Peer feedback in preclinical simulation class

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Introduction

Preclinical simulation training in dental education plays a central role in learning practical skills[1], as students can link theory to practice. In optimal settings, the students will not only learn technical skills but also other competences such as transversal competences that will strengthen their collaboration and communication skills but also their higher order thinking[2]. Several studies emphasize that to achieve higher order thinking and achieve optimal learning, it is important to have a problem-based teaching approach, making the exercise investigative and letting students pose ideas on how to solve the problems[2,3,4,5,6]. Agustian et al. describes facilitating meaningful learning in a laboratory requires not only to look at different learning domains of the individual learner but also to look at the social domain where interaction between peers also facilitate learning[3]. Peer feedback can, in this context, be quite valuable in simulation training as it allows students to enhance their practical skills and knowledge through active engagement with their peers[7]. By giving and receiving feedback, dental students can gain diverse perspectives and identify areas for improvement in their own work[7].

Motivation

For a few years, I have been teaching in dental preclinical simulation courses and clinical courses with patient treatment. During my teaching, I have noticed that the students in general learn the practical skills in simulation training but do not reflect much on the exercises they do, which may affect the extent of their learning outcome. This has motivated me to investigate how to facilitate reflection on the hands-on exercises in the simulation class.

Allocating time for the teaching activity
There are many factors that may influence the level of engagement and reflection on the hands-on exercises and one of them is to designate enough time for the students to actively engage with the exercise[7]. In previous course evaluations, the students have complained about too many practical exercises

and too little time to do the practical work making them rush and focus on finishing rather than taking their time with the exercises.
In the preclinical simulation class, the students need to perform specific practical hands-on exercises to acquire skills they can use in patient treatment. In the simulation class the students have access to video tutorials, and they are given written instructions on the exercises that they need to perform. Each simulation class last in total 2 hours and 15 minutes and usually starts with theory introduction and watching the tutorial video in plenum before the students start their practical work individually. The theory introduction and video tutorial can take up to 30 minutes. This time is taken from the hands-on exercises which can leave the students stressed about finishing the practical exercises on time. Flipped classroom in this situation can be valuable to consider, as the information transmission teaching such as theory and video tutorials can be taken out, creating more time for the hands-on exercises[8,9].

Formative feedback
When the students are in doubt on how to proceed or need feedback on their progress, they often approach the teacher for feedback. Here, I usually describe what will be evaluated and by using dialogue I go through the evaluation with the student so both the points that are performed correctly and points that need adjustment are mentioned. If the practical work that is shown by the student does not meet the criteria, the student will have to start over.
Formative feedback in the simulation classes is based on teacher/student interaction which can be quite time consuming. Furthermore, most students make the same common mistakes and I tend to give similar feedback to each student standing in line waiting to receive feedback. This motivated me to investigate how to engage the students in the evaluation process using peer feedback so they can reflect more on their work and at the same time optimize and allocate more time for the hands-on exercises.

Assessment
Once the exercise has been completed and approved, the teacher signs off the students' stamp sheet. The stamp sheet serves as documentation for participation. Some teachers in other preclinical simulation classes have reported, that they have experienced students compete in finishing first and getting their sheets stamped rather than taking time reflecting on the exercises. This has motivated me to investigate the congruence of the evaluation process, considering assessing the reflection process rather than completing the exercises.

Social interaction in simulation class
I have noticed, most students work independently and quietly in the simulation room. It is not often they interact and discuss their practical work with their peers during class. Some students have told me that they do not like to show their work and mistakes to their peers. Equally, other students don't mind sharing their experience with their peers. A study by Agustian[3] investigating

different learning domains in the laboratory, highlights the importance of the social domain and the interaction among students, sharing experience and knowledge which facilitates meaningful learning. Furthermore, it can also be comforting knowing that other students have similar struggles or can also be inspiring to see how their peers solve tasks. Therefore, it would be of high value to encourage the students to interact more during the simulation class.
The overall aim of this project was to investigate whether peer feedback can help the students reflect on their practical work, encouraging the students to practice discussing their work with their peers.

