Can you tell what it is yet?

An investigative approach to final year group project work

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Group projects

Why?

- Shortage of research project supervisors as student numbers increase
- Cost effective
- Developing team working skills

Why not?

- Parity of experience?
- Mark is dependent on performance of others in team?
- Accurate assessment of individual performance?

What should the students get out of it?

(Luck, 2008)

- Ownership – experiencing the limits of confident knowledge
- A taster of real science – “knowledge of science” and “knowledge about science” (Ryder, 2004)
- Skill development - employability
- Independence, motivation and fun

Context

- ~250 Stage 3 students from 13 bioscience degree programmes
- All students undertake 10 week (40 credit) research project at Stage 3
- Students achieving <55% at Stage 2 are offered a “dry” project
- Since 2007-8: Alternative “group” project module offers these students laboratory experience

Setting the scene

You have just started work at a top biotechnology company and have been asked to prepare a product information sheet for a new batch of the common laboratory reagent, trypsin, which has been ordered by an important client.

?

But…….

there has been a labelling mix up on the production line and some tubes containing chymotrypsin have been wrongly labelled as trypsin.

Where do they start?

Students are provided with:

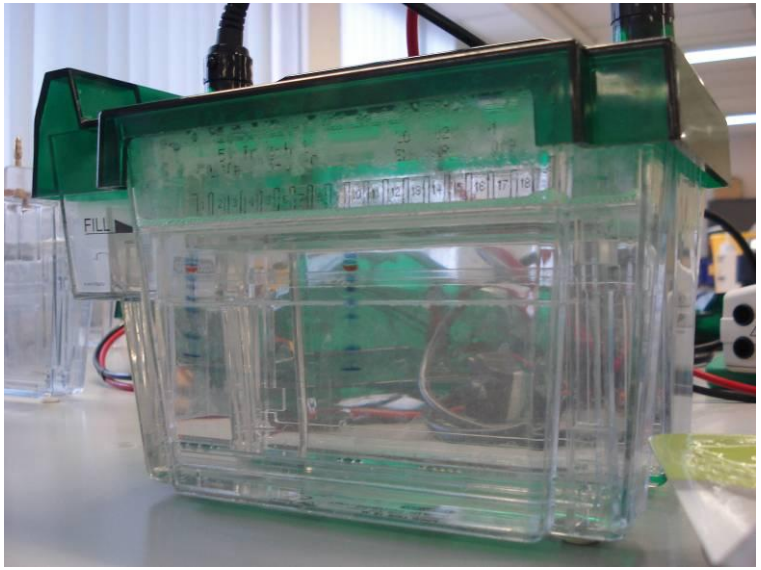
3 samples:

- Test sample
- known trypsin sample
- known chymotrypsin sample

Practical handbook containing:

- Equipment list
- Reagent list
- BASIC protocols for the 7 assays

Techniques



- uv spectrophotometry
- Lowry assay
- BAEE trypsin activity assay
- BTEE chymotrypsin activity assay
- SDS PAGE
- Western blotting
- ELISA

The questions:

All students:

1. How can you confirm that the Test sample which you have been given contains trypsin and not chymotrypsin?

2. What is the total protein concentration of your Test sample?

3. What is the activity of your Test sample?

Group 1:
What is the % purity of the Test sample?

Group 2:
What is the optimal pH and temperature of storage?

Group 3:
What is the optimal pH and temperature for maximal activity?

OR

Any question the student would like to investigate

Can you tell what it is yet?

The Rolf Harris approach???

Equivalent skills in information retrieval & scientific writing?

Module includes extended essay on experimental design

- Each student has individual topic
- Requires critical evaluation of primary literature
- Allows us to tailor to individual degree programmes
- Forms basis of individual oral presentations

Structure

Week	
1	Seminars
2	Project plan (20%)
3	
4	Lab work: 52 hours
5	and extended essay (20%)
6	
7	Final results workshop
8	Lab report (30%)
9	Oral presentation (15%)
10	(Professionalism & competence 15%)

Final data is shared by the whole group:

- Students evaluate their own data in light of class results
- Lots of data for relatively short lab time
- Allows meaningful statistical analysis

The best of both worlds?

Working as individuals:

- Plan experiments
- Execute experiments
- Write up report

Some collaboration
& peer support

- Write essay
- Make oral presentation

Working as a group:

Working on a common “scenario” in teaching lab

- ⇒ easier for staff to plan and set up
- ⇒ low-risk for both students & staff

Working on common core questions

- ⇒ easier for staff to supervise multiple students
- ⇒ easier to mark

What *DID* the students get out of it?

• Ownership? – experiencing the limits of confident knowledge?

Students liked the fact they were “doing their own work” rather than looking at data generated by others.

