HOT TIPS FOR LAB TEACHING

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THE UNIVERSITY OF AUCKLAND
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Te Whare Wānanga o Tāmaki Makaurau

Contents

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1. Introduction

Lab teaching refers to anyone who is responsible for overseeing students when they are doing practical work.

Often the people doing lab supervision are senior students who are completing master's degrees, or PhDs, and for that reason are likely to be close in age to the students they are helping.

Labs may be staffed by a single demonstrator/tutor or by a group.

The teachers may have slightly different responsibilities and may be designated as **lab demonstrators**, **tutors** or **teaching assistants** (known as TA's).

The labs may be designated as **wet labs** (as in some biology labs); **dry labs** (physics) or they may have a strong discussion base (first-year psychology). In some subjects there may be field work which is overseen by the teachers.

Lab teachers may be responsible for marking lab reports.

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2. Key Concepts

Getting students started

- Circulate around lab
- Introduce lab clearly
- Check if students need help

Listening and communicating

- Be a good listener
- Take care in the way you respond to questions
- Check for understanding

Enabling students to learn

- Get students to generate solutions to problems
- Try to empathise with student difficulties
- Give constructive feedback

Professionalism

- Record attendance accurately
- Be aware of disabilities
- Know learning outcomes

Features of a well-run lab

- Lab is enjoyable
- Familiarity with equipment
- Friendly

3. Getting students started in the lab

Even though students may have a lab guide which they are instructed to read in preparation for a particular experiment, there still needs to be an introduction, so that everyone is familiar with the expectations of the experiment. *(100% of students want an introduction, Irene Barnett)**

The **introduction** may cover the purpose and aim of the experiment, some basic theory and some tips to get started. Note that the short-term memory only holds 7 items.

Leave time for **questions** after the introduction.

If an experiment has many parts, only go through the first part, and get students together to **discuss** the other parts.

As the students are working on an experiment, **circulate** around the room but don't intrude unless you need to: let the students get on with it.

Resist the temptation to dive in and solve all the problems a student or a group might be having.

If you see puzzled looks or people floundering, try **asking questions**: How's it going? What are you doing/ going to do? Why? Try and see the problems from the students' perspective.

If a lot of people are **floundering** you could stop the lab and have a quick general discussion and then proceed.

Try to be **vigilant** of the whole room, so that you don't inadvertently spend too much time with one student or group to the detriment of the others.

What to help with?

- Answering particular questions: "Why isn't the meter registering a current?"
- Practical things with the equipment
- Theoretical and conceptual understanding
- The significance/importance of instructions (simple instructions often hide assumptions which enable the experiments to work)
- With analysis – particularly with error and graphical analysis

** Irene Barnett , Physics, "Why do students do labs?"*

4. Listening & communicating effectively in the lab

Being an effective lab teacher is having a clear vision of what is to be done in the lab, but also being alert to ways to help students.

A key skill is to **listen carefully** to what students ask. This requires you to be an **active listener**. The listener not only hears the words but also observes the body language of the speaker.

Paraphrasing what has been asked is also **active:** "Is the problem focusing the microscope on the higher magnification?" In this way the student can respond with a 'yes', or give further clarification of the problem. This approach may be particularly important for those for whom English is a second language.

How you **respond to questions** and answers from students is really important, because the tone of your voice and the choice of language that you use can engage the student or alternatively de-motivate them.

Respond positively and **without pre-judgement,** and avoid obvious criticism such as "Weren't you listening to the introduction to the lab?"

Enable students to learn by taking a **student-centred** approach. Don't assume you know what the problem is – get the student to explain. Try to get the student to talk and offer solutions. You may then be able to offer and analysis of options.

When helping students, **check for understanding** at intervals. Try to keep explanations fairly brief, and beware of jargon and technical words. Don't speak too quickly, especially when talking to students who are not native speakers of English.

Good lab teachers seek to make it possible for the student to learn and develop by direction and **self-discovery**, not only within the context of the tutor/student situation but also beyond it.

A key skill is to listen carefully to what students ask

5. Enabling students to learn

The essential experience for students in laboratories is to have hands-on experience related to their subject material, so that they can more readily understand and connect with the more abstract facets of what they have been taught.

Lab demonstrators/tutors/teaching assistants can help to promote increased self-reliance on the part of the student so as to enable him/her to make appropriate decisions, to cope with the system, and to manage the transitions that form an important part of every student's intellectual development.

So, rather than telling students what to do, **enabling** makes it possible for them to learn and develop by self-direction and self-discovery, not only within the context of the tutor-student situation but also beyond it.

Lab teachers can facilitate this by making attention-giving eye contact in a supportive and respectful way, demonstrating by posture and facial expression that the student has their full and relaxed attention, avoiding or minimising distractions.

