

Embedding Employability within the Curriculum: Designing the Biology curriculum to focus on skills development

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Embedding Employability within the Curriculum:

Designing the Biology curriculum to focus on skills development

Outline

1. Background
2. Planning
3. Re-design
 - a. Transition
 - b. Refocus of learning activities
 - c. Integrating quantitative skills
 - d. Portfolio

Background

In 2014 instituted the Undergraduate Teaching Review (UTR)...

...to assess “undergraduate teaching in Biological Sciences and to make recommendations for its future development”

Report produced in 2016

Key weaknesses :

- **Practical field and laboratory skills**
- **Quantitative skills/statistics**
- **Programming/coding/(bio)informatics**
- **Data handling and experimental design**
- **Logical and critical thinking**
- **English writing skills**

“[T]eachers and students report that students’ core skills are underdeveloped. These need to be instilled from 1st year and reinforced by use in subsequent years.”

Planning

Skill	When skill is learned	at what level
		2 nd Year
Laboratory/field skills		
Lab safety and etiquette		2
Basic lab skills	1	2
Basic fieldwork skills	1	2
Following protocols	1	2
Developing and adapting protocols		1
Data recording and analysis	1	2
Maintaining equipment	1	2
Quantitative skills		
Statistics	1	2
Mathematics	1	2
Programming		1
Visualisation of data	1	2

“No plan survives contact with the enemy”
Field Marshal Helmuth Karl Bernhard Graf von Moltke

Skills development matrix

Planning

Skill	When skill is learned and at what level	
	1 st year	2 nd Year
Communication		
Good scholarship and plagiarism awareness	1	2
Writing and presentation skills		1
Lab reports	1	2
Posters	1	2
Oral presentations	1	2
Essays, report, summaries, blogs	1	2
Scientific debate		1
Working in a team	1	2

Critical Thinking and Experimental Design also
represented in the matrix

Skills development matrix

Planning

Skill	When skill is learned and at what level	
	1 st year	2 nd Year
Knowledge acquisition/ independent learning		
Literature searching	1	2
Use of online databases		1
IT skills (spreadsheets, simple databases)		2
Bioinformatics/modelling software		1
Revision and assessment strategies	1	2
Appreciation of what makes for high quality work	1	2
Monitoring and organising own learning		1

Independence: Not only to develop the skills (including independent learning) ...
... but to appreciate that they have gained them

Skills development matrix

Re-design

Year 1

Year 2

Existing

Core Biology S1

Core Biology S2

Optional Biology S1

Optional Biology S2

Optional Biology S1

Optional Biology S2

Optional Biology S1

Optional Biology S2

Outside Course S1

Outside Course S2

Outside Course S1

Outside Course S2

Re-design

Knowledge acquisition/independent learning

Laboratory/field skills

Communication

Quantitative skills

Critical Thinking and Experimental Design

Core Biology

Core Biology S1

Optional Biology S2

Outside Course S1

Outside Course S2

Outside Course S1

Outside Course S2

Re-design

Year 1

Year 2

First 6-weeks are crucial for retention and engagement (Levitz & Noel 1989)...

... they can't gain skills and independence if they aren't here or aren't engaged

Re-design

Transition period

Knowledge acquisition/independent learning

Laboratory/field skills

Communication

Quantitative skills

Critical Thinking and Experimental Design

Core Biology

Core Biology S1

Optional Biology S2

Outside Course S1

Outside Course S2

Outside Course S1

Outside Course S2

Re-design

Transition
period

Most students leave (or consider leaving) due to:

- Academic issues
- Isolation
- Concern about future achievement

Sense of belonging

... those that consider leaving are also less engaged throughout



Field trips/work



Semester-long group work and projects

Thomas (2012) What works?
Student retention and success

Re-design

Lecture-based activities – Active Teaching

Article

active learning
in higher education

Quectures: Personalised constructive learning in lectures

Heather A McQueen
University of Edinburgh, UK

Craig McMillan
University of Edinburgh, UK

Abstract

Active learning exercises engage students during lectures, but often fail to take account of the individual learning position of each student. The 'quecture' is a partially flipped lecture that incorporates students posing their own questions (quecture questions), discussing them during lectures and revisiting them later. These interactive learning events are designed to personalise students' construction of learning during lectures. Quectures were trialled in direct comparison with both fully flipped and traditional lectures, providing information on student attitudes, experiences and engagement with the learning strategy. Quectures were favoured by participants over the two other lecture formats and were found to be helpful both in increasing

<https://www.ed.ac.uk/staff/teaching-matters/focus-school/biological-sciences/experimental-interactive-learning-quectures>

Active Learning in Higher Education
1–15
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DOI: 10.1177/1469787418760325
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SAGE

Practical-based activities – Applied Learning



What questions would you ask?
How would you design the protocol?

