Managing Teaching Innovations

The Development of the Strathclyde Teaching Clusters

Jim Boyle, Department of Mechanical Engineering, University of Strathclyde

Anderson's University

In 1796 John Anderson, Professor of Natural Philosophy in Glasgow University decided to form a second university in the city … to be a place of useful learning …

The Glasgow Mechanic's Institute

- In 1823 the University split to form the Glasgow Mechanic's Institute & Anderson's College
- By 1850 there were almost *four hundred* similar Mechanic's Institutes in the UK
- More than *six thousand* in the USA
- Nearly every major engineering school has its roots in a Mechanics' Institute

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The Royal College of Science & Technology

"… it is a college of pure and applied science of the highest university rank … producing a class of men for Professors of Applied Science such as can be found nowhere else in the world … and can give postgraduate work to the men from the Universities …"

King George V, 1912

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The University of Strathclyde

In 1964, the Royal College was granted the Royal Charter and became the University of Strathclyde

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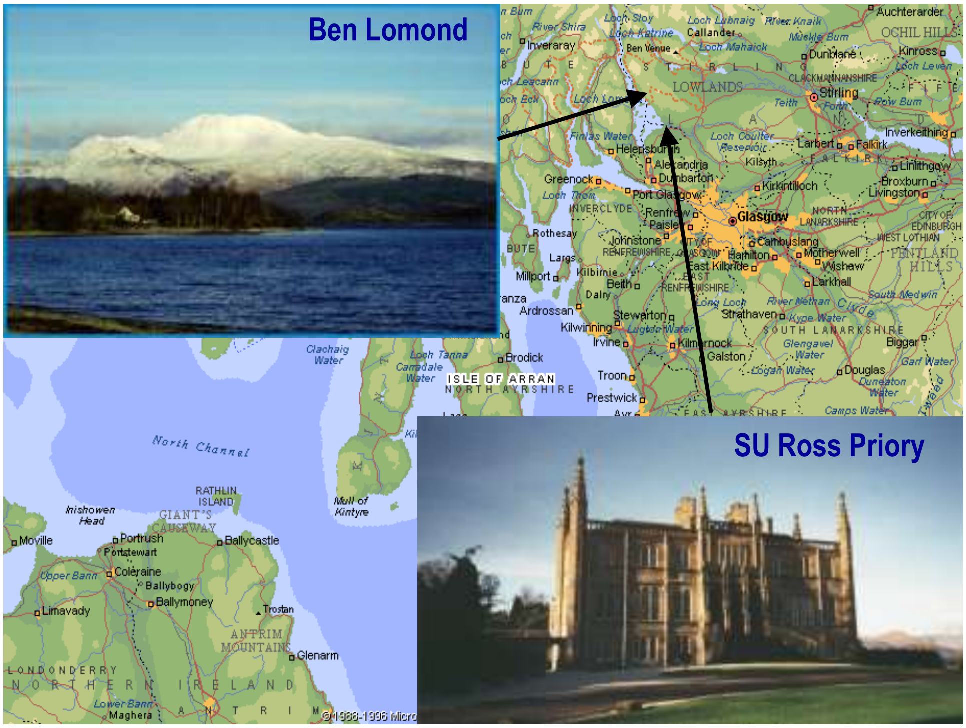
Ben Lomond
SU Ross Priory
North Channel
ISLE OF ARRAN
Glasgow
Stirling


