

Tips for Effective Lab Instruction for Teaching Assistants

Part I: General Tips and Instruction

What does it mean to be a professional in this setting?

Teaching Assistants who teach lab sections are faced with a unique teaching situation. They are often tasked with leading practical exercises that expand on material from the primary course. This material is frequently prepared by the primary course instructor, with the TA having little control over content. Additionally, many lab sections are practical exercises expanding on material that was already taught, meaning the TA is not teaching new material. This can be challenging for teachers since it may feel like the job is to supervise as opposed to teach. That said, lab instruction is a form of teaching and there are ways to increase its effectiveness for student learning. The question that drives effective teaching in the lab is the same as in a traditional classroom: how can I enhance student learning?

General Tips for Running and Effective Lab

Confidentiality

It is the University's policy that all student information, including grades, be kept confidential (i.e., is not to be shared with any persons other than the student and the course instructor). It is important that student information is kept private and grades are not seen even by other students in the class.

Refer to the instructor's syllabus or speak with the course instructor about any additional privacy and confidentiality policies and procedures.

Academic Integrity

The scientific community and the University have strict policies regarding academic integrity, including plagiarism and cheating.

Refer to the instructor's syllabus for the procedures for preventing/detering plagiarism and dishonesty or punishing those who engage in academic dishonesty.

Relay these policies clearly to the students; it may also be beneficial to discuss with students what constitutes academic dishonesty (e.g., plagiarism [including copying lab results or assignments of their own or classmates; taking credit for the ideas of others or not correctly citing others], falsifying data, cheating).

Safety

Make sure that all lab equipment and materials are in working condition and are set up properly for use.

Make sure all students wear safety equipment and are familiar with safety procedures for the lab in general and the specific lab activities.

A good way to demonstrate lab safety is to be an example of good safety practices yourself (e.g., practice safety in lab procedures, wear appropriate safety gear).

Professionalism and Instructor Personae

Although it is important for TAs to maintain professionalism in their roles as lab instructors, it is also beneficial to cultivate an “instructor personae” that incorporates yourself as an “instructor” but also includes aspects of your personality that may help to build rapport with your students.

In the pedagogical literature, many researchers have demonstrated that being authentic in your instructor personae is important for building rapport with students. However, the “right” balance between professionalism and authenticity will likely need to be developed over time and may change depending on the students, the course, and what is required of you as an instructor or TA.

Follow the dress code of the department and keep in mind that research has found that teaching assistants that dress professionally have fewer student conflicts and receive higher evaluations.

How can TAs enhance learning in the lab?

Articulate the goals and objectives for student learning

- **Context**
 - Upper-level (3000-4000 level) labs will look different and have different goals when compared to lower-level (1000-2000 level) labs. Lower-level labs often focus more on foundational knowledge while upper-level labs usually focus more on preparing students to become more independent researchers.
- **Derive goals/objectives from lab exercises**
 - An exercise may include various standardized procedures (e.g., stir until reaction is complete). Understanding these basic procedures may come naturally to you (an expert) but will be more challenging for less experienced students. Use these basic components of lab exercises to frame the learning objectives for the lab.
 - “Students will understand how to initiate and monitor a basic chemical reaction. Students will be able to articulate common mistakes and plan follow-up procedures.”
 - The exercise may help introduce the process (monitoring a reaction) but the TA can help provide context by encouraging students to think about “next steps.” Additionally, by sharing personal experience or observations related to common

mistakes, the TA can help add nuance to the procedure while helping students avoid those mistakes.

- **Provide context for exercises**

- What is the real-world use/application of the procedure? What new questions/follow-up procedures relate to what students will have completed?
- Avoid using future classes as the context (e.g., “this procedure is a foundation for a lab we will conduct two weeks from now.”). Instead, frame exercises in terms of their real-world application (e.g., this procedure is the foundation for ____ process often used in ____ field in the development of _____).

Provide active support to students throughout labs

- **Be prepared to avoid distractions/delays**

- Ensure you understand the procedures/plan for the day (this will help with the goals/objectives mentioned above). Arrive early and make sure materials are prepared, lab is clean, and other procedures are followed properly. Demonstrating good lab etiquette will help future scientists understand what behavior is expected in lab settings long after they complete your class.

- **Be intentional in your positioning/interactions during exercises**

- Don't sit behind a desk waiting for students to ask questions. Move throughout the room and spend time checking students' progress and providing support as necessary.
- Throughout a lab, move around so you can listen in on student progress and ascertain where your help may be needed. If no students are obviously in need of help, feel free to ask questions to students to emphasize important points. For example, if there is a very crucial process they will need to understand later in the semester, ask various students to explain how they implemented the process. This helps them walk you through the steps while reinforcing their learning.

- **Facilitate students' learning rather than giving them the “correct” answers**

- It is best practice based on pedagogical literature and also voiced by chemistry lab students that it is preferable for TAs to help guide students to answers, rather than simply telling them the answers.
- For example, using Socratic questioning methods. If a student asks whether they got an answer correct, you could ask them to describe the procedure they used, then confirm whether they are performing the experiment correctly or not.

- **Provide detailed feedback to students early and often.**

- When grading students' work, be sure to provide students with grading criteria so they don't keep making the same mistakes.

References

McKeachie, W. & Svinicki, M. (2013). McKeachie's teaching tips. Cengage Learning

Herrington, D.G., & Nakhleh, M.B. (2003). What defines effective chemistry laboratory instruction? Teaching assistant and student perspectives. *Journal of Chemistry Education*, 80, 1197-1205. doi:10.1021/ed08op1197

For more information or to discuss how you might incorporate these ideas into your courses, contact the Reinert Center at ctl@slu.edu.