Embedding EBL in the Manchester Chemical Engineering UG Curriculum

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Outline

1. Motivation

2. Changes to the ChemE curriculum
   - Content
   - Structure
   - Delivery
   - Assessment
   - Student Support

3. Outcomes
Why do we change the curriculum?

External factors:
- Change in the profession over the years
- Globalised working environment
- Key skills also required
- Student's attitude and background

Our observations:
- Compartmentalised knowledge
- Weak problem solving skills
- Shallow learning
- Students' motivation
What did we have?

In a typical year:

- 10 modules
- Traditional lectures
- Large tutorial classes
- Labs
- Project work
- Tutorial:Lecture (1:2)
Main changes to the curriculum

Key questions:
- Knowledge?
- Skills?
- Learning methods?

Content
Structure
Delivery

Learning Outcomes
Teaching and Learning Activities
Changes to the ChemE curriculum: Structure

- **Integrated format**
  - 1\textsuperscript{st} and 2\textsuperscript{nd} year
  - Topics linked with
    - Intended learning outcomes
    - Other subject knowledge along and across years

- **Module format**
  - 3\textsuperscript{rd} and 4\textsuperscript{th} year
  - Specialisation and research projects
New Structure

Year 1: Integrated Format

Year 2: Integrated Format

Year 3: Modular format

Year 4: Integrated Research Project

Specialization
New delivery approach

Student-centred instead of Tutor-centred

More of what they do and less of what we do

Problem sessions : Lectures
1 : 1
New delivery approach

Traditional Approach

- Lectures
- Plenary Lecture

Enquiry-Based Learning

- Laboratory Projects
- IT/Programming/Simulations/Practical Activities
- Problem Solving Sessions
- PASS sessions

e-learning (Virtual Learning Environment)

Personal Tutors
Peer mentoring scheme
Problem Solving Sessions

Encourage
  - Thinking – problem solving skills
  - Teamwork – discussing
  - Reflecting
  - Integrating

- Groups of 11-12 students
- Post Graduate facilitator per group
- One Academic 12 groups
- Question booklet
  - Closed and open
  - Integrating
  - Different levels of difficulty
EBL suite
Changes to the ChemE curriculum: Assessment

- Based on demonstration of learning outcomes
  - Individual components
    - demonstration of subject knowledge
    - demonstration of professional skills
    - Examinations and Self-assessments
  - Enquiry-based learning/Project based activities
    - Self-assessments
    - Peer-to-peer assessment
    - Group assessment
Outcomes

Evaluation: Year 1, Cohort 2006-07

- Monitoring attendance at PSS
- Feedback from students
  - Students' experience questionnaire
- Feedback from Staff and facilitators
Problem Solving Session
Attendance: Semester 1

![Bar chart showing attendance per problem session number. The total students in session and the semester 1 average (84%) are indicated.](image)
Performance vs PSS Attendance
Students' feedback: Problem Solving Sessions

What I like the most is....

“Teamwork”, “can discuss with friends”
“able to concentrate & consolidate what lectures have taught”
“questions are very useful to enhance my understanding”
“I do questions that I would not do on my own accord”
“getting others' perspective on questions”
“discussions”
“can get help if unsure about questions”
Students' feedback:
Problem Solving Sessions

What I do not like about the problem sessions is....

“Some demonstrators cannot help”!
“Crowded”
“Noisy”
“Early in the morning”!!
“Difficulty of some questions”
“Nothing”
General Staff's feedback

- Good exam performance
- Reduced wastage
- Deeper learning?
- More fun!
Outcomes

The story so far...

- Very high level of attendance
- High level of performance overall
- Good motivation
- Better working environment for both staff and students
Outlook

Some of the issues...

- EBL is resource intensive
  - Staff for Problem Solving Sessions
  - Training for facilitators
  - Enough Adequate spaces
- Staff buy-in and ownership
- Joint courses (timetable)
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