MECHANICAL ENGINEERING
Arran
ISLE OF ARRAN
Glasgow
Stirling

The Strathclyde Teaching Clusters

MECHANICAL ENGINEERING

teams@mecheng.strath.ac.uk

Loch Eil Outward Bound Course

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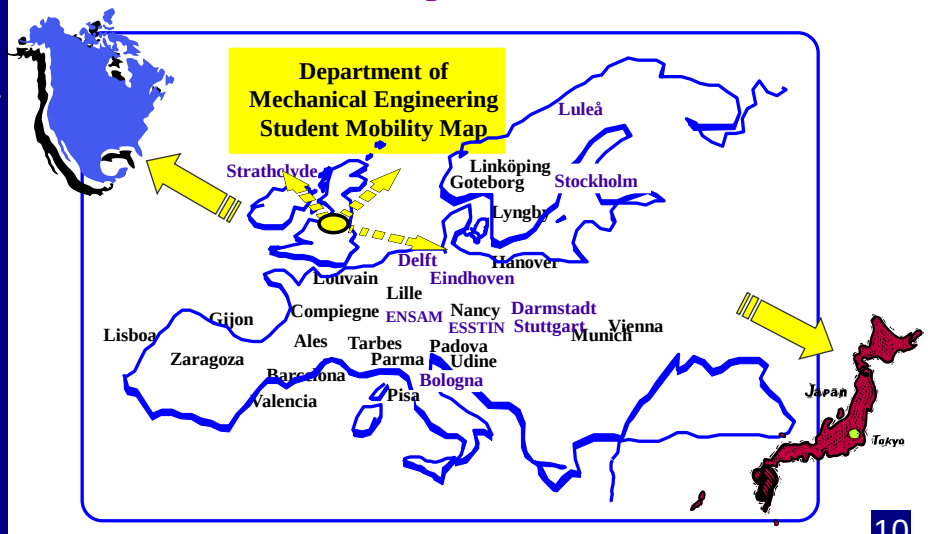
teams@mecheng.strath.ac.uk



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FORMULA STUDENT

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esa Student Parabolic Flight Campaign

European Space Agency

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Our Educational Philosophy

Student Centred

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But … A *Higher* Education?

"… they were not all learning what I wanted them to learn …"

"… inexplicable blunders from apparently bright students …"

"… one problem … lies in the presentation of the material ... it comes straight out of textbooks and/or lecture notes, giving students little incentive to attend class …"

"… students asked to distribute lecture notes in advance so they didn't need to spend time copying down notes ... so they could pay more attention to my lecture … then students complained that I was lecturing straight out of my lecture notes …!"

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But … A *Higher* Education?

"… we cover too much material and don't pay enough attention to helping students to reason inductively …"

"…there is very limited active thinking during a lecture …"

"… only exceptional lecturers are capable of holding the students attention for an entire lecture period …"

"… as I passed the lecture hall each day, I saw … the bored expressions on the faces of the students. The lecturer is one of our best …"

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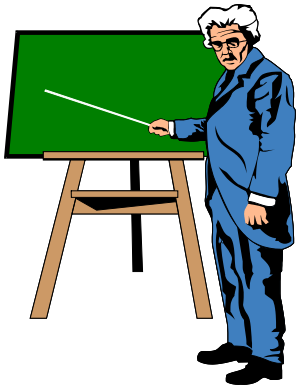
The Problem?

Chalk & Talk?



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Talk?
Active Collaborative Learning

talk 1 *v.* convey or exchange ideas or information … **2** *n.* conversation …. discussion

The Oxford English Dictionary

"…learning is the process whereby knowledge is created through the transformation of *experience*…"

D Kolb in "Experiential Learning"

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Chalk?
Learning Environments

How can *active learning* be enabled in a large class?

Use innovative teaching 'environments':

1. ***Problem-Based Learning***
2. ***The InterActive ClassRoom***
3. ***The Active Learning Studio***

"… for the computer to bring about a revolution in higher education, its introduction must be accompanied by improvements in our understanding of teaching and learning …"

Herbert Simon, Nobel Laureate

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1. Problem Based Learning

In the same way that students of medicine learn the workings of the human body through clinical dissection, engineering students can learn a great deal about engineering components by *mechanical dissection.*

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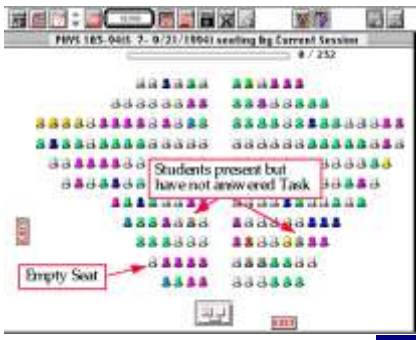
2. The InterActive ClassRooms

NATALIE

ClassTalk

"… *teaching by questioning*, commonly referred to as the *Socratic Method*, was the basis for **ClassTalk**

- a **networked software system** that facilitates the Socratic teacher by providing an effective way to manage an interactive class and involve every student …"



Louis Abrahamson, Better Education Inc.

The Strathclyde Teaching Clusters

ClassTalk -Benefits

*"...students chatted with each other, discussing answers. A swarm of wrong answers brings out sprinklings of **laughter**, applause or boos ..."*

*"... it made class **fun** ... I knew I wouldn't just be listening to a lecture but rather that I could actively participate in my learning ..."*

*"**... raised levels of creativity**... wonderful **chaos**..."*

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PRS - Why do you like that class?

