



University College Dublin

School of Biomolecular & Biomedical Science

Best Practice in Teaching and Demonstrating for Technical Officers

Dr Tara McMorro

UCD School of Biomolecular and Biomedical Science

AGENDA

2.00-2.30pm **'Exploring best practices in teaching/demonstrating science'**

- Overview of principles of good teaching
- Teaching supports in UCD (UCD Teaching and Learning)

<http://cop.ndlr.ie/LINCS2010/ucd/teaching-and-learning-principles-for-demonstrators/player.html>

2.30-3.00pm **'Planning a Teaching Session and Sample Practical Presentation'**

- Overview of lesson planning ('Planning a Teaching Session')
- Presentation and discussion of video clips on practical presentations

3.00-3.30pm **'Good teaching/demonstrating practice and Sample Demonstrating Techniques'**

- Overview of good demonstrating practice
- Presentation and discussion of video clips on sample demonstration (Cell culture technique)

3.30-3.45pm Break

3.45-4.30pm **'Dealing with Demonstrating/Laboratory Dilemmas'**

- Discussion of common problems for technical staff
- Overview of frequently asked questions by technicians/demonstrators

4.30-5.00pm **Question and Answer Session and Overview of Session**

What is the point of teaching theory?

- Increases your confidence
- Helps understand your teaching role
- Inform decisions in how to develop new teaching methods
- Inform planning

However putting theory into practice can be difficult!

Exploring Best Practices in Teaching and Demonstrating Science

***Apathetic students, illiterate graduates,
incompetent teaching, impersonal campuses –
common criticisms of higher education***

7 Principles for Good Practice in Undergraduate Teaching

1. encourages contact between students and faculty
2. develops reciprocity and cooperation among students
3. encourages active learning
4. gives prompt feedback
5. emphasizes time on task
6. communicates high expectations
7. respects diverse talents and ways of learning

Seven Principles of Good Practice

1. Encourages Contact Between Students and Faculty

Frequent student-faculty contact in and out of classes is the most important factor in student motivation and involvement.

2. Develops Reciprocity and Cooperation Among Students

Learning is enhanced when it is more like a team effort than a solo race. Good learning, like good work, is collaborative and social, not competitive and isolated. Sharing one's own ideas and responding to others' reactions sharpens thinking and deepens understanding.

3. Encourages Active Learning

Learning is not a spectator sport. Students do not learn much just by sitting in classes listening to teachers. They must talk about what they are learning, write about it, relate it to past experiences and apply it to their daily lives.

4. Gives Prompt Feedback

Knowing what you know and don't know focuses learning. Students need appropriate feedback on performance to benefit from courses.

5. Emphasizes Time on Task

Time plus energy equals learning. Learning to use one's time well is critical for students and professionals alike. Students need help in learning effective time management.

6. Communicates High Expectations

Expect more and you will get more. High expectations are important for everyone - for the poorly prepared, for those unwilling to exert themselves, and for the bright and well motivated.

7. Respects Diverse Talents and Ways of Learning

People bring different talents and styles of learning to college. Brilliant students in the seminar room may be all thumbs in the lab. Students rich in hands-on experience may not do so well with theory. Students need the opportunity to show their talents and learn in ways that work for them.

Diagnostic View of Teaching

- Where do you need to make changes
- How do you know what to change
- Why should you make changes
- What will it mean in practice
- How will you assess if it made a difference

Some teachers ask students to assess by using 2 key questions

- What was the main point of this class?
- Do you have any questions?

Effective Teaching in Laboratories

Science teachers are teaching students TWO things of equal importance:

1. The importance of finding the correct solution to a problem
2. The importance of understanding the correct process of finding that solution

Lab students are expected to have acquired a specific set of skills and knowledge

Effective Teaching in Laboratories

Key elements:

Consider the issues of organisation, presentation, and evaluation

Define the day's activities and goals clearly (And make sure students know how those two things relate)

Offer positive encouragement and supervision

Provide periodic meaningful feedback to students (during the class and in their reports)

Effective Teaching in the Laboratory

- Prepare for the Lab
- Read the assigned lab in the lab manual
- Do the experiment and analysis about one week or so before your class
- Think about time management
- Know your equipment and materials
- Think about safety
- Plan your introduction and closure
- Plan for student preparation and write-up

"Preview, View, Review"

Copyright Dr Tara McMorrow 2012

UCD School of Biomolecular and Biomedical Science

Effective Running of the Lab

- Go into the lab early and write a brief outline on the board
- Begin the lab on time
- Briefly summarize the results of the previous week's lab (if relevant)
- Give a brief introduction to this week's lab
- Demonstrate any tricky techniques or apparatus and point out the location of special materials
- Interact with students
- Never pretend to know the answer to a question
- Let students take responsibility for learning
- Pace student progress
- Provide a sense of closure and clean up

Copyright Dr Tara McMorrow 2012

UCD School of Biomolecular and Biomedical Science

Some Current or Novel Teaching and Demonstrating Techniques

- Computer Assisted Teaching (CAL)
- Critical Evaluation of case studies
- Small Group Discussion (Problem based learning PBL)
- Use of Structured Role Play
- Gamification

Planning a Teaching Session

What is a Lesson Plan?