You can:

Use **effective listening** behaviours such as reflecting back students' questions, and checking for understanding.

Provide **problem-solving structures** - getting students to see a problem from the outside by identifying what the problem really is – getting them generating solutions and choosing suitable ones to try out.

Offer an **analysis of options** - helping students to recognise that there is more than one path ahead and that a careful check on the thoughts and feelings involved in taking each option may reap rewards.

Use **discreet self-disclosure** - telling a student something about yourself that helps her/him see you as a partner in the human predicament. You can give verbal and non-verbal indications that you want to understand and that you have some empathy with the student's feelings.

Sometimes a **confronting** approach may be necessary in order to bring a student face to face with her/his own behaviour, and its consequences. In this case you might:

Give **direct feedbac**k.

Interrupt a pattern of behaviour where you want to draw attention to it or to avoid an unproductive process.

Hold up a mirror, i.e. describe to the student what you see and hear her/him doing.

Ask a direct question in order to elicit specific information.

6. Professionalism

Lab demonstrators/tutors/teaching assistants are often in the front line of teaching and are likely to have the most direct contact with students during proctical work. As a result, the attitudes displayed by these teachers can have a big influence on the wellbeing and success of students. Lab teachers can help motivate students and increase their confidence.

Lab teachers need to be **professional** in their approach. You should:

Be **conversant with equipment** and of the safety issues in the lab. Be especially aware of the safety requirements of your particular subject (chemical, electrical, fire, radiation, biological materials, or glassware safety).

Be aware of **first aid** facilities.

Arrive at the lab **on time** or even before the students.

Tell someone if you have been delayed unexpectedly or are sick.

Be well prepared with any reading or consultation and know the **learning outcomes** of the particular lab.

Be accurate with **recording attendance** at labs.

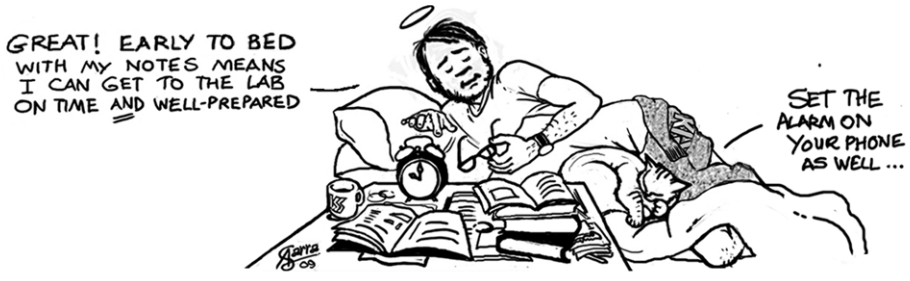
Be **impartial** and resist pressure from students to sign off on work that is not completed properly.

Seek to improve students' understanding by **questioning** rather just giving answers.

Be alert to, and deal fairly and promptly with students suspected of cheating and/or collusion with others.

Be fair with **time spent with individuals** or groups of students so that there is no gender or other kind of bias.

Be aware of students who have **disabilities** and who may need special conditions to allow them to participate properly.



Preparation and Punctuality are part of Professionalism

7. Features of a well-run lab

Demonstrators/teaching assistants/tutors can have a big influence on how fulfilling the lab experience is for students.

Effective labs are usually ones that have a positive and pleasant atmosphere.

Think back to the labs where you learned a lot and had an enjoyable experience. It is quite likely that they had the following things in common:

- The demonstrator **showed interest** in the material and in the group as a whole.
- The lab was well set up and the demonstrator was familiar with equipment and the **purposes/ outcomes** for the session.
- The **aims** of the session were clearly explained.
- There were ample chances to **ask questions** and get clarification at the beginning.
- The demonstrator(s) circulated around the lab checking on progress.
- You were **acknowledged as an individual** and could ask a question of the demonstrator.
- The demonstrator was **friendly and respectful** of students.
- The work was **challenging** and interesting.
- Where appropriate you got **constructive feedback** (written or oral).
- You left the lab feeling that you had **learned/achieved** something.

Keep explanations brief - beware of jargon and technical words

8. The 6 p's of good lab practice

One of the aims of labs is to further the understanding of students taking a particular subject.

The attitude of individual students is important but the demeanour of the demonstrator/tutor is very important as well.

The attributes of good lab practice are sometimes designated as the 6 p's: **preparation, patience, punctuality, personality, presence** and **professionalism** *(Ian Brailsford, Lecturer in Academic Practice)*. The last has been dealt with in section 5.

Preparation: this means thoroughly knowing the details of the course and what a particular lab entails. Being familiar with the equipment and possible pitfalls is important too. It might also mean having attended a meeting with the lecturer or senior tutor.

