



Peer-Assisted Tutoring in Chemical Engineering: Development of a Tutor-Oriented Module

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Chemical & Bioprocess Engineering at UCD

- 4-year (8 semester) degree programme
- typically 35-40 graduates
- accredited
 - Engineers Ireland
 - IChemE (MEng level)
- strong emphasis on development of **problem-solving skills & effective team work**
 - ⇒ preparation for professional life, e.g.
 - Stage 2 Problem-based learning (PBL) project
 - Stage 4 Capstone Design Project (15-credits)



Basis for Peer-Assisted Learning in UCD

CHEN30020 Unit Operations

- 5-credit compulsory, lecture-based module
- Traditionally, 36 x 50-minute lectures per semester
- Principles & analysis of Chemical Engineering separation processes (e.g. Distillation, Evaporation, Liquid-Liquid Extraction, etc.)

Objective

- Developing student confidence in independently applying relevant principles
 - Worked solutions to exam questions?
 - Homework assignments?
 - Tutorials?
 - Peer-Assisted Tutorials?



Comparing PAL & PAT

PEER-ASSISTED LEARNING

(e.g. Bournemouth)

- 2nd Year Tutors : 1st Year Tutees
- Agenda set by **students**
- Content & outcomes confidential
- *Not* compulsory
- Typically, no homework

PEER-ASSISTED TUTORIALS

(UCD)

- 4th Year Tutors : 3rd year Tutees
- Agenda set by **lecturer**
- Tutors update Lecturer on *group* progress, problems
- *Not* compulsory, *but* marks awarded for attendance & participation
- Homework assignments, to be undertaken individually, for each session

But did it work...?????



**3rd Year Tutees, working with
4th Year Tutors during a
Unit Ops PAT
March 2009**

For the TUTEES.....

"It's great! It's a small group, so I can ask questions without feeling stupid. And I'm learning from what my classmates have to say."

"I like that we're working in a small group. I don't feel under pressure. But we're getting the problems done"

"I'd like to be a Tutor myself next year!"

Kieran P, O'Neill G (2009) AJPL



But did it work...?????



**4th Year Tutors
March 2009**

For the TUTORS.....

"I understand Unit Ops better now myself!"

"I'm getting better at nudging the students towards their own solutions."

"I can definitely see my group learning!"

"They worked hard to understand the problem. And there's a good rapport developing."

Kieran P, O'Neill G (2009) AJPL



Building from 2008-09.....

- Development of 5-credit, Tutor-oriented module
supported by NAIRTL grant

CHEN40430: Peer-Assisted Tutoring in Chemical Engineering

5-credit elective module for 4th Year students

- Tutors assigned (in pairs) to PAT group in **TWO** 3rd Year core modules
CHEN30020 Unit Operations (UO) **Patricia Kieran**
CHEN30160 Computational Methods (CM) **Dermot Malone**



Peer-Tutoring Module: Learning Outcomes

TUTOR Learning Outcomes

On successful completion of the CHEN40430 module, students (Tutors) should be able to:

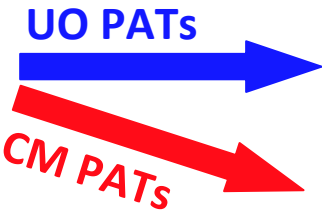
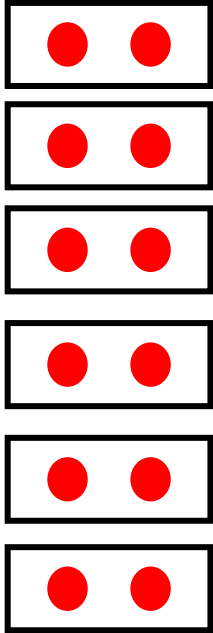
- Facilitate productive team work, in engineering contexts;
- Effectively communicate, and encourage student communication of engineering concepts;
- More confidently apply engineering concepts;
- Critically appraise personal and team performance.