A **lesson plan** is a teacher's detailed description of the course of instruction for an individual lesson (in this case practical)

Developing a lesson plan

Most lesson plans contain some/all of the following components:

Title of the lesson

Time required to complete the lesson

List of required materials

List of objectives/ learning outcomes, which may be behavioral objectives (what the student can *do* at lesson completion) or knowledge objectives (what the student *knows* at lesson completion)

An instructional component that describes the sequence of events that make up the lesson

Independent practice that allows students to extend skills or knowledge on their own

A summary, where the teacher wraps up the discussion and answers questions

An evaluation component, such as a test for mastery of the instructed skills or concepts/ such as a set of questions to answer or report to generate

An analysis component the teacher uses to reflect on the lesson itself —such as what worked, what needs improving

Demonstrator's Lesson Plan

A Summary and checklist of things to do before, during and after the practical
Before

- Discuss practical with Lecturer
- Set up experiments or lay out specimens
- Familiarise yourself with the practical
- Listen to the introductory talk
- Know how to use the instruments required for the practical

During

- Be involved
- Think before answering questions
- Be enthusiastic
- Always wear a (clean) lab coat, fully done-up and safety glasses, if required.

After

- Put away experiment or specimens as required
- Mark practicals as required
- Learn from the experience- think how you might improve your teaching next time

Always

- Be aware of safety
- Notify problems and potential problems to the lecturer in charge

Graduate Teaching Assistant (GTA) Lesson Plan Assessment Sample

Name of Practical:		
Timing	Practical Events	Demonstrator/Student Activities
-24-72hrs	Preparation of practical, including pre-practical presentation	Demonstrator
0-15 mins	Practical Presentation- Introduction	Demonstrator
	Key point 1:....	Demonstrator
	Key point 2:....	Demonstrator
	Key point 3:....	Demonstrator
	Key point x:....	Demonstrator
15-20 mins	Question and Answer Session	Demonstrator + students
20-25 min	Practical Presentation- Overview of Practical	Demonstrator
25-150 mins	Organisation of the practical	
	Organisation of the practical (Practical Steps)	Demonstrator + students
	Step 1:	Demonstrator + students
	Step 2:...	Demonstrator + students
	Step 3:...	Demonstrator + students
	Step 4:...	Demonstrator + students
	Step x:....	Demonstrator + students
150-170 mins	Practical Presentation- Overview of practical report	Demonstrator
	Tables:...	
	Graphs:...	
	Equations:...	
	Sample Results:...	
170-180mins	Question and Answer Session	Demonstrator + students

Use of video clips to generate good teaching and demonstrating principles

Effective Presentation

- Video clip of **good(not perfect)** practical presentation and lesson plan
- Video clip of **poor** practical presentation and lesson plan
- Discussion of effective presentation

Effective Demonstrating

- Video clip of **good(not perfect)** demonstration (cell culture technique)
- Discussion of effective demonstration

Effective Presentation Discussion-Previous suggestions

Stages of Effective Presentation	Elements of Effective Delivery

Effective Presentation Discussion-Previous suggestions

Stages of Effective Presentation	Elements of Effective Delivery
<ol style="list-style-type: none"> 1. Title of practical 2. Introduction and Overview of what the presentation will cover 3. Summarising scientific points and definitions relevant to the practical and link to relevant lectures 4. Relevance of the practical and putting it in wider context 5. Practical details, what students are expected to do, operational details and steps 6. Question and answer session 1 7. Discussion of results 8. Writing up the report, highlight key points 9. Questions and answer session 2, ask an open ended question (pop quiz) 	<ul style="list-style-type: none"> - Give an overview of the practical presentation - Motivation! Make it context specific, relevance to everyday life, make it controversial, make it motivating - Make the practical link relevant to the lectures and also real-life applications of the science - Break down the topic into key points - Highlight what to look out for during the practical - Include sample results, highlight key points to look out for in the practical, - Show sample tables and explain how to do the calculations - Use of colour in visuals to show contrast and use of other visual aids (pictures/diagrams) - Early on, point out practical requirement, such as location of equipment required - Summarise the key points at the end of the presentation - Enthusiasm!!!! Confidence! Speak slowly! Tone of voice, body language, simple language, short points, large font - Incorporate the use of open ended questions

