



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

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## 1 Introduction

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

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

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77

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

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

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

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

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

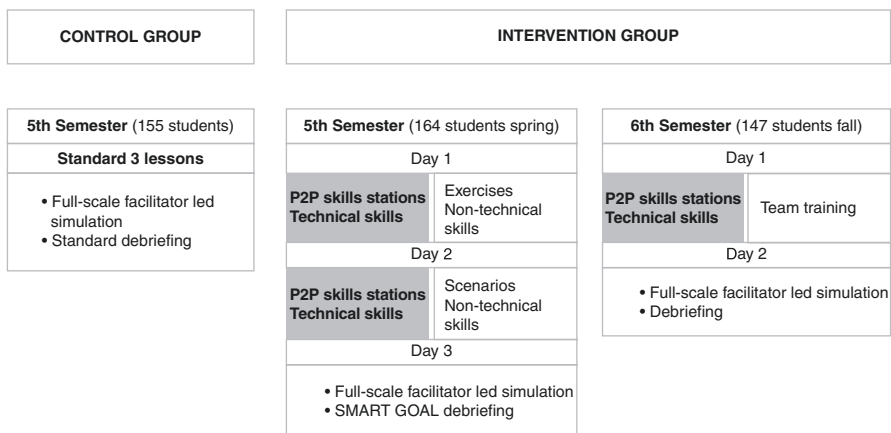
The central research question we address in this chapter is: *How is peer-to-peer learning in simulation perceived by students, and what are the implications for the role of the teacher?*

## 2 The Case

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

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

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



**Fig. 1** Project interventions

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

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

### 2.1 Peer-to-Peer Self-Learning Stations

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

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



Fig. 2 Set up P2P skills station

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

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

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

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

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### 3 Methods and Ethical Considerations

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

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

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

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## 4 Results

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

### 4.1 Strengths of the Peer-to-Peer Method

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

#### 4.1.1 The Learning Environment

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

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

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

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

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<sup>1</sup>All quotes from students have been translated by the authors.

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

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

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

#### **4.1.2 Collaboration and Team Dynamics**

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

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

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

## **4.2 Summary of Strengths**

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

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

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

### **4.3 Weaknesses of the Peer-to-Peer Method**

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

#### **4.3.1 Group Dynamics**

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

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

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

#### **4.3.2 Students’ Perception of Learning**

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



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

It becomes a bit frivolous with the doll, now that we are in clinical practice where we use it all day in the real world.

Yet, it is too unrealistic. It would be better earlier in the program. I get more out of experiencing it in clinical practice. First time was enough. This was repetition.

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

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

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

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

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

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

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

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

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

#### 4.4 Summary of Weaknesses

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

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

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

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## 5 Discussion

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

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

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

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

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

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

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

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## 6 Conclusion

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

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