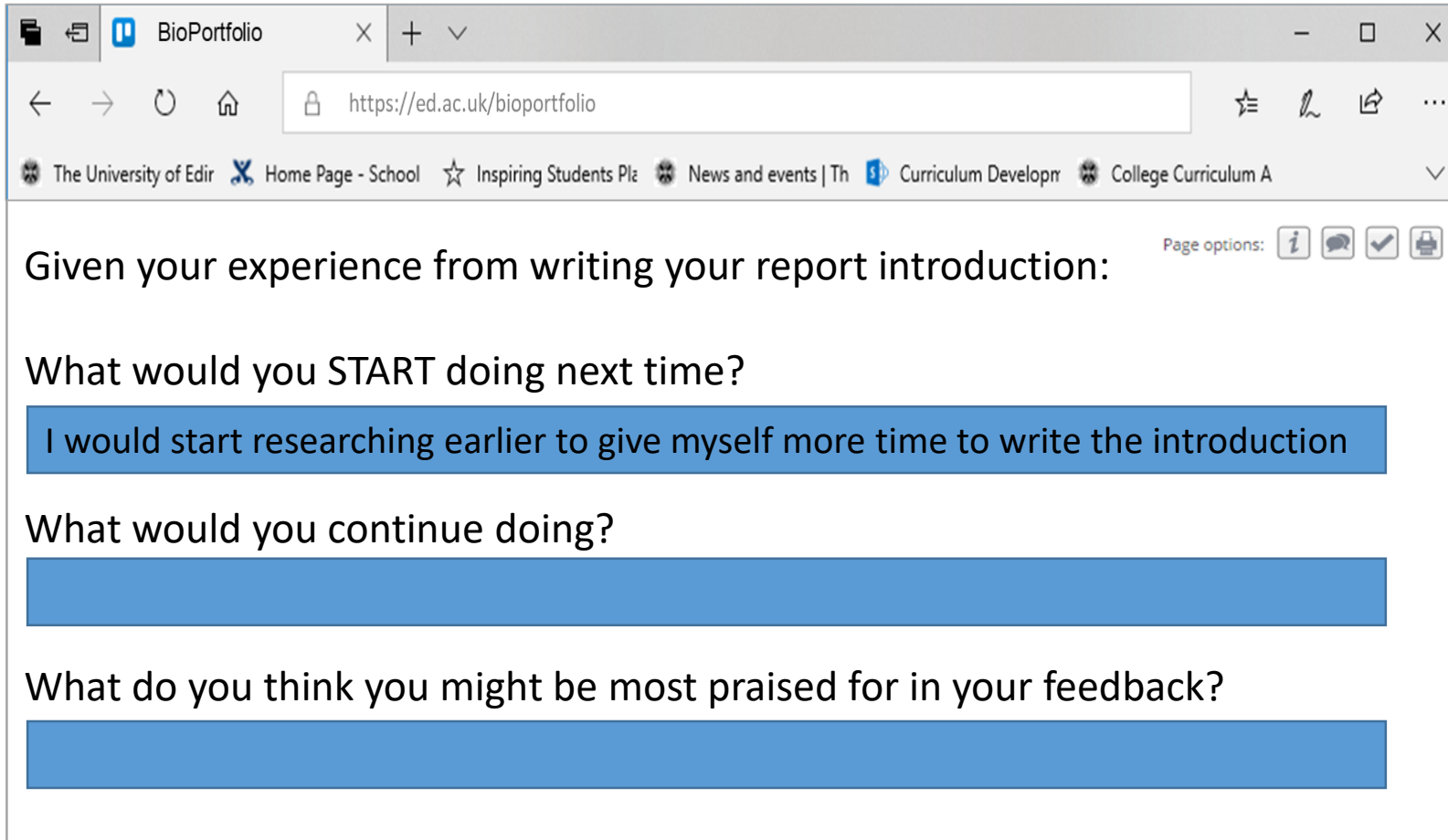
To build **Critical thinking and Experimental** skills

