Supporting learning from laboratory experiments through across-course collaboration

Keywords: Collaborative learning, laboratory teaching, experiential learning, Community of Practice, Co-creation

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ABSTRACT

Students have difficulty connecting the theory they learn in lectures and exercises with observations they make in the laboratory. We address this challenge by creating across-course collaboration between a basic- and an advanced-level ***ocean and atmosphere dynamics* course**. We train students from the advanced-level course to act as "guides" and to support groups of basic-level students doing laboratory experiments. Our case study shows that combining a basic- and an advanced-level laboratory session to learn from and with each other can benefit both student groups:

- Basic-level students appreciate the help with new lab equipment and the supporting questions that help them make sense of observations.
- Advanced-level students understand the importance of questions in the learning process and realize how far they have come in understanding the topic in just one year.

Prepping the guides

Before the joint laboratory session, we train the guides. First, they run the experiments and discuss different aspects of the observations and the accompanying theory. Second, they co-create a list of relevant questions and discuss how to best support the students in making observations and discussing the results. We emphasize that it is important not to answer all questions immediately, but to facilitate the students' discussions by providing hints or asking new questions that help them find the answer themselves.

Feedback from the students

Students report back that they are generally satisfied with the experience of the lab session and their learning. The guides helped the students feel safe in handling the equipment and secure necessary observations and contributed to a good discussion of the phenomenon.

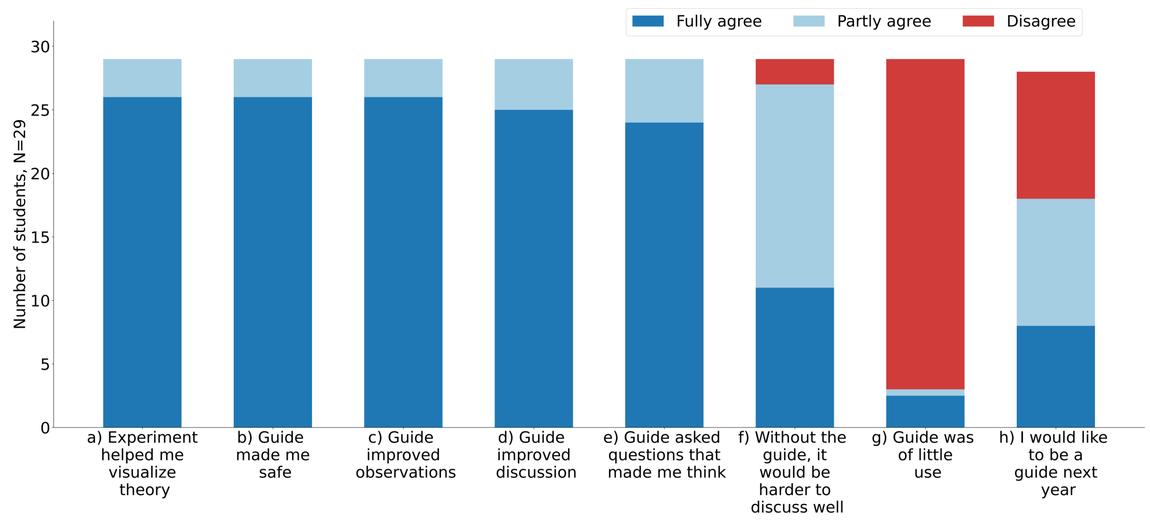

Figure 1. Students' survey responses concerning their learning and the role and value of the guides. According to the legend, the colors indicate the level of agreement with the quotes a-h).

"It worked great with a guide. Since we did not know what was going to happen, it was useful to have a guide that could pay attention to what we were looking at and point us in the right direction when we missed out on any observations. In previous courses, we typically had a few laboratory assistants covering the whole class. That increased the threshold for getting help compared with having a guide available during the whole session."

"Having a guide from GEOF213 did help a lot in knowing what to look for during the experiment, which was helpful to get as much as possible from doing the experiment. Without the guide, it would have been easier to miss key points during the experiment."

Feedback from the guides

Most guides reported learning new aspects of the experiment and becoming aware of their own learning during the past year through their role as guides (Fig. 2a,b). Most guides also reported no discomfort in their role as a guide during the lab experiments and would be happy to act as a guide again (Fig. 2c,h).

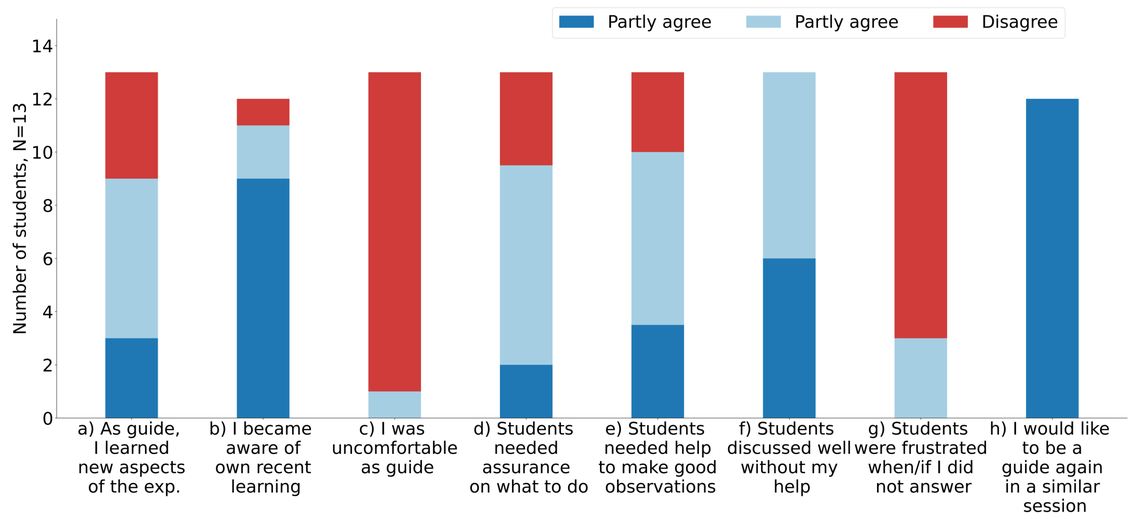

Figure 2. Guides' survey responses concerning their learning and their role as guides. According to the legend, the colors indicate the level of agreement with the quotes a-h).

"It all worked well. It was fun to try to explain my knowledge in an easy manner that, at the same time, made the students think themselves."

"It was frustrating to no be able to give direct answers, but very fun when the students arrived at the answers themselves"

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