One-shot teaching seminar: Implementation of new structure and strategy for enhancement of student engagement

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Introduction

Active student learning, participation, and engagement improves performances by 6% and reduce failure rates within science, technology, and mathematics (Freeman et al., 2014). The one-shot teaching format is a term often used in a library instruction context (Bryan et al., 2018; Pho et al., 2022), and critically defined *"as a standalone session, superficially (or not at all) connected to course content, that is tacked onto a class. Within a curriculum, the one-shot has no memory of where information literacy has been and no vision of where it is going."* (Pagowsky, 2021). Thus, a one-shot teaching situation is different from typical classroom teaching as students and teacher only meet once for a relatively short period of time. Outside a library context a one-shot format could be a guest lecture at any given university course. Within this setting there is less opportunity to build relations and trust between students and teachers and for the teacher to read and understand the student cohort to build a safe learning environment (Tanner, 2013). In the present pedagogical development project, I explore possibilities for enhancement of student engagement in a one-shot teaching situation through theoretical frameworks and practical interventions.

Practical settings

The master of headache disorders is an international two-year master program at University of Copenhagen and the Danish Headache Center at Copenhagen University Hospital – Rigshospitalet. Students are

professionals wanting to specialize in headache disorders and may join the program with a variety of backgrounds, e.g. neurologists, general practitioners, nurses, physiotherapists, osteopaths, dentists, pharmacologists and others. In the course *SHDM16005U Clinical Course at a Specialized Headache Center,* I am responsible for a 3-hour basic science seminar covering different aspects of basic and preclinical headache experimental research. The seminar content is not part of the final course examination and in that sense fits the critical definition of a one-shot seminar relatively well "*a standalone session, superficially (or not at all) connected to course content"* (Pagowsky, 2021). Yet, we aim for the students to get inspired to achieve some fundamental insights into basic headache science as this may likely become useful at some point in their career. The seminar has followed the same format for multiple years and has generally received such positive feedback that the course responsible did not ask for changes. At the seminar, we are three senior scientists each giving a scientific presentation followed by a series of practical demonstrations lead by the same three scientists.

Overall, the seminar is placed after lunch from 13-16 with the following structure:

1) Welcome [by me] (5 min)
2) Introduction to the Research Center by the Head of Center (5 min)
3) Scientific presentation A (20 min)
4) Scientific presentation B (20 min)
5) Scientific presentation C [my presentation] (20 min)
6) Practical demonstrations of lab work and experimental animal facility, group split in two (2 x 1 h)
7) Goodbye

The student cohort of 25 is split in two and each group of 12-14 students attends the course *SHDM16005U Clinical Course at a Specialized Headache Center* three months apart. I utilized the repetition of the basic science seminar to evaluate interventions implemented after the first student cohort had the seminar. Interventions were based on feedback received from UP supervisors, prior students, and own observations. Following the second teaching seminar, evaluation was

based on feedback from peer-supervisors, students, and my own observations/reflections.

Interventions

I wanted to test specific interventions in the basic science seminar for the second student cohort. Interventions were classified as either *structural* or *active learning*:

Structural interventions

1. To improve the structural alignment of the session, the order of scientific presentations was changed to C), A), B) as presentation C contains more basic principles and then builds upon that whereas session A and B are more direct on scientific data (Biggs, 1996).
2. In my presentation (C), I placed multiple references to what would be demonstrated at the practical part of the seminar to improve congruence, which was also a tool applied by presenter A (Entwistle, 2007) .
3. Presenters were asked to prepare for 15 minutes rather than 20 min to keep time and introduce a 5-minute break after the first scientific presentation (C) to make the seminar less intense.

Active learning interventions

The active learning interventions were applied in my own presentations (intro and lecture C) and during the animal facility practical demonstrations lead by me. The purpose of these active learning interventions was not merely to increase participation, but to engage students in disciplinary thinking. Specifically, I wanted students to critically discuss experimental methodology, reflect on strengths and limitations of preclinical headache models, and consider how basic science findings can be translated to clinically relevant problems.

1. With the aim of creating a didactic room for dialogue and/or questions, emphasize that questions are welcome during the lecture and that there is also ample time for discussions during the practical demonstrations.
2. Provide intended learning outcomes during the introduction.