Developing the intervention

This project was carried out in the dental course "indirect single tooth restorations" which is a clinical course on BSc level (6th semester) that I recently became manager of. The course consists of lectures, three simulation classes with hands-on exercises, a quiz and patient treatment in the clinic. The intervention was performed in one of the three simulation classes. The teaching was carried out by a colleague and I, and we have discussed and worked on the intervention together to synchronize the teaching[7]. Eighty-six students participated in the simulation class, but for this project and data collection I only included 52 students of whom I have taught. The theory and the video tutorial were taken out from the class and the students were asked to prepare in advance to create more time for hands-on exercises and discussions. The clinical examples that were usually discussed in class were also taken out from the class and given after the class as part of a quiz they took later in the course. Furthermore, I decided to cut down the practical exercises from 3 to 2 exercises, as the third one wasn't mandatory, and the students only managed to finish the 2 exercises last year. A schematic overview on the program for the day and how it was changed after the intervention is presented in Table 1.

Introducing the project and the intended learning outcome (ILO) for the students
In the beginning of the class, the students were informed about the project and the ILO. They were informed that they would be working in pairs and that they were to show and discuss their work with their peers. As the learning outcome is highly dependent on the students' motivation and willingness to engage in the hands-on activities[3], it was important for me to explain why the changes were made and the clinical relevance and benefits for the students. They were informed that they would be assessed on their engagement in the peer feedback and not on finishing the exercise. The students were asked to do the formative peer feedback on a sheet of paper and that it would be collected at the end of the class and serve as documentation for participation. Therefore, they were told not to rush to finish because it was the process that mattered and would be

evaluated rather than finishing the exercise. This change was made to have a better alignment with the aim of the project.

Table 1. A schematic overview of the program for the day before and after the intervention.

Program	Before intervention	Intervention
8:15-8:30	Theory introduction (passive learning)	• Introduction to the hands-on exercises (active learning) • Information about change in assessment form • Information about peer-feedback exercise
8:30-9:00	Clinical examples and video tutorials	**Hands-on exercise 1** • Students pair up and discuss challenges and help each other with the exercise • Validation: Round up in plenum with the students
9:00-9:30	3 Practical exercises with formative feedback by teacher	**Hands-on exercise 2** • Students work individually • Self-evaluation form is filled
9:30-9:50		• Validation: Round up in plenum with the students • Students work individually
9:50-10:15		• Formative peer feedback by students • Students implement the feedback into their work
10:15-10:30	Collecting assessment sheets with stamped exercises	• Institutionalization • Evaluation on padlet

Hands-on activities

The two hands-on activities were introduced to the students through a dialogic approach[10]. The students were encouraged to chip in with information from what they have read and seen prior to the class, instead of the passive lectures they were used to. This was done to activate and engage the students from the start of the class. The students were not given any written instructions and were asked to discuss with their peers on how to proceed if they ran into any difficulties during the practical exercises.

After the first exercise was completed, the students were gathered, and they shared their difficulties and experiences in plenum and talked about how they overcame their obstacles. The first exercise was thus rounded up by engaging the students in a discussion.

In the second exercise the students were asked to fill out a self-evaluation form before they continued their work. Here, they had to evaluate and reflect on their own work. After filling out the form individually, they were gathered again, and they shared their difficulties and experiences in plenum so that the students could learn from each other's experiences. The students were then asked to continue their work and halfway through the exercise the students were asked to pair up and evaluate each other's work. For this formative peer feedback evaluation, I designed a rubrics for the students to use. The designed rubrics was inspired by the guidelines given by O'Donnell et al. centered around dental education[11]. After finalizing the rubrics, it was sent to colleagues in both simulation and clinical departments to make sure that the rubrics covered all aspects. After the students had done the peer feedback, I went to each student while they were working and asked:

- Have you given and received feedback?
- What feedback did you receive, and do you agree with it?
- How will you proceed from here?

The purpose of discussing with each student was to make sure all students had given and received feedback. Furthermore, the purpose was also to give myself an opportunity to moderate the process and check their work, making sure they were on the right track[7]. I also wanted to try and avoid the students queuing up to get feedback.

Institutionalization

The last 15 minutes of the class were spent summarizing the students' experiences from the 2 activities and linking them to the theory. All the students' experiences were organized in a flowchart on the board and a finished version was uploaded on the course's website so the students could access it next time they needed to do this practical work in the clinic. Take home messages were given and the slides were put on the website as well. Lastly, the students were asked to evaluate the class on padlet.