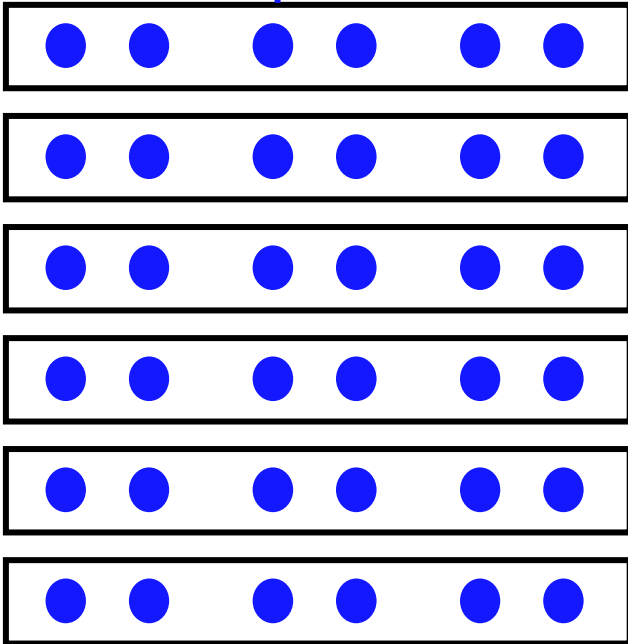
Peer-Tutoring Module: People Management

- Unit Operations:** Lecturer (PK) + post-grad Teaching Assistant
- Computational Methods:** Lecturer (DM) + post-grad Teaching Assistant
- Development & Training:** Geraldine O'Neill, Patricia Kieran, Dermot Malone
- 12 Tutors:** Applied, interviewed; minimum academic requirements

