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## Teaching Laboratory Classes in the Natural Sciences (6)

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### 6. Group Work in the Laboratory

In lab classes, students often perform experiments in small groups. This mode of instruction works well, because experiments require **a high degree of cooperation** and, at the same time, provide **clearly defined responsibilities** to each group member. Along with the practical reasons for working with small groups, such as **limited lab space**, group work also has pedagogical value. Particularly regarding STEM disciplines, learning in small-group settings has been well researched and turned out to be **highly effective**.<sup>[1]</sup>

During group work, students practise **social competencies** which will be beneficial to them in future professional laboratory work. Depending on group composition, cooperation may allow slower students from those who learn more quickly. As the group setting requires systematic communication between students from the beginning of a lab class, it can create an atmosphere in which students approach each another more readily with subject-specific questions. For **non-traditional students** in particular, collaboration can lead to a meaningful sense of community, which may help counteract intentions of dropping out.<sup>[2]</sup>

Small-group work bears the **risk of unequally shared participation** among members. Therefore, assigning **individual responsibilities** increases the likelihood of success. Use the following questions to help structure group assignments and assign responsibilities: Who is in charge of what? How do the students' individual responsibilities dovetail? Unequal participation can take on various forms. For example, one student comes better prepared than the others, and group members rely on the work of this one student. In another example, the same students may always perform the experiments while

others are always responsible for taking notes. Sometimes this plays out along stereotypical gendered behaviour, where female students volunteer to take notes and male students perform the experiments. However, rotating responsibilities is vital, as all students should achieve the learning outcomes. We suggest teachers pay attention to student interactions within groups, which requires observation skills. Teachers should also be prepared **to intervene in group formation as well as to divide or assign responsibilities within a group.**

**Lab Roulette** is an example of a structured rotation method in which all responsibilities are distributed among group members and rotate in subsequent experiments. With this method, students will have the opportunity to practise all the skills needed in the lab. Responsibilities in the lab setting include: Safety and equipment, performing experiments, assistance (communication with teachers and stand-ins/substitutes). Explain the individual responsibilities and their significance during the first class session in order to help students understand the necessity for each role, for instance for proper documentation. Students should include information on the distribution of responsibilities in their lab reports.

Combining individual and group performances makes fair and nuanced **assessment** possible.<sup>[3]</sup> Explain to your students how you weigh individual elements in relation to the group elements of the grade.

### Continue reading

Laboratory Classes (7): Blended Learning & Digital Competencies (</en/start-page/course-types-disciplines/teaching-laboratory-classes-in-the-natural-sciences/7-blended-learning/>)

### References

- [1] Kyndt, Eva, Elisabeth Raes, Bart Lismont, Fran Timmers, Eduardo Cascallar, and Filip Dochy. „A meta-analysis of the effects of face-to-face cooperative learning. Do recent studies falsify or verify earlier findings?" *Educational Research Review* 10 (2013): 133-149; Ruiz-Primo, Maria A., Derek Briggs, Heidi Iverson, Robert Talbot, and Lorrie A. Shepard. "Impact of undergraduate science course innovations on learning." *Science* 331, No. 6022 (2011): 1269-1270.
- [2] Coppola, B.P. "Laboratory Instruction: Ensuring an Active Learning Experience." In *McKeachie's Teaching Tips: Strategies, research and theory for college and university teachers.*, edited by Marilla D. Svinicki, and Wilbert J. McKeachie, 13th edition, 280-289. Belmont, CA: Wadsworth Cengage Learning, 2011.
- [3] Hilger, Annett, Thorben Lübbert, Igor Pretzer, Jessica Reinartz, Julia Theißen, and Michael Schneider. "Seminar." In *Gute Hochschullehre: Eine evidenzbasierte Orientierungshilfe*, 39-62. Berlin, Heidelberg: Springer-Verlag, 2015; here: p. 41-43.

### Recommended citation

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