Final Year: what are valid research projects?

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The Higher Education Academy Centre for Bioscience

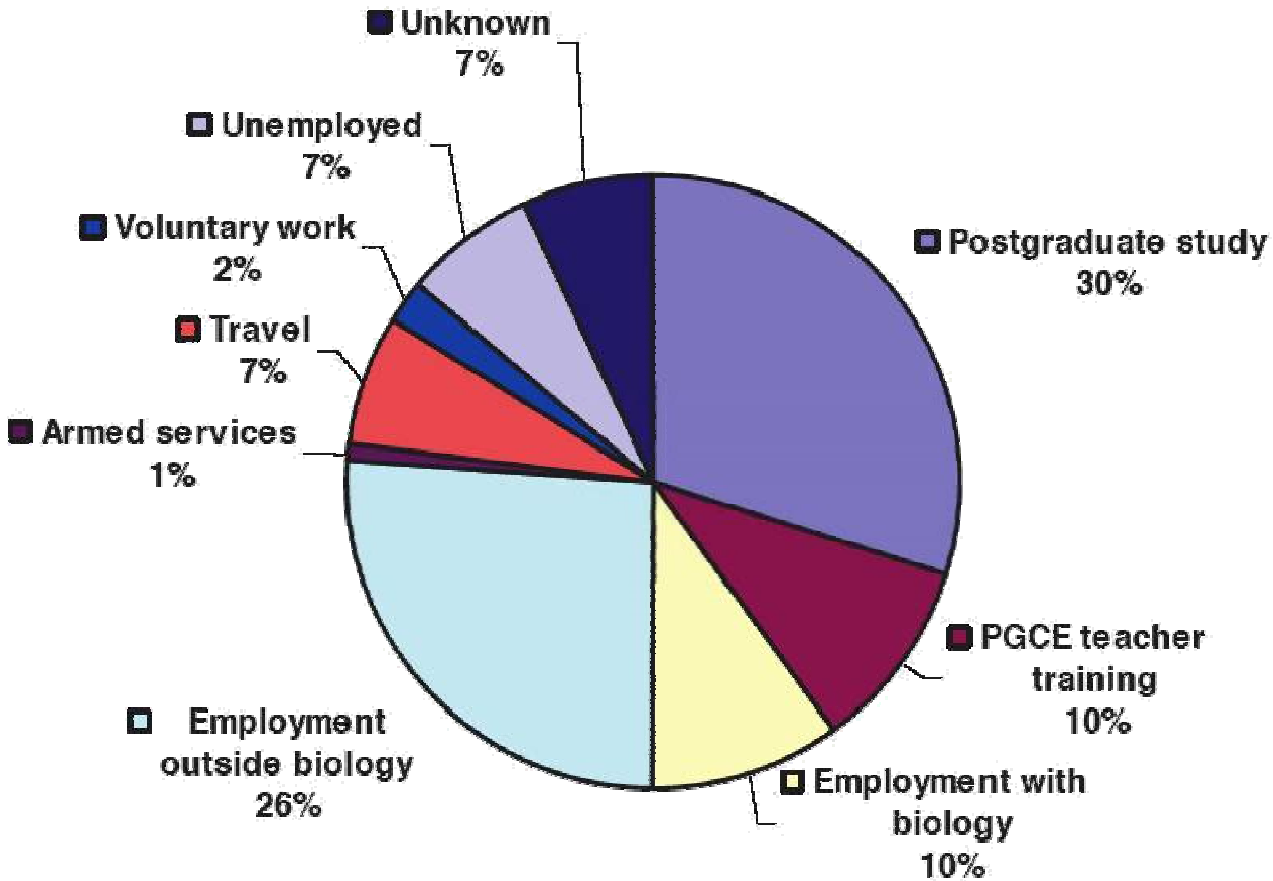
CARDIFF UNIVERSITY
PRIFYSGOL CAERDYDD

Why are alternatives required to the traditional research-based practical project?

- The ‘Appropriate Skills’ reason.
  Practical training and laboratory skills are considered almost essential for those wishing to enter postgraduate study in biological or biomedical research. However, two-thirds of our graduates may never need these skills in their future careers. How best should we cater for these students?

Graduate Destinations: only about one third of biologists continue with a research career in biosciences.

(Data for Durham University 2002-4, Przyborski 2005)



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- The ‘Pragmatic’ reason.
  Increased student numbers make it difficult to offer each student effective laboratory-based research projects

- The Solution?
  Alternative methods to training in scientific technique.