The self-evaluation form, the peer feedback form and answers from the quiz were collected and analyzed. The students' evaluation on padlet was also used to appraise the project.

Outcome of the intervention and future improvement

Allocating time for the teaching activity

During the intervention I noticed the class was much more dynamic, and the students were more engaged in discussions compared with my experience from previous years. Reducing the number of exercises and taking out the theory part allocated more time to work in depth with the hands-on exercises. There was also enough time to give feedback and to apply the feedback on their work.

Several students mentioned that they appreciated a short introduction compared to the long lectures they were used to from other simulation classes. The majority of students highlighted that the class was much more time efficient, and they really appreciated not standing in queue for feedback. Several students mentioned being able to reflect on their work was nice as they usually are so busy, they do not have time to do it.

Formative feedback and social interaction

During the class the students were very engaged in the formative feedback process. However, when looking at the collected self-evaluation and peer feedback papers, many of the questions and rubrics boxes were left with no comments and were unticked. The students were asked to fill out the forms, but precise explanation was not given to them, thus as a result some of the evaluations were not properly filled out. In the future I will need to explain how to fill them out and show examples. Figure 1 and 2 sums up the students' self-evaluation and peer feedback in percentage. It is based on 52 answers, however, because the evaluation forms were not fully filled most of the answers didn't add up to 100%. The results from the self-evaluation and the peer feedback showed that the students performed well and that the difficulties they had were similar. Although, these figures were made for this project (after the class had finished), they would have served as a beneficial tool to illustrate for the students that the difficulties they had encountered during the exercises were common and I believe this would have encouraged the students to show and discuss their work in future. From a teachers' perspective these results can be used to provide a better understanding of what was difficult for the students and what to focus on next time this class is held[11]. In general, the students found it positive and meaningful to work in pairs and to evaluate each-others work. Several students mentioned the benefit of sparring with their classmates was to be able to compare results and see other ways to work. However, one student did not like to pair up with the neighboring person because it wasn't someone that the person had a good connection with. It made the peer feedback session feel uncomfortable. A way to overcome this is to tell the students before sitting down that they will be working in pairs and that it would be a good idea to sit next to someone they feel comfortable sharing ongoing work with. Another important aspect is to explain the aim of the feedback and emphasize that the feedback is not personal. Additionally, the use of anonymous feedback can also be considered so relationship factors such as friendships do not affect the process[7].

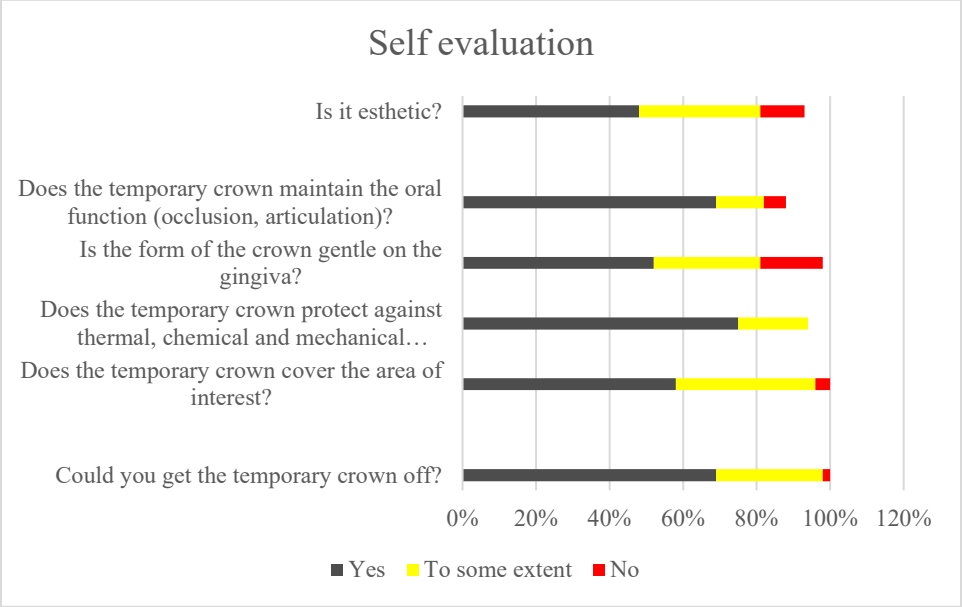

Fig. 1. Summarized self-evaluation answers in percent.

