# **Designing inclusive lab practicals**

Accessibility is a key aspect of inclusive teaching. Due to the range of equipment, setting and the type of tasks that students are required to do in lab practicals, some students will require lab-specific modifications to ensure teaching that takes place in a lab is accessible. Using learning technologies such as audio-visual recordings can further increase accessibility and are particularly important when teaching online.

If you are the senior demonstrator or part of the academic team running the practical, this resource will help you to consider accessibility requirements specific to laboratory teaching as well as other ways to design inclusive labs. The Centre for Teaching and Learning’s [flexible and inclusive teaching page](https://www.ctl.ox.ac.uk/teaching-remotely) also has advice on [adapting lab practicals](https://www.ctl.ox.ac.uk/lab-teaching) to more remote or face-to-face settings.

This resource supports our guidance on the [Key principles of inclusive practice](https://ctl.ox.ac.uk/inclusive-teaching-steps).

## **Know your lab team**

**Identify accessibility support in your lab.** Find out and get to know the key contacts in your lab, such as the lab manager, co-ordinator, technicians and those who are responsible for supporting disabled students. They will have knowledge about ways you can make your practical inclusive and accessible, such as using adaptive technology. These contacts will also be familiar with many common adjustments, which include adjustable benches, use of individual screens so all students can clearly see what's being demonstrated, preparatory videos to watch in advance of the session, special pipettes which reduce the physical strain of pipetting, and so on.

**Help your demonstrators prepare.** In advance of the practical, meet with your demonstrators to communicate the aims and expectations of the experiments (this can be in person, but maybe more convenient online). This includes:

* Sharing the materials, deadlines and expectations for students with your demonstrators at least 24 hours in advance so they have time to prepare for the practical.
* Outlining how they can support student learning during the practical and link to any related lectures or content so they are aware of what students know about the topic.
* If you have permission from students, let individual demonstrators know if they will be supporting students with specific learning requirements.
* Discussing questions that students might ask and challenges they might encounter, as well as how demonstrators might respond to these in a way that will encourage student learning, for example, asking students to reflect on why something didn't work, what they might do next, and what the consequences of a specific action might be.

## **Develop students’ lab skills**

**Identify the key practical skills students need to develop.** Consider incorporating a range of techniques into the practical so students are learning and demonstrating expertise across the practical (eg observation techniques, data manipulation, using equipment safely). Planning and data analysis can take place outside of the lab and, if teaching is taking place online this may be a much more effective way for students to communicate and work together.

**Promote active engagement.** Inviting students to engage directly with the experiments will prompt them to develop a better understanding of what they're trying to achieve and what the experiment means, rather than simply following instructions that you've provided. This could be done, for example, by asking students to read or view a brief overview of the experiment and complete a short Canvas quiz with relevant problems to solve before the practical so they can apply their learning.

**Encourage teamwork.** It is common across many disciplines for students to work in pairs or groups to complete practicals, and this is often the safest way to conduct experiments. Asking students to share and divide the task between them will give them flexibility in the way they approach the task and also give them the opportunity to learn from each other. However, be aware that some students might struggle to work with others, that some students may end up getting left behind, and that you will need to regularly check in to see how they're progressing in their pairs or groups.

## **Communicate practical details clearly**

**Provide details in advance.** It is essential that health and safety information is shared with students in advance. In addition to this, share lab protocols and experiment details before the practical whenever possible. This will help students to prepare and pre-empt any difficulties. Check with your lab contacts what other information is available to share with your students, such as induction videos that show the layout of the lab or the equipment that will be used so students know what to expect and are clear they can contact you if they foresee any issues. Some labs may also offer computer simulations that benefit students by giving them the opportunity to practise lab techniques. As always when sharing materials in advance, be clear about how you expect students to use materials.

**Give instructions in both written, live and pre-recorded AV format.** Talk through instructions and make sure that all students and demonstrators can hear and see you. You can pre-record this to share with students and demonstrators in advance via Canvas or Weblearn. Also providing written instructions (in an [accessible format](https://www.ctl.ox.ac.uk/accessibility-teaching)) will allow students to refer back to the instructions while they're working and review methods later on. If screens are available, consider using video during the practical so students can clearly see the techniques being demonstrated.

## **Structure learning into key stages**

**Set achievable time frames.** Whether the practical is over a couple of hours or several days, set a realistic time frame for completion that takes into account common experimental or technical setbacks that students might encounter. Being clear and specific in outlining what you expect students to have completed at each stage of the practical will help them to keep on track.

**Recap learning.** Whether or not each student's experiment has been successful, providing an overview of what students should have found, and offering a chance for students to ask questions, will benefit all students. Doing this at intervals throughout the day (rather than at the end when some students may have left) will prevent students from falling behind. If an experiment has failed, this can be a powerful learning experience as it gives you and demonstrators an opportunity to prompt reflection on what went wrong. You can encourage students to outline a plan of how they might identify the problem and how they might redesign the experiment to minimise failure in the future.

Further support and guidance on supporting disabled students is provided from the [Disability Advisory Service](https://www.ox.ac.uk/students/welfare/disability) including:

* [Guidance on reasonable adjustments in teaching and learning](https://academic.admin.ox.ac.uk/teaching-and-learning-reasonable-adjustments)
* [An introduction to different disability types, the likely impacts on study and the common adjustments that may be needed](https://academic.admin.ox.ac.uk/implications-for-study#collapse1745296)