Refocus of learning activities

Re-design

Forms the backbone of core courses (contributing 25% of assessment in the 1st year):

Link learning activities to portfolio activities to encourage:



The screenshot shows a web browser window with the address bar displaying 'https://ed.ac.uk/biportfolio'. The page title is 'BioPortfolio'. The main content area contains the following text and input fields:

Given your experience from writing your report introduction:

What would you START doing next time?

I would start researching earlier to give myself more time to write the introduction

What would you continue doing?

What do you think you might be most praised for in your feedback?

- forward planning,
- engagement with activities,
- reviewing of performance (personal reflection),
- and then onto forward planning for the next activity.

Portfolio

Re-design

Forms the backbone of core courses (contributing 25% of assessment in the 1st year):

Demonstration of Sterile Technique

Make a link to your video

+ Add an event

Justify, expand upon, or provide a context for your evidence

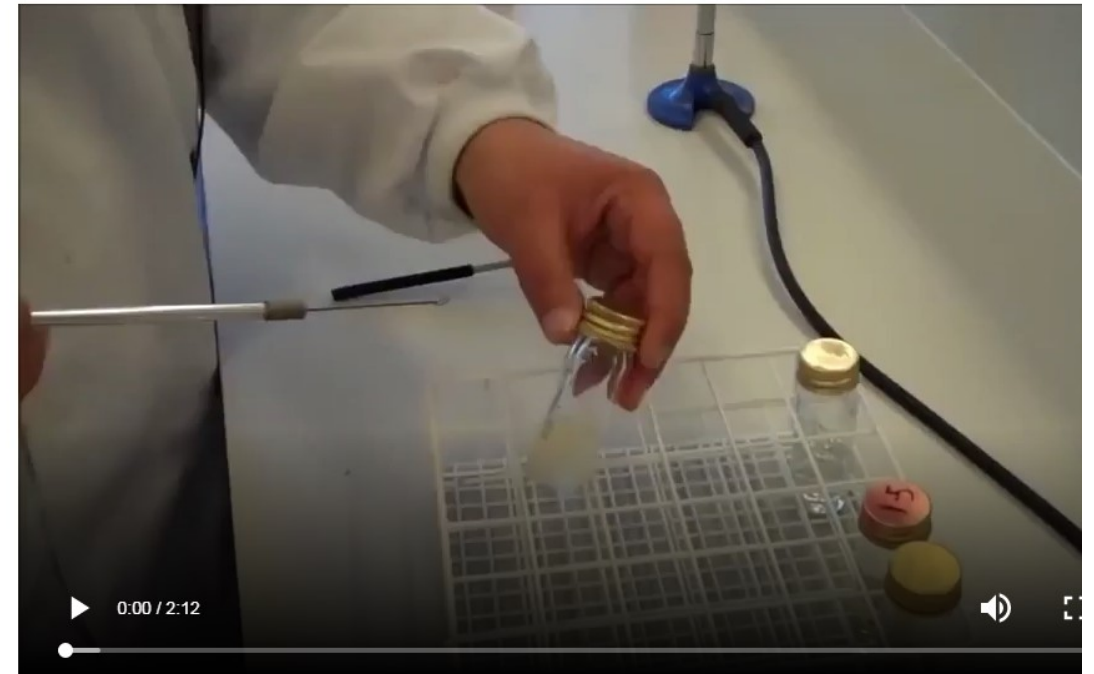
To fully justify I would need to show that after incubation the resultant plate has single colonies of one type

To what extent does this evidence prove what you can do or have done?

- This item has not yet been evidenced
- This item has been fully evidenced

Write short notes relating to the video that demonstrate how you minimise contamination

	Aspect 1	Aspect 2
Action	Work quickly	
Reason	This minimises chances that contaminating spores will land on the plate	



CV building and review activities

The aim will also be to relate skills development to awareness of career planning

Portfolio