Lectures and the transition to university

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Acknowledgements: the roughly 2000 first-year students who've helped me to find out what doesn't work.

This is not a lecture.

Exercise for the audience: **why not?**

What is an effective maths lecture?

An effective lecture enables (encourages? cultivates? inspires?) further **meaningful mathematical activity** by the students.

- Roles: communicating, modelling, motivating.
- Integration with lecture–homework–tutorial cycle.
- Lectures are where learning starts. [Mason 2002; Pritchard 2010]

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Suggestive observations...

- Attendance correlates with performance — supplying alternatives can backfire. [Cretchley 2005; Inglis *et al.* 2011]
- For many students, the 'further activity' is what's lacking. [HEPI 2012]

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A useful idea: **didactic contracts**. [Mason 2002]

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This is not new:

... just as in playing ball it is necessary for the catcher to adapt his movements to those of the thrower and to be actively in accord with him, so with discourses, there is **a certain accord between the speaker and the hearer, if each is heedful of his obligation**. [Plutarch, c. 100 CE]

Some malfunctional contracts

- "I was good at maths at school."
  - Maths is about carrying out **procedures** efficiently.
  - Motivation depends on regular **affirmation** of success.
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  - Learning is **passive**, and it's the teacher's responsibility.
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- "What's the point of lectures anyway?"
  - All "real" applications take place in groups/online etc.
  - Thus all "real" learning takes place in groups/online etc.
  - Lectures are **strange** and must therefore be useless — just like mathematicians?

Breach of contract

What happens when students' and lecturers' expectations don't coincide? All too often:

- stubborn persistence with **ineffective study strategies**;
- **anxiety**, avoidance, and self-handicapping;
- a sense of **betrayal**; rebellion and revenge.

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Some symptoms (complaints from evaluation forms):

- "The lecturer makes maths seem academic."
- "Time was spent on examples not needed in the exam."
- "Having skipped some of the lectures I found it hard to find information in the notes."

What can we do about this? General suggestions

- Find what works for you together with your students.
  - Not everyone teaches well in the same way.
  - Different classes/cohorts may respond very differently.
  - Be prepared to sense the mood and react to it (live).
  - Identify your students' **expectations**
    — to accommodate *and* **challenge** them!
    - Do learners know best? [Kirschner & van Merriënboer 2013]
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    - Transition as a rite of passage? [Clark & Lovric 2008]
- Don't plan lectures: plan a course involving lectures.
  - Lectures should show students **what maths is**, not just show them maths.
  - Starting points need to be quickly followed up
    — perhaps in class, and certainly beyond.
  - Tell students how to use lectures. [Plutarch; Alcock 2012]

What can we do about this? Specific suggestions

- Do maths **live** in class — and take risks. [Körner 2013]
  - **Humanise** the **process** of doing maths. [Wood *et al.* 2007]
  - Give **comments** as well as content (blue/black pen?)
  - But beware of the "tyranny of examples" ...

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- Decide on the role of **note-taking**.
  - Long-hand note-taking helps. [Mueller & Oppenheimer 2014]
  - But: many students struggle to read (or write) mathematics. [Shepherd *et al.* 2012; Inglis & Alcock 2012]
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- Explicitly **link** lectures to tutorials and homework.
- Use your **authority** (not *just* classroom management).
  - Expectations: courtesy, organisation, focus.
  - Can give students "mandate to interact". [Yoon *et al.* 2011]

Why wasn't this like a maths lecture?

Any thoughts?

Why wasn't this like a maths lecture?

Some major differences:

- Different **contract** between speaker and audience.
  - Totally different **authority** relationship.
  - Novices vs experts?
- No **follow-up** (homework, tutorials, further lectures...)
- No **modelling** component.
  - Talking about teaching $\neq$ actually teaching.
  - Not doing maths live (or taking risks?)

However —

- Like any lecture, this may provide a **starting point**...

References and further reading

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