Evidence-based practice in teaching

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Research
- Evidence based
- Build on work of others
- Create knowledge
- Progress subject

Postgraduate
- Active engagement
- Enquiry and problem-based
- Ownership of learning

Teaching
- Age old model
- Ignore research evidence generated by others
- Based on previous experience, anecdote
Why should we change our approach?
Can we use research evidence to inform curriculum development and pedagogy?
The employable graduate

Subject knowledge

Problem solving, communication, team work, time management, handling data, etc

Professionalism, creativity, entrepreneurial, global
Building on research evidence

What does 21st Century pedagogy look like?
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I bring my laptop to class, but I'm not working on class stuff.
What does 21st Century pedagogy look like?
Have things changed?
Does it work?
The drive to innovate

• make changes in something established, especially by introducing new methods, ideas, or products
What about impact?

• ‘Evaluation of teaching’
• Did it work? How do we evaluate?
  – For who?
  – Happy sheets?
  – Questionable data
  – The Hawthorn effect
Research evidence vs evaluation

- Quality and quantity of data
- Identify meaningful learning gains
- Understand how students learn
- Attitudes, aspirations, experiences
- Collect valid, reliable, transferable evidence
- Evidence informed innovation and change

http://ctsi.psu.edu/
Law of Gravity!

Oranges also follow the law of Gravity!

High Impact Paper

Low Impact Paper
Some examples relevant to STEM
Cognitive load in learning science

Cognitive load in the lab


Cognitive load in the lecture


Pre-lectures

- Remove lecture time
- Replace with background reading
- Improved exam results
- Loss of correlation with previous background
Active learning


They must **read, write, discuss, or be engaged in solving problems**.....to be **actively involved**, students must engage in such **higher-order thinking** tasks as analysis, synthesis...strategies promoting active learning be defined as instructional activities involving students in doing things and thinking about what

...leads to **better student** writing......surpasses traditional lectures for retention of material, motivating students for further study and developing thinking skills
• **Context-based learning**
  – Enhanced motivation and attitudes

• **E/Inquiry-based learning**
  – Deep learning, research skills, nature of science, transferable skills

• **Problem-based learning**
  – Deep learning, motivation, research skills, interdisciplinarity, range of skills
Why Minimal Guidance During Instruction Does Not Work: An Analysis of the Failure of Constructivist, Discovery, Problem-Based, Experiential, and Inquiry-Based Teaching

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Design, Implementation, and Evaluation of a Flipped Format General Chemistry Course

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capacity for multitasking and distraction when using laptops. The present research suggests that even when laptops are used solely to take notes, they may still be impairing learning because their use results in shallower processing. In three studies, we found that students who took notes on laptops performed worse on conceptual questions than students who took notes longhand. We show that whereas taking more notes can be beneficial, laptop note takers’ tendency to transcribe lectures verbatim rather than processing information and reframing it in their own words is detrimental to learning.
So why?
How do we embed in practice?

- Promote and disseminate meaningful evidence
- Lead by example
- Mentoring, support, training
- Link to graduate employability
- Use students as advocates
- Student representation
- Peer observation/assessment
- Define professional standards
- Preparation for honours and PhD
- Criteria for reward, recognition, promotion
How do we get there?

KEEP CALM AND JOIN THE REVOLUTION!
Thank you for listening

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