Student perceptions of embedded employability skills

Sarah Gretton, Derek Raine and Patrick Conboy
Centre for Interdisciplinary Science
University of Leicester
Natural Sciences at Leicester: Key features

• Core modules are interdisciplinary (Biology, Chemistry, Physics, Earth Sciences)

• Delivered by research-based (or problem-based) learning

• Explicitly designed to embed professional skills into science modules
Embedded skills

Professional skills are supported by authentic (usually group) assessments ("deliverables")

The learning cycle:
Authentic Assessment

- **What is it?** (Ashford-Rowe & Brown, Establishing the critical elements that determine authentic assessment, 2014)
  - An authentic assessment should be **challenging**
  - The outcome should be in the form of a **performance or product**
  - Authentic assessment design should ensure **transfer of knowledge**
  - **Metacognition** as a component of authentic assessment
  - The importance of a requirement to **ensure accuracy** in assessment performance
  - The role of the **assessment environment** and the tools used to deliver the assessment task
  - The importance of formally designing in an opportunity to discuss and provide **feedback**
  - The value of **collaboration**

**What do we do?**

- pitches for funding, expert witness, museum podcast, website, National Geographic video, research journal, POST note...
Explicit skills

• Skills modules run alongside the core science modules e.g. presentations, writing for various audiences as well as CV workshops, job interviews…
• These cover only a subset of the skills e.g. critical thinking and leadership are not explicitly taught but are expected learning outcomes from PBL

Research Question:
Is it clear how the programme is designed to work, in terms of professional skills, but how is it perceived by students?

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Research questions

- Do they see a progression of skills which they acquire with increasing confidence?
- Can they articulate these skills, for example, to prospective employers?
- Can they even use these skills outside the classroom?

As part of an undergraduate pedagogic research project, we present a selection of the results from:

- a questionnaire with current students (part of a longitudinal study)
- interviews with recent graduates
Research:

- Undergraduate final year project
  - Questionnaire at special session: 35 participants (~60% cohort) across all years of the programme
  - Identify key issues
  - Semi-structured interviews with 7 graduates
The McMaster Questionnaire

How important is it for you to learn…
How confident are you that the degree is contributing…

• Independent learning skills
• Research skills
• Critical thinking skills
• Problem-solving skills
• Editing your own writing
• Information retrieval
• Preparing visual materials
• Presentation skills

• Project management
• Personal time management
• Communicating effectively with team/group members
• Leadership skills
• Maths/statistical skills
• Laboratory skills
• Computer skills
• Field skills

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Importance of skills

• **All skills surveyed** had more than half of students agree they were at least *somewhat important*

• **All** students believed **Independent learning, Research skills** and **Problem-solving** to be important skills they should learn/develop on the programme

• **Effective communication and critical thinking** were also highly rated

Confidence of degree contribution

• Similar levels for highly rated skills but all ratings were lower for confidence than importance

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Change in Confidence and Competence

- Proficiencies:
  - Presentation Skills,
  - Engaging with others academically (discussing ideas and problems)
  - Professionalism (meeting deadlines, being on time etc.)
- Subject knowledge:
  - Biology,
  - Chemistry,
  - Physics,
  - Earth Sciences
Changes in confidence, changes in competence

Increase in confidence

- Presentation skills (explicitly taught) - 77.2%
- Engaging with others of students confidence (implicit) - 80%
- Professionalism (implicit) - 68.5%

Confidence vs competence map quite closely
- similar pattern for presentation skills (explicit)
- and professional skills (implicit)
Effectiveness of the programme:

- Lectures
- PBL sessions
- Reflective practise
- Project work
- Independent Learning

- Personal tutor meetings
- Weekly question sets
- Tutorial Sessions
- Group deliverables
- Individual deliverables

- Journal Club
- Invited speakers
- Labs/Workshops

- Learnt most through weekly homework questions
- Project also worked highly valued
- Deliverables effective - group more than individual
- Lectures more effective than PBL sessions
- JIST more effective than journal club
- Labs, field trips and personal tutor meetings/reflective practise - limited effectiveness
Alumni’s thought on questionnaire responses

- Thoughts on important skills-
  Agreed that problem-solving was an important skill in employment—something they had gained

- Why were some teaching types less effective?
  Students require more support in PBL—contradicts current students' responses on effectiveness of PBL sessions

- Would you have preferred PBL or a more lecture-based programme?
  Big adjustment to PBL at University, however skills acquired are essential advancement in professional/academic role
Alumni quotes on skills

Hugo, now grad student at McMaster: “With hindsight, pbl has been 'spot-on’.”

Donna, Finance Manager: “Without my degree I do not believe I would have progressed as far as I have in the short space of time I have been with Norbert Dentressangle. A degree in science does not mean you are ever restricted in pursuing a career in a completely different field.”

Suzanne, IT company: Her current project involves computer coding, getting a tablet product out and monitoring its quality. She says that the key to where she is today is the research nature of the degree

Louise is a research scientist and civil servant: originally shy, Louise says that as a result of the degree she now feels confident at delivering information in front of large crowds. Overall she feels more of a ‘strong’ character in these high pressure working environments.

Antony (Clinical research): “With hindsight, I have realised just how many skills that the [Natural Sciences] course and staff there have instilled in me.”
Summary

• Students recognise the importance of professional skills
• They do not always recognise the value of the way the programme delivers these (not a single free form comment was about skills)
• Graduates judge the effectiveness of the programme more positively