*" ... with 100 people in the class you normally just sit there without being involved... and add to your notes. In that class **everybody's involved**, you have to think about what's being said...you have to stay awake...**but it's more fun**, you get more from it...better than just sitting taking notes..."*

*"... what **fun** it can be, it can be **light-hearted** yet you still learn a lot ..."*

*"... **how quickly a two-hour class passed compared to other one hour lecture classes**..."*

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Classroom Feedback Systems

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3. Studio Teaching

The Strathclyde *Active Learning Studio* is a copy of the Rensselaer Polytechnic Institute studio model.

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Studio Teaching - 1

"What is so special about RPI's **studio model**?

Why is it not just another "neat" application of technology, one of a panoply of examples of how faculty are using technology in instruction? Why is it perhaps the most important model of on-campus, technology-mediated instruction in the U.S.? Simple …"

Jack M Wilson,
Rensselaer Polytechnic Institute (RPI)
(Now President of UMass)

An Active-Learning Environment

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Studio Teaching - 2

"Most technology-mediated learning environments illustrate possible solutions to higher education's problems - some increase **access** (e.g., distance learning and networked resources) and some improve **quality** (e.g., multimedia, interactive learning applications) but **few control costs**. At R.P.I faculty contact hours are reduced by up to 20%!"

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RPI Studios - 1

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RPI Studios - 2

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RPI Studios - 3

The Future – Web Connections

- Next Generation Studio
- The Virtual Studio
- Just in Time Teaching

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Managing Innovation

- **Education in transition**
- **Where are we now?**
- **Management for change**

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Education in Transition

"… it is a time of change, and indeed a time for change … how should education respond? … there is no magic bullet … it is a time that calls for experimentation…

… above all, we must remain dedicated to providing a rich experience for our students - challenging them, teaching them to think, to create and to understand excellence …"

Charles M Vest, President of M.I.T in an address to the National Academy of Engineering, 1995

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Where are We Now? The Stages of Transition

- **Cottage industry: the entrepreneurs**
- **The beginnings of real reform**
- **Transformational change**

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The Beginnings: 1989

"… the biggest and most long-lasting reform of undergraduate education will come when small groups of instructors adopt the view of themselves as reformers within their immediate sphere of influence, the classes they teach every day …"

Patricia Cross: *Reforming undergraduate education one class at a time*, 1989

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Transformational Change

- **The promise of 'e-learning'**
  - Not technology, but the first *real* opportunity for transformation in teaching & learning in mass higher education
- **Is your institution ready?**
- **Are your staff ready?**

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Is your institution ready?

- **Does the institution want to increase academic productivity?**
- **Are leaders committed to e-learning?**
- **Is computing firmly integrated into the institutional culture?**
- **Does the institution have a mature IT support structure?**
- **Does the institution have a demonstrated commitment to learner-centred education?**

Carol Twigg: *Improving Learning & Reducing Costs: Redesigning Large-Enrolment Courses Improving Learning & Reducing Costs: Redesigning Large-Enrolment Courses,* Pew LTP, 1999

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Are your staff ready?

- **Are staff familiar with e-learning concepts and practice?**
- **Is there effective partnership between academics, IT staff and administrators?**
- **Is there scope for substitution of capital for labour?**
- **Are staff willing to use learning materials from outside?**
- **Do you have the requisite skills – or can you buy them?**
- **Have you thought through the pedagogic implications?**

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Management for Change

- **Active leadership**
  - Give up control and aim for influence
  - 'Cognitive complexity'
- **Engage academics**
  - Study your campus like a work of art
  - 'Interpretative strategy'

Robert Birnbaum: *How Academic Leadership Works*. Jossey-Bass, 1992.

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Active Leadership

- **Make good teaching a leadership priority**
- **Become a partner in the venture**
- **Have faculty lead the change**
- **Put your money where the rhetoric is**
- **Reward good teaching in ways that matter**
- **Make good teaching an institutional responsibility**
- **Make teaching ability a criterion for hiring**

Madeline Greene: In *How Administrators Can Improve Teaching*. Jossey-Bass, 1990

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Engage Academics

- **Accept the challenge to tradition**
  - Traditional roles
  - Autonomy
- **Know your staff**
  - Entrepreneurs
  - Risk aversive
  - Reward seeker
  - Reluctant
- **Make it fun!**

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Education in Transition

" … university teaching should see the severest attenuation of the formal lecture, if not its total abandonment. The formal lecture is a refuge for the faint hearted, both lecturer and students …"

R Barnet: "Realizing the University in an Age of Supercomplexity", 2000