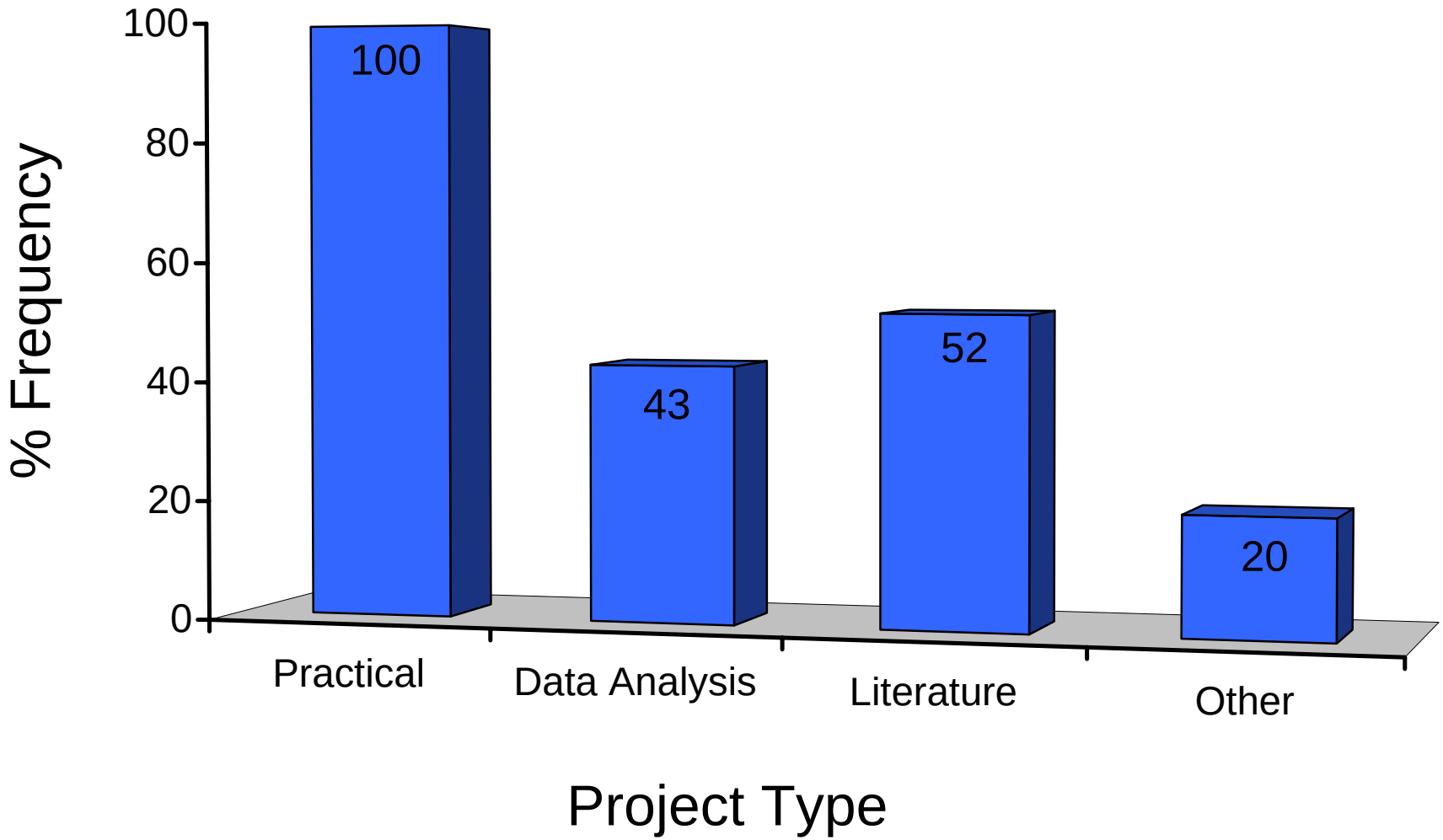
Common Types of Final Year Projects

- Practical Projects - students undertake experimental work in either the laboratory or field, collect data, test hypotheses, discuss the results and draw conclusions.

- Data Analysis Projects - as above, only students do not collect the data themselves, but are given an existing data set to analyse that was collected by someone else.

- Literature Project - ideally students use the scientific literature to test hypotheses, although sometimes this may just involve producing a review of existing knowledge on a particular subject.

Relative frequency of different types of final year project in 58 UK HE Bioscience departments.



Case Study 1: Biology Enterprise Elective

(Stefan Przyborski, University of Durham)

This is a collaborative venture between the School of Biological and Biomedical Science and the Durham Business School, with the following aims:

- To study in depth a chosen topic in biological science
- To introduce science students to the key processes of business start-up
- To enhance students' enterprising skills and behaviour

Case Study 1: Biology Enterprise Elective

(Stefan Przyborski, University of Durham)

- **Students generate an idea for a business opportunity that is based on a scientific discovery**
- **Students apply their knowledge and understanding of science to develop and research their idea into a technology that can be readily commercialised**
- **The Business School teaches students the necessary skills and knowledge required to develop their idea into a successful business**

School of Biological Science

Business School

Case Study 1: Biology Enterprise Elective
(Stefan Przyborski, University of Durham)