3. Be funny and make the science relatable to bridge the gap between students and teacher and retain attention (easter eggs (Miles, 2023)).
4. Prepare questions to ask during the practical demonstrations and use the "count to five" method to allow students time to answer (Tanner, 2013).

Evaluation

Based on feedback from students (appendix A), UP and peer-supervisors, and teacher reflection our general impression is that our seminar generally works well, and that the students appreciate the introduction to basic science and practical demonstrations. At the actual intervention seminar, we implemented the structural changes and aimed to implement the active learning interventions described above. Three unforeseen specifics are worth mentioning as they had some impact on the seminar and successful testing of the interventions:

1. The students arrived 15 minutes late due to delays in their prior agenda.
2. Four or five extra students (in-house bachelor and masters) spontaneously joined the theoretical part of the seminar making the teaching room very full and warm.
3. The student cohort was generally more active and engaged than the previous cohort.

Self-observations and reflections

The fact that we started the seminar 15 minutes later than planned, stressed me out a bit as I would feel very bad about keeping the students additionally 15 minutes later after 16 o'clock and I tried to rush my intro and presentation to catch up. Therefore, I did not sufficiently frame the didactic room (active learning intervention 1). It was clearly communicated that we had time for questions during the demo, but not that students were also welcome to ask questions during the talk. Also, I did not leave any breaks long enough for students to ask questions during the lecture. Despite this stressful start, my experience was that my presentation was well received (students nodding and paying attention)

and that active learning interventions 2 (learning outcomes) and 3 (be relatable) worked well. This is based on the observation that students paid attention and giggled when I provided the learning outcomes and mentioned that the seminar content is not part of the final exam, and that they laughed when I tried to be funny and relatable. The questions that I had prepared to ask during the demonstrations (active learning intervention 4) were not delivered the way I had intended. It was my impression that the students were active and asked questions themselves creating a fruitful dialogue. When I did ask questions, I often made the mistake of answering them myself not providing sufficient wait time as described by Tanner (Tanner, 2013). I have had this experience before and it is my interpretation that it happens because I feel the questions are too easy or silly and I therefore end up presenting them semi-rhetorically and hurry up answering them myself.

Peer-supervision feedback

I received feedback on the seminar from two peer-supervisors also currently training in University Pedagogy but from unrelated scientific fields. On structural interventions they confirmed that *"The break was needed"* in contrast to saving time and that our structural alignment between sessions was well implemented: *"Good intro to the day and framework, caught people's interest"* and *"Do you recall from the theoretical part? – worked well".* Furthermore, their observations that *"Students responded well to jokes about piezo tattoo, funny facial expressions, and illustration of work done by master student"* makes me confident that for this teaching format it is important to establish a shared didactic room despite the short time available. Here this was achieved by humor and shared laughs. Another observation from the peer-supervisors was that during the demonstrations, *"the second group had more questions, bringing things up independently and you did things differently and went off topic. You went with the flow acknowledging their discussion".* Considering my failure of implementing direct questions and the "count to five" wait, it is encouraging to know that the other less structured dialogue also worked.

Feedback from students

Unfortunately, only 3/12 students replied to my e-mail with feedback (appendix 1). Thus, it may not be representative. However, the student feedback aligns well with my own reflections and the peer-supervisor feedback: *"It was well organized with theory and presentations first and seeing the facilities after"* and *"The alignment between lectures and demonstrations were very good as we can actually understand the theory of those experiments in real-life demonstrations. In particular, preclinical studies are difficult for clinicians to understand sometimes"* indicating that the structure of the seminar is very good, but also that we have room for improvement when it comes to active student participation:

> "All was clear. Really liked highlighting to relevance to clinical presentations. Would love to see more about the future direction and hypotheses to try and spark a discussion. Also trying to open discussion about the research methods and pros and cons, potential biases and how they are mitigated"

and *"Encouragement of active participation could be more in the lecture. Creating discussion points within lectures really helps with understanding and application".* The few pieces of feedback from the students will be used forward to further improve active student participation and discussion.

