observer was never completely gone, informal questioning and audio diaries provided another source of information that was exempt from this effect.

Member checking was performed by presenting preliminary results to the participants during a meeting on the ward after the observations were complete. The feedback was that they unanimously agreed with the author's interpretation of the observations.

Initially the plan was for student nurses' audio diaries to have a larger role, but despite the financial incentive, few participants responded. Students reported that they had a lot of studying to do and were tired after a long day on the ward. As the concept of audio diaries is new to most, it also may have felt uncomfortable to talk out loud or to record oneself. The motivation could also be low when one does not see others around doing the same thing. The audio diaries that were submitted were a rich source of information, with relatively uninhibited deep self-reflection. The use of audio diaries in the future could be enhanced by for example allocating a specific time slot for students to complete the recordings.

8.4   STUDY II

All the nurse supervisors at both wards that could be contacted agreed to participate, which was a 100% response rate. While perhaps expected for the ward in which I had previously conducted the observational study, it was surprising on the ward which I had never previously visited. The organisation of the interviews could have been a contributor, as the interviews were conducted during gaps on an education day, with no patient workload. The enthusiasm to participate could be in line with the motivation and interest required to supervise on an adapted student ward. Some participants at one of the wards were familiar with me after the observational study, which could have affected their responses. Participants were aware that I had observed their actions and could have been more truthful in their responses to avoid contradictions. Participants who felt comfortable with me personally could be more likely to provide reflective responses. However, having built up a knowledge of one another during a six-month long study period, participants could have also been inhibited by the increasingly personal relationship with me as the interviewer.

8.5   STUDY III

The pilot questionnaire was answered by a limited number of participants and the results are preliminary. Further investigation with more participants is planned.

8.5.1 Questionnaire development

The questionnaire that was developed had many overlapping domains with the CLES questionnaire (Clinical Learning Environment and Supervision instrument)[145,146]. Although CLES is aimed at students rather than supervisors, there were similarities in the questions asked such as ward atmosphere, learning on the ward and supervisory relationships. This supports that the questions developed in study III were relevant to investigating the clinical learning environment.

Questions regarding specific situations during participants' most recent shift were chosen to reduce selection bias of which scenario the participant answered about, but could have introduced recall bias. A test-retest analysis could have been performed to increase the reliability. Participants' reported activities could differ from their actual activities, and reporting bias could be greater among PLW supervisors trying to align their actions to their ward's pedagogy.

8.5.2 Participants

There may have been a selection bias towards wards with a higher rated work environment as ward managers that agree to participate are more likely to be interested in contributing to research. However, this selection bias could be assumed to equally affect PLW and N-PLW. More of the wards contacted were PLW than N-PLW, and the unevenness was accentuated by the higher response rate for PLW, perhaps reflecting greater interest in education and research.

8.5.3 Classification into PLW and N-PLW

The classification of PLW and N-PLW was based on the reported use of peer learning as a pedagogical framework by the ward manager. This included those named "student wards" as well as wards with no special name. The results could therefore be confounded by the considerable variation in the implementation of peer learning frameworks on the wards classed as PLW. Moreover, supervisors who had previously worked in different wards and supervisors who converse with colleagues from other wards could influence their views and actions and thus be another confounder.

8.5.4 Statistical analysis

Many Mann-Whitney U tests were performed, increasing the likelihood of a false positive. The results were triangulated with the discriminant analysis, which found that the questions that were found to be different between PLW and N-PLW in the inferential statistics were the same as those that discriminated the two wards using advanced statistics.

The OPLS DA results should be interpreted as exploratory, and patterns of predictors and variable clusters could be interpreted from a bird´s eye view rather than focusing on each single predictor identified. Also, being an observational study, no conclusions can be drawn on causality.

9 FUTURE RESEARCH DIRECTIONS

In the setting of the studies in this thesis, there was an emerging trend of multiple students placed with a single supervisor. All wards in study III had multiple students present simultaneously, although we did not select for this. Thus, an emerging focus for research could change from exploring peer learning compared to individual supervision, to exploring peer learning compared to other approaches to supervising multiple students.

Study III was a pilot study, and the planned next step is to refine the questionnaire and conduct it with a larger number of participants. As well as distributing the questionnaire to participants from PLW and N-PLW, wards with other pedagogical frameworks could be included. This would shed light on the specific role of peer learning on any differences in characteristics.

It is known that students of different healthcare professions can perceive the same learning environment in different ways[143], and it would be interesting to investigate whether this also applies to supervisors. Therefore, an area for future research is to assess the transferability of the findings about nurse supervisors to supervision of peer learning among medical students and other healthcare professional students. For instance, are the same roles identified in study II recognisable among medical student clinical supervisors?

