

Linking teaching and research – teaching experimental design

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Teaching experimental design is hard

- **Can teach principles in a lecture** – but students forget them easily and find them difficult to relate to real situations
- **Learn through seeing/doing well designed experiments** – good design seems obvious, features of good design not always easy to see, choices and how they were made are not explicit
- **Learn through making YOUR OWN mistakes** - effective, efficient? Do we have time to allow this? Do we have resource to allow this? Are today's students sufficiently robust? **Use of simulations?**
- **Learn through seeing mistakes OTHERS have made**
 - bad papers have been (hopefully) filtered out
 - insufficient mistakes in any one paper
 - telling the story of an investigation, warts an' all, provides a solution

Learn through MY mistakes

I've made lots!!!

Tell the story of one of your research programmes;

(you already have all the information)

- **not just the successes, outcomes and published data**
 - **also the thought process and line you followed**
 - **also the problems**
 - **also the mistakes**
 - **also the choices and the reasons for them**
 - **the compromises where the science is not the best and why**
 - **the constraints**

Tell it warts an' all!!!

How toxic is ORG GB94 (Mianserin)?

Antidepressants are a common cause of death (suicide) in overdose
(cardiovascular and CNS effects)

Translate to testable question

How/what measured?

End effect?

Fixed dose/dose to effect?

Route?

Species?

Randomization?

Pilot experiments?

Comparable to reality?

Choice of comparitors (standards)?

Numbers?

Anaesthesia?

Solvent?

Data collection?

Data processing?

Publication?

Timing/deadline

Different approaches possible

1 hour lecture on principles of experimental design then 1-3 days later:

- 1. (Y1 and Y2; 40 minutes) Tell them how the research programme evolved, where and how you considered the basic principles, the choices you made, why, and how it worked**
- 2. (Y2; 2.5 hours) In groups of 5-10 set them the problem you started with and then use a set of **specific consecutive questions** to structure their approach to designing the experiment. Set one question at a time, share each group's answer and their reasoning, agree where we are at and then set the next question (this keeps a common position for each successive question and stops designs diverging).**

Both work well and are rated very highly by the students; 2 particularly well received and students surprisingly competent