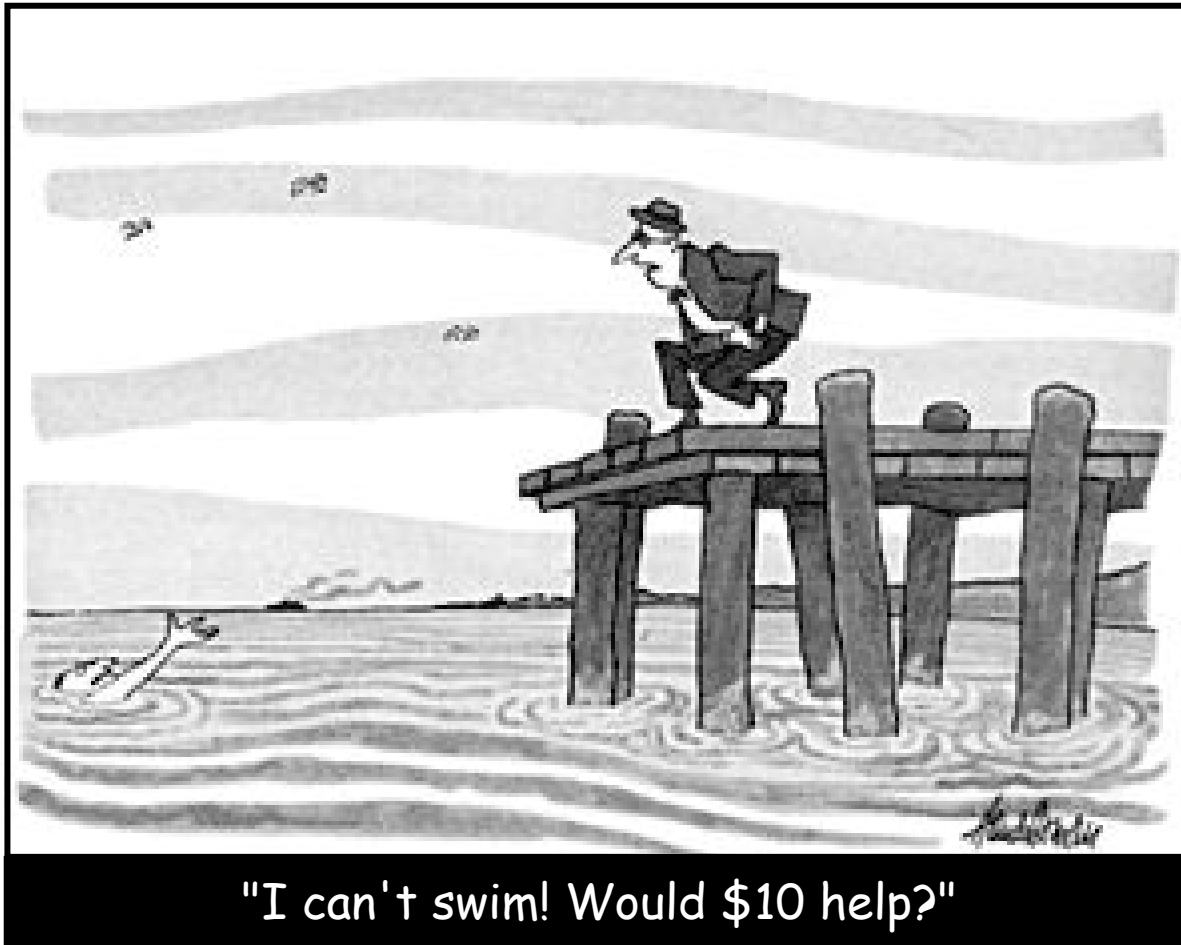
12 Tutors
6 Tutor Pairs



35 Tutees
6 Tutee Groups



Peer-Tutoring Module: Tutor Training





Peer-Tutoring Module: Tutor Training

- **Discipline-based PAT Content**
 - Unit Operations
 - Computational Methods
- **PAT Structures**
 - Unit Operations
 - Computational Methods
- **PAT Delivery & Evaluation**
 - Group Facilitation
 - Effective Questioning
 - Active Learning
 - Scholarship
 - Reflective Writing

Unit Operations PATs



- 1 hr/week
- Flat-format classroom
- Group around table
- PAT Groups
 - 5-6 Tutees
 - led by 2 Tutors
- Exam-style questions
- Distributed & discussed during class
- Finish for homework

Computational Methods PATs



- 2 hr/week
- Computer room
- Tutees in a row
- PAT Groups
 - 5-6 Tutees
 - 2 Tutors
- Lecturer leads session
- Alternating 'lecture' & 'implementation'
- Mid-session 'review'

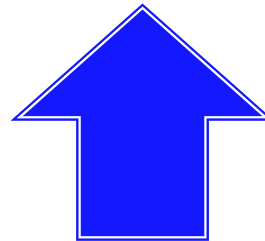


Peer-Tutoring Module: Tutor Assessment

Assessment		% of grade
Continuous assessment	Preparation for, attendance at & participation in assigned PATs	50
Continuous assessment	Short, online reporting on & appraisal of PATs, via 'Blackboard' Blogs	30
Assignment	Short, reflective, written report on personal experiences of PATs	20
Total		100

Report: Evidence-Based Reflection

Reflective Writing



PORTFOLIO OF EVIDENCE

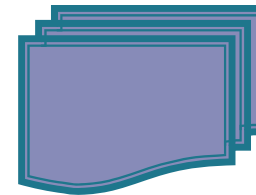
Blogs: *Personal
Reflections &
Reflective
Responses*



Tutee Feedback
Forms



Tutor-Partner
Observation Forms



Pedagogical
Literature



Module Evaluation - Tutor Feedback

Awareness of learning outcomes?	12/12	'very much'/'fully'		
Achieved learning outcomes?	12/12	'very much'/'fully'		
Modes of assessment supported achievement of learning outcomes?	12/12	'very much'/'fully'		
How useful was module for you?	12/12	'useful'/'very useful'		
If you knew in Sept what you know now, would you enrol in module?	10/12	'yes'	2/12	'maybe'
Would you recommend the module?	10/12	'yes'	2/12	'maybe'



Conclusions

- Successful introduction of module focussing on development of professionally-relevant, transferrable skills
- Potential for implementation in other disciplines
- Longitudinal study of Tutees & Tutors required
- Positive Tutor experiences:
Best aspects of the module? "Tandem self-development & Tutee-development"



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