Use of video clips to generate good teaching and demonstrating principles

Effective Presentation

- Video clip of **good(not perfect)** practical presentation and lesson plan
- Video clip of **poor** practical presentation and lesson plan
- Discussion of effective presentation

Effective Demonstrating

- Video clip of **good(not perfect)** demonstration (cell culture technique)
- Discussion of effective demonstration

Effective Demonstrating Discussion- Previous suggestions

Stages of Effective Demonstrating	Elements of Effective Demonstrating

Effective Demonstrating Discussion- Previous suggestions

Stages of Effective Demonstrating	Elements of Effective Demonstrating
<ol style="list-style-type: none"> 1. Title and Introduction 2. Safety aspects 3. Preparation and explain why the students will be using the materials 4. Demonstrating, showing the students, what they need to do, questions and answers 5. Get the students involved and actually get them to do the practical steps themselves, ask questions, eg. are they having any problems 6. Clean-up 7. Close the practical, question and answer session 	<ul style="list-style-type: none"> - what is the objective of the practical. What are you going to show the students, key steps, set the scene - anything specific that may be dangerous or tricky that they may have to do, gloves and labcoat - through out demonstration, give advice and any warnings. Also make students aware that it is not just their safety but also other members of the group - show the students how to set up the practical and organise their materials - speaking clearly and slowly. Also explain why you are actually doing something and then do it, visual aspect important, ask groups individually how are they getting on - constantly explaining the steps of the practical, enthusiastic - show the students the safest and correct places to put lab waste and rubbish - recap and check that the students understood the practical, the objectives of the practical and that they could do the practical themselves - try to summarise all of the questions asked throughout the practical and give answers to all the practical class

So, what makes for great lab instruction?

An awareness of the basics of presenting, but also understanding of how group work fits within a larger context

Good lab instructors are both great teachers AND great managers

They get their students to understand the importance of the day's activities by first clearly explaining the significance of the activity

Good Lab instructors are always seeking to make experiments and practical problems relevant

Good lab instructors spend time early in the semester preparing their students to work in groups

Good instructors offer just enough help, forcing students to solve problems on their own

Finally, great lab instructors have eyes in the back of their head, are always alert for potential problems and they ALWAYS address safety issues first

Dealing with Demonstrating or Laboratory Dilemmas

Demonstrator Feedback from Students

- **No feedback on reports and not told what percentage each aspect accounts for in overall mark**
- **Demonstrators did not appear to know what should happen in the practicals, Practical manual had some errors**
- **Answers to Practical Assessments should be made available**
- **Different demonstrators have different marking systems**
- **There are no comments provided and sometimes as far as student is concerned there is everything in the report, but the grade is low**
- **It was suggested many times that demonstrators wear badges with names, as it seems that often students do not even know their first names**
- **Students would like to have the contact details so that they can ask questions about their work**

Laboratory Dilemmas

- Late arrivals
- Lack of interest/chatting
- Rudeness/use of mobile phones
- Fainting/ Sickness
- Plagiarism/Copying in reports
- Abusive emails or emails requesting review of grades

Late arrivals

If less than 20 minutes late, usually give benefit of the doubt, we have all been late on occasion!

If later than 20 minutes, check with academic/technician/senior demonstrator

Lack of interest (chatting)

Approach student, ask if they need any help, and if they understand the practical

Engage the student, set the context of the practical. Try to develop their interest by asking open ended questions

Rudeness

If a student is deliberately being rude or ignoring you, do NOT get angry.

Walk away!

Ask another demonstrator to deal with them and if they continue to cause problems report them to the academic/technician in charge and they will deal with them

Fainting/Sickness

Don't panic!

Remove them from the practical class, get them to sit down and drink some water.

Also tell one of the technicians and they will assist you

Plagiarism/ Copying

Very serious offence, do NOT discuss it with the student or give them a lower grade if you suspect them of plagiarism

Report immediately to the academic in charge of the practical or the module coordinator and they will deal with it.

Abusive Emails

Try to avoid giving out your email address if possible

Report any abusive/inappropriate emails to the module co-ordinator. Do not respond to the emails

If requested to review a grade and are satisfied it is appropriate, send email to academic /technician in charge to confirm

Any Others??

Demonstrator Issues!

- Arriving late
- Not engaging with students (sitting at the back chatting with other demonstrators!
- Not correcting reports

Suggest contacting the module co-ordinator unless you think you can resolve the issue yourself. Ask for advice!

On a positive note!

Recent feedback from undergraduate student highlights the importance that technical staff and the graduate teaching assistants (GTAs) play in the teaching and learning environments of academic institutions and the relevance of the training programmes and their continued improvement