• A taster of real science – “knowledge of science” and “knowledge about science” (Ryder, 2004)

Students identified one of skills acquired as “Ability and confidence to talk about doing experiments and being in a lab and to answer questions on this”

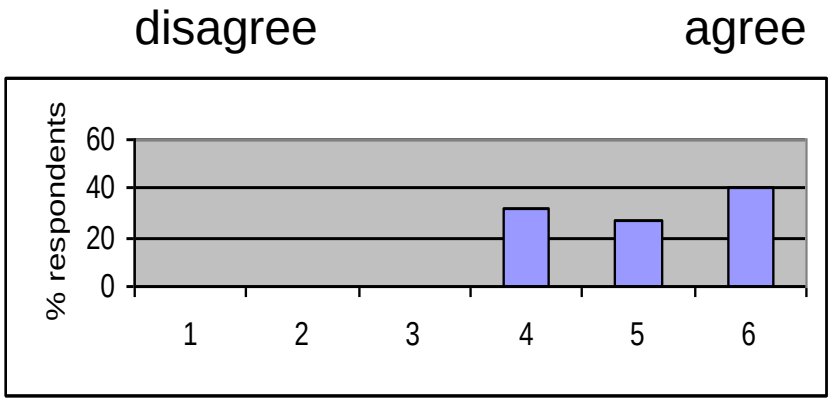
- Skill development – employability?
- Independence, motivation and fun?

Students said the module had taught them:

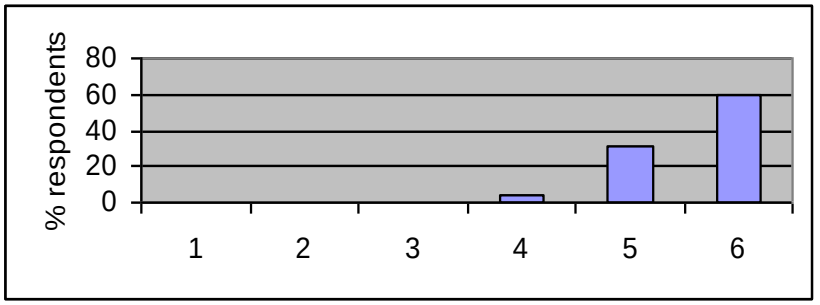
"How to approach an experiment"
"How to be independent in the lab"
"How to plan experiments"

…now if I ever go and do lab work again I'd think about it a lot more: why am I doing this? What will it tell me?"

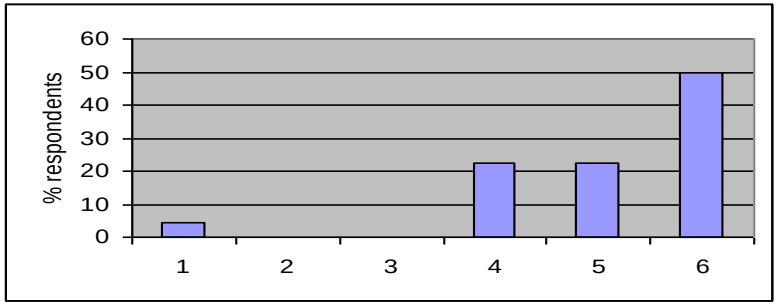
The module improved my **confidence** in performing numerical calculations



The module improved my **confidence** in the laboratory



Overall I found the module **enjoyable**



Better than traditional project for some?

Student support

- Weekly one-to-one meeting with academic supervisor
- Postgraduate demonstrators
- More “standardised” support
- More structured format

having spoken to friends involved in alternate laboratory projects, ours seemed to be far more varied, interesting and above all, enjoyable.

I felt more comfortable being part of a group in the lab, as I would have found it too intimidating on my own.

people I've spoken to are like wow is that what you're doing, that sounds good!

Anything students felt they had missed out on by being taught in this way?

- Being put into a different situation
- One student felt experience of peers doing more traditional projects experience was more like real research and they had been lucky to have “met experts”
- Opportunity to publish results
- Some felt the workload was higher than traditional project

Summary

- Group projects are an attractive alternative to traditional final year projects when faced with large cohort sizes
- There are challenges in providing students with an individualised experience within a group project
- We have developed a project module which “blends” elements of group project and individual project
- Feedback suggests that, for the majority of students, the module provides a robust alternative to the traditional project

References

Luck M. (2008) Student Research Projects: Guidance on Practice in the Biosciences, HEA Bioscience centre, available at http://www.bioscience.heacademy.ac.uk/resources/guides/studentres.aspx (accessed May 2010)

Ryder J. (2004) “What can students learn from final year research projects? *Biosciences Education e-journal,* 4-2 available at http://www.bioscience.heacademy.ac.uk/journal/vol4/beej-4-2.aspx (accessed May 2010)