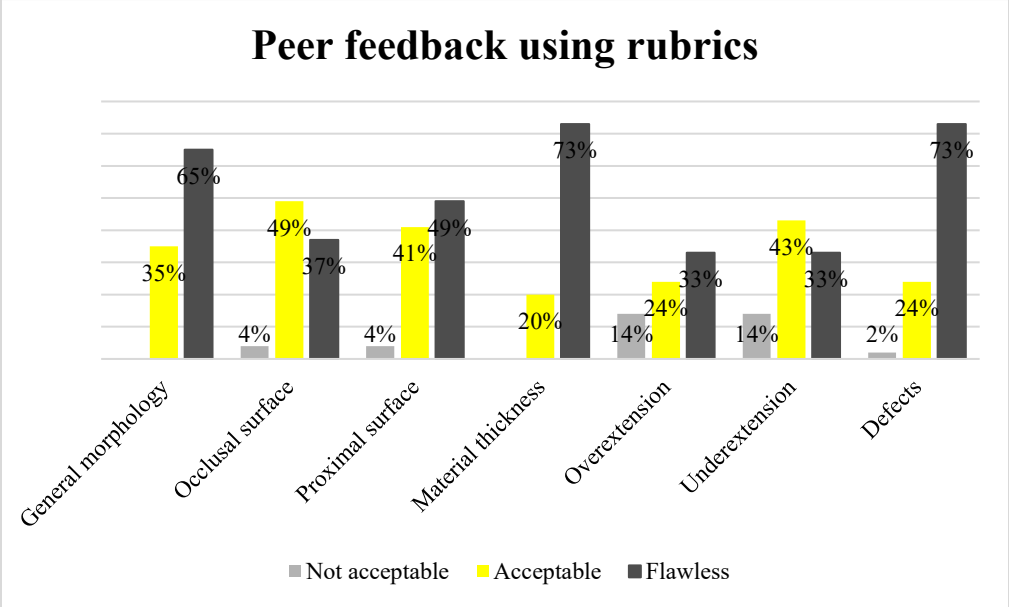

Fig. 2. Summarized peer feedback answers in percent.

In this intervention, short validation sessions were made after each exercise and at the end of the class all take home messages from the day were summarized and given. Several students appreciated the rounding up in plenum. They found

it meaningful and got to understand how the exercise cohered with the clinical work. Several students mentioned that the peer feedback exercise made them reflect on their own work especially after seeing how their peers had done things differently. In general, the students agreed that the self-evaluation and the peer feedback exercise made them reflect more during the hands-on exercise.

Assessment

The change in assessment form made the students not worry about finishing the exercise. The students' feedback was very positive about changing the assessment and several mentioned that it was nice that the pressure of finishing to get the stamps wasn't there, allowing them to relax and focus more on the process. Even though the emphasis was not on completion of the exercises, the majority of the students still managed to finish both exercises. It was surprising to see how many students felt a relief not having to rush to complete the exercises. This may indicate that there is a need to look further into the congruence of assessment in simulation training, creating an assessment that both coheres with the aims of the course but also doesn't create unnecessary pressure for the students. A few weeks after the class, the students had to take a quiz. The results from the quiz showed that the students performed well on questions related to the hands-on exercises but not as well on the questions related to the theory that they read by themselves prior to the class. This further demonstrates how working actively with teaching content facilitates learning.

General reflections

There was consensus among the students that peer feedback did indeed facilitate more reflection on their work. This was also reflected in the answers during the validation sessions, in the feedback sessions and in their quiz responses. However, this intervention was not easy to plan. It was very time consuming, and the rubrics had to be cross checked by different departments to ensure congruence across different courses[7]. The content of the intervention was also discussed with my colleague so that our teaching would be as uniform as possible. This project showed that peer feedback can be a useful tool to increase reflection in simulation training and to facilitate social interaction among peers.

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