There were situations that called for stepping away from peer learning, even on PLW, in studies I and III. It would be valuable to investigate which situations these are and why they are inappropriate, since they could form an important barrier to acceptance of peer learning. There could be situations that are perceived by some supervisors to be inappropriate, such as stressful clinical situations, but which can also be seen as rich and powerful learning opportunities by others. Future research could focus on how to select appropriate clinical situations in which to use peer learning, and how adopting peer learning as a pedagogical framework could offer flexibility.

10 CONCLUSIONS

The studies in this thesis have explored peer learning on clinical wards, through observing a student ward with peer learning as a pedagogical framework (study I), interviewing supervisors about their roles in peer learning (study II) and comparing questionnaire answers from supervisors on different types of wards about supervision, learning activities and the learning environment (study III). Wards that used peer learning as a pedagogical framework were found to be student-led, had learning interactions between students, had physical adaptations for students, and had support for the supervisor (study III). These characteristics were more prevalent than on wards with no pedagogical framework. The different views of the supervisor's role in peer learning (study II) explored possible reasons for these differences. A broader view of supervision was commonly adopted in peer learning, including seeing oneself as a team player in the ward's community of practice. The pilot questionnaire (study III) results found that supervisors on wards that used peer learning as a pedagogical framework were more satisfied with their workplace; however it may not be the peer learning activities themselves that account for the differences, but rather the ward's community of practice centred around their pedagogical approach. Using a pedagogical framework on a clinical ward could be a key factor in creating a community of practice centred on student learning.

11 PRACTICAL IMPLICATIONS

In the future of learning for healthcare professionals, it is possible that more students, more patients, and a greater workload will drive universities, hospitals, wards, and individuals to increasingly use peer learning. The studies in this thesis deepen the understanding of how peer learning can be supervised, and the effect of peer learning as a pedagogical framework on the learning environment.

Creating adapted student wards

The characteristics of a student ward described in study I could be used to guide the set-up of future student wards. Since the publication of study I, I have had contact with educational leaders internationally who are using the research findings to aid in the development and implementation of student wards[147]. Moreover, the characteristics of student wards could be replicated on existing wards to create similar environments elsewhere. While these studies were conducted in a context of multiple students present simultaneously, there could be contexts in which single students are placed with no possibility for interactions or peer learning. However, characteristics such as student-dedicated resources, providing supervisor support and supervising student-led learning can all be re-created with only one student.

Supporting supervisors of peer learning

The findings from study II can support how clinicians, educators, institutions, and healthcare settings can implement supervised peer learning. The supervisory strategy for peer learning requires a broader viewpoint of the supervisor's role than has been reported in the supervision of single students. This broadest view involves other staff, managers and the organisation, which can aid in creating clarity regarding different people's roles, including those that do not directly supervise students.

To support supervisors of peer learning, training and support should be offered. This is best performed situated in the clinical workplace and anchored in daily practice, such as in the form of collegial discussions. Dedicated time for this legitimises and validates the importance of supervision as well as ensuring that the supervisor support does not get side-lined in the face of clinical pressures. This could be generalisable to different healthcare professions, and even to outpatient settings.

Creating a community of practice

Creating a community of practice centred around student learning may be more influential for supervising students than the specific pedagogy. A joint enterprise of student education could be created by involving other staff other than just supervisors, and setting expectations that all staff should address students by name, treat them as patients' caregivers, and allow them to participate in the team.

12 SVENSK POPULÄRVETENSKALPLIG SAMMANFATTNING

Introduktion

Verksamhetsförlagd utbildning i dagens hälso- och sjukvård genomförs i en alltmer pressad vårdsituation med hög patientbelastning, ökande dokumentationskrav och hög personalomsättning. Samtidigt behöver fler utbildas vilket medför att man ofta är flera studenter samtidigt på samma vårdenhet. Parallellt med detta har synen på lärande till en profession utvecklats och präglas idag av en förståelse av att lärandet är en social process som sker i interaktion mellan människor och med fördel i ett liknande sammanhang som där professionen senare ska utövas.

Peer learning innebär att människor med likartad ämnesinriktning och kompetensnivå som inte själva är professionella lärare hjälper varandra att lära sig och lära sig själva genom att undervisa. Peer learning har ökat i världen och på senaste tiden särskilt i sjukvården. Det underlättar handledning av flera studenter samtidigt för att utöka kapaciteten inom verksamhetsförlagd utbildning, men skapar även unika fördelar. Att ingå i ett socialt sammanhang underlättar lärande för studenter och att lära sig handleda andra är en viktig färdighet för yrkeslivet. Det finns mycket forskning som visar på fördelar av peer learning ur ett studentperspektiv, men än så länge är frågor om vad peer learning innebär för handledaren, och vad handledarens roll är, relativt outforskat.