Students are expected to:

- Write an extended essay
- Prepare a presentation
- Produce a business plan

They receive training to enable them to:

- conduct market research
- research & develop the technology
- write a business plan
- determine company structure
- promote & market the product
- plan production & operations
- raise finance
- apply for IP and patents
- present a business plan

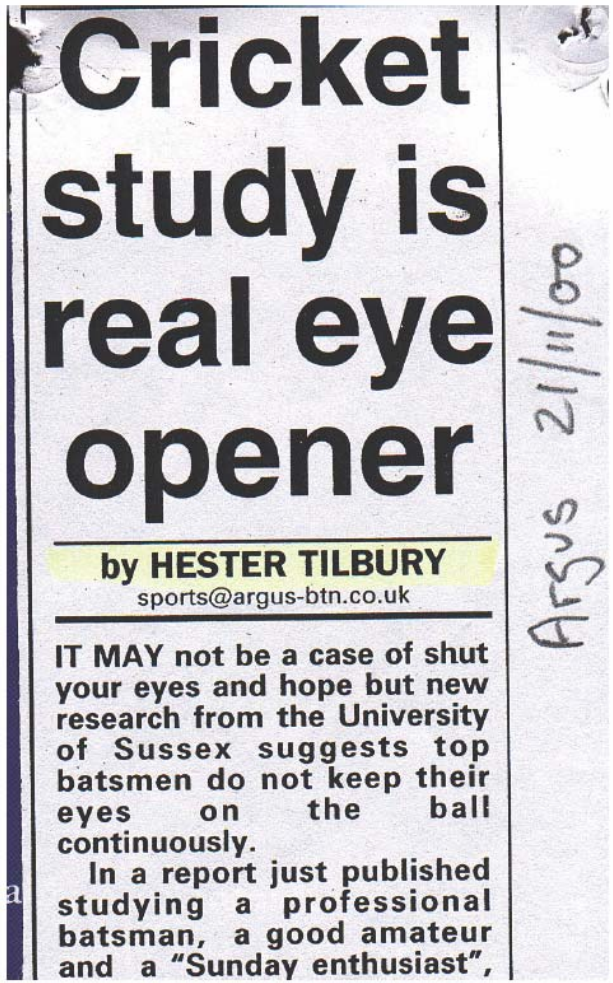
Case Study 1: Biology Enterprise Elective
(Stefan Przyborski, University of Durham)

• FIRST DIAGNOSTICS	cholesterol self testing kit
• MORAPEL	oral insect repellent
• LEDRELL INNOVATIONS	diabetes breath tester
• BIOCLEAN TECH LTD	biodegradable chewing gum
• DIAGNOSTIC INNOVATIONS LTD	rapid Chlamydia test
• VIT-A-MAX LTD	vitamin and mineral assay kit
• TISSUE TECHNOLOGIES	stem cell banking

Case Study 2: Science Writing Projects
(Robert Whittle, University of Sussex)

Such projects enable students to:

- Learn how to interview primary sources (e.g. research active staff)
- Understand the scientific evidence, and its broader perspectives within science.
- Develop transferable skills in communication and science writing.
- Examine issues in the publicising of science (involving interaction with the University press office).
- Explore a possible career path beyond the laboratory.



Cricket study is real eye opener

by HESTER TILBURY
sports@argus-btn.co.uk

IT MAY not be a case of shut your eyes and hope but new research from the University of Sussex suggests top batsmen do not keep their eyes on the ball continuously.

In a report just published studying a professional batsman, a good amateur and a "Sunday enthusiast",

Argus 21/11/00

Case Study 3: Writing a Grant Proposal

Graeme Henderson, Bristol University

A research proposal is written up in the form of a Wellcome Trust grant application. Skills learned include:

- Writing to a severe word limit
- Designing experiments
- Determining which technique is appropriate to the question to be answered
- Reading the scientific literature with a view to identifying key material
- Identifying essential information and excluding irrelevancies

Case Study 4: Web-based Projects
(Hollingworth et al. 2004, Manchester University)

- 17% of final year projects are web-based.
- Majority of web sites have been designed to support staff teaching.
- Technical support involves workshops provided by an IT specialist in the use of web-authoring software, as well as dedicated PCs equipped with Dreamweaver, Flash etc.
- Project mark based on performance during project (20%) and final web site plus report (80%).
- Student performance on web-based projects was comparable to those undertaking practical projects.

Generic research skills which final year project students should be developing:

- Understanding the general scientific process involving the construction and testing of hypotheses (including experimental design)
- Ability to gather information carefully and accurately.
- Learning the right balance between showing initiative and seeking help.
- Choosing appropriate methods for analysing data and testing hypotheses.
- Developing critical skills and an enquiring mind, particularly in the context of changing knowledge.
- Being able to communicate science to a scientific or general audience.
- Hopefully, experiencing the excitement of scientific discovery.