Patience: students need to feel that they can ask for help and that the demonstrator will assist without speaking too quickly and without being threatening. The aim is to communicate and explain well so that the students can do the work themselves. Being considerate and empathetic to students who make mistakes is also a good aim.

Presence: the aim of good demonstrating /tutoring a lab is to be fully alert to what is going on in the lab, so that the students are aware of the guidance available, but also feeling that they can proceed independently. Even if the students are not requiring help, the lab teacher should not be doing private work or reading. Good presence requires attentiveness.

Personality: student surveys often comment on lab teachers who were friendly, approachable, encouraging and enthusiastic. These attributes are very motivating for students and help them progress.

Punctuality: being on time for the lab sets a good example for students and focuses on the tasks in hand without being rushed or flustered. Let someone know if you are sick or unavoidably detained from being at the lab. If you are not punctual it is likely that the students will follow suit.

Professionalism: students have high expectations of their lecturers and their professors, but there is also a desire to be well taught in labs as well. See section 5 on professionalism.

Be considerate and empathetic to students who make mistakes

9. Frequently asked questions

1. **As a demonstrator am I expected to be in the lab all the time?**

   Yes. Demonstrators/Teaching Assistants are paid for two- or three-hour lab sessions and are expected to be there the whole time. This is especially important for labs where there is potential danger.

2. **I have not done any marking before - should I be concerned about being consistent?**

   Yes. Check with your senior tutor or the lecturer involved in the course to ascertain what is expected, and carefully plan what the answers should be and the marks to be allocated before you begin marking.

3. **What if the equipment doesn't work?**

   Try to get to the lab before the class is due and check the equipment with lab technicians (if you have them). It also pays to remember that no matter how well prepared the lab is equipment sometimes fails.

4. **What if I am sick or late for the lab?**

   Make sure you have the telephone number of the senior tutor and/or your fellow tutors and phone them as soon as possible so that a replacement can be arranged.

5. **What if the students ask me questions that I cannot answer?**

   Make sure you are fully conversant with the theory and practical aspects of the lab before the session. All teachers sometimes get asked questions they cannot answer, but you could try to get assistance from another demonstrator, or consult with the course convener.

6. **What do I do if lots of students in the lab are lost or struggling with the work that is to be done?**

   Rather than helping individuals or small groups it would be better to stop the lab, and brainstorm with all the students on how the problems might be overcome.

7. **What should I do if students arrive but absent themselves from a large chunk of the lab?**

   Mark the roll at the beginning of the session, in the middle if necessary, and have the students sign off as they leave the lab at the end. This is particularly important where lab attendance is compulsory for awarding the final grade.

10. Acknowledgments

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Teaching in Labs resource http://flexiblelearning.auckland.ac.nz/teachinginlabs.

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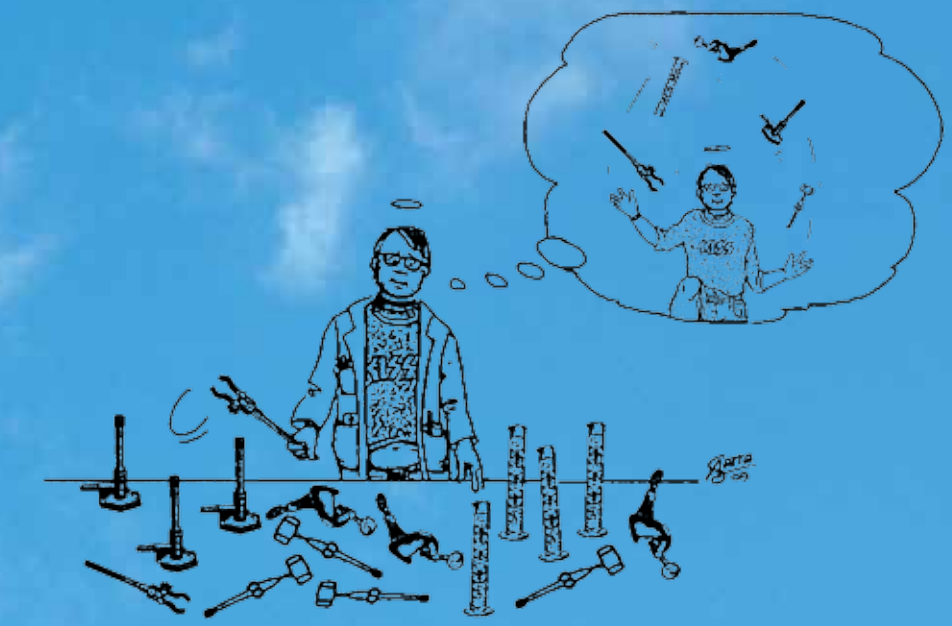

Be familiar with equipment and safety issues in the lab

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