Discussion

Based on the presented self-reflection and feedback from students and peer-supervisors, I find that multiple interventions to our basic science seminar within the course *SHDM16005U Clinical Course at a Specialized Headache Center* were successfully implemented. The structural changes to the program improved alignment by starting with the most basic presentation followed by the more scientifically heavy talks and by continuously making bidirectional references between the theoretical lectures and practical demonstrations (Biggs, 1996). Furthermore, the one-shot obstacle of not having any relation to the students was eased by effectiveness of the interventions used to improve relatedness and the seminar had a fruitful dialogue during the practical

demonstrations despite the one-shot format. However, the dialogue was spontaneous and student driven rather than teacher driven. Initially, this was interpreted primarily as a sign of engagement. Looking back, a dialogic teaching perspective suggests a more nuanced interpretation. According to Olga Dysthe, meaningful classroom dialogue involves not only participation, but also the development of *flerstemmige klasserum* (multivoiced classroom) a learning environment where different perspectives are valued and incorporated into the collective construction of knowledge. Central elements include authentic questions, uptake of participant contributions, and recognition of students' ideas as legitimate resources for learning (Dysthe, 2005). Interestingly, the student feedback aligns closely with a dialogic perspective, as students specifically requested opportunities to discuss methodological strengths and weaknesses, potential biases, and future hypotheses rather than receiving additional content. This suggests that future iterations should place greater emphasis on structured disciplinary dialogue around authentic scientific questions. These are elements I will have continued focus on for development of the seminar.

For my personal development as a teacher, I will likewise have focus on implementation of active learning exercises. The “Twenty-One Teaching Strategies to Promote Student Engagement” presented by Tanner (Tanner, 2013) represents a useful and actionable toolkit to reach this goal.

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Appendix 1

Feedback on Basic Science Seminar from students attending course *SHDM16005U Clinical Course at a Specialized Headache Center*

The following was sent by e-mail to participants after the seminar and 3/12 students replied:

Hello all,

Thank you very much for visiting us at Trace on Wednesday. As I am currently undergoing university pedagogical training, it would

be a great help for me if I can get some feedback from you on our basic science/animal model seminar.

The feedback will be used as part of my final report and teaching portfolio in the university pedagogical course. All info will be anonymized and treated confidentially.

Any feedback on the following topics may be sent directly to me on xxx@regionh.dk.

1. Structure of the seminar, order of presentations and theory – lab demos
2. Alignment between lectures and demonstrations
3. Content level and ability of teachers to convey the topics
4. Encouragement of active participation
5. Any other feedback 😊

Thank you very much for your help.

Student A feedback

Structure of the seminar, order of presentations and theory – lab demos
It was well organized with theory and presentations first and seeing the facilities after.

Alignment between lectures and demonstrations
Good balanced teaching

Content level and ability of teachers to convey the topics
Content level was good, some parts of basic science a bit foreign but well explained nevertheless.

Encouragement of active participation
It was a pleasant and welcoming experience

Any other feedback 😊

Keep it going with the good research 😊

Student B feedback

Thanks a lot for the kind introduction at TRACE last wednesday.

The alignment between lectures and demonstrations were very good as we can actually understand the theory of those experiements in real-life demonstrations. In particular, preclinical studies are difficult for clinicans to undestand sometimes.

For some background information or definitions, like what is IIH, diagnostic criteria of IIH can be shortened or omitted.

Student C feedback

Structure of the seminar, order of presentations and theory – lab demos

All was clear. Really liked highlighting to relevance to clinical presentations. Would love to see more about the future direction and hypotheses to try and spark a discussion. Also trying to open discussion about the research methods and pros and cons, potential biases and how they are mitigated.

Alignment between lectures and demonstrations

The demonstration in the labs, particularly Xxx's was brilliant. Being able to visualise what is being done and also how skilled the techniques are. Possibly being able to talk about how many mice are needed for student skills is useful too.

Content level and ability of teachers to convey the topics

Great level and explanations of all presentations.

Encouragement of active participation

Could be more in the lecture. Creating discussion points within lectures really helps with understanding and application.

Any other feedback 😊

Really enjoyed the visit, I think a really valuable part of the MHD program. Thank you!