Syftet med forskningen i avhandlingen är att utforska peer learning och handledning av peer learning bland handledare av sjuksköterskestudenter på vårdavdelning.

Metoder

Avhandling innehåller tre studier:

I.   En observationsstudie av en studentenhet som använder peer learning som pedagogiskt ramverk.

Jag observerade återkommande, under ett halvår, interaktioner mellan studenter, handledare och andra medarbetare, samt själva miljön på avdelningen. Deltagare svarade på korta informella frågor, och studenter spelade in reflektioner över sitt lärande under dagen.

II.   En intervjustudie med handledare av sjuksköterskestudenter som jobbar på två studentavdelningar där de använder peer learning.

Jag intervjuade 15 handledare av sjuksköterskestudenter (varav 13 var sjuksköterskor och två undersköterskor) från två olika avdelningar. Syftet var att utforska handledarens olika sätt att se på sin roll i handledning av peer learning. Frågorna handlade om hur de handleder, inklusive vad de tyckte var svårt, lätt och andra reflektioner.

III. En enkätstudie av handledare som jobbar på olika avdelningar, både de som använder peer learning som ett pedagogiskt ramverk, och de som inte gör det.

Vi utvecklade en enkät med frågor gällande handledning på avdelning, tankar kring handledning och nöjdhet med avdelningen. Enkäten genomgick sju steg av olika kontroller för att säkerställa frågornas kvalitet. Därefter svarade 46 sjuksköterskehandledare på pilotundersökning, och resultatet analyserades med olika statistiska metoder.

Resultat

Analys av observationsdata identifierade fyra olika teman som beskrev lärandemiljö på studentenheten: student-centrerat lärande, att lära tillsammans, medarbetarens syn på studentlärande, studentens fysiska utrymme. Analys av intervjudata identifierade olika syner på handledning, där bredaste synen på handledning var som en "lag-medlem". Då såg handledaren sig själv som en av en många olika individer och faktorer som bidrar till studentlärande, i stället för ett smalare perspektiv där handledarens handlingar styr lärande. Som lagmedlem kunde handledaren överföra sina principer till övriga medarbetare för att skapa en peer learning miljö. Analys av enkätdata visade förenlighet med observationsstudien avseende att avdelningar som har peer learning som ramverk har mer lärande tillsammans (såsom förväntades), mer student-centrerat lärande, mer fysiska anpassningar för studenter. Utöver detta visade studien att enheter med peer learning hade mer stöd för handledare och handledarna var mer nöjda. Det fanns dock ingen direkt koppling mellan hur mycket en individuell handledare använder peer learning och nöjdhet.

Diskussion & slutsatser

Peer learning användes både på studentavdelningar med ett peer learning ramverk och på andra avdelningar. Att handledning är annorlunda i peer learning kan vara på grund av en bredare syn på vad man har för roll i studenthandledning. Genom att skapa ett pedagogiskt ramverk för peer learning utvecklas ett pedagogiskt förhållningssätt som stödjer en lärande miljö där handledarna utvecklar en bredare syn på sin roll. Det är förenligt med teorier där en miljö där människor som jobbar tillsammans kring en gemensam strävan formar ett sammanhang där man påverkar varandras syn på arbete och lärande och hur det kan utvecklas.

13 ACKNOWLEDGEMENTS

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15 APPENDIX

Questionnaire used in study III.

Supplement to appendix: Navigation for questionnaire.
Some questions were hidden until the participant selected a specific answer that indicated that the question was relevant. When the answer alternative was selected, the question was shown to the participant.

Q	Sub-question	Answer alternative	Command
1	-	Mindre än 1 månad	End survey
2	-	Mindre än 1 månad	End survey
14	-	Ja	Show Q15, Q17
15	-	Ja	Show Q16, Q18, Q19, Q20
20	-	Ja	Show Q21
22	-	Ja	Show Q23
24	Läkare	Dagligen/Ibland	Show Q25
	Arbetsterapeut	Dagligen/Ibland	Show Q26
	Sjukgymnast	Dagligen/Ibland	Show Q27
	Kurator/psykolog	Dagligen/Ibland	Show Q28
	Undersköterska	Dagligen/Ibland	Show Q29
	Annat	Dagligen/Ibland	Show Q30
31	Studentexpedition / ett rum till studenter	Ja	Show Q32