Active Learning in STEM Foundation Year Maths Lectures

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Main advice and recommendations

- Read *Tilting the Classroom* by Dr. Lara Alcock
  - A must read for any lecturer
  - Google it, or go to `www.lovkush.com/tilting.pdf`
- Do try making your lectures more active
  - It is possible
  - Students say they like it
  - Start small. Small thing in all lectures vs. big thing in a few
- Please start a discussion (with me or anybody else)
  - We can help each other
  - Feedback on this talk
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Challenges

Challenges I am currently thinking about. Any improvement in these should have a big impact. Talk to or email me if you have any ideas or are interested.

1. Preventing a student from falling behind
2. Helping a student who has fallen behind
3. Achieving long-term learning
4. Student organisation, punctuality, etc.

1. Questions throughout. What and why

- What?
  - I ask students to attempt questions throughout the lecture
    - I do a question then they attempt a similar one
    - True/false questions
    - 'Self-explanation' tasks (highly recommended)
- Why?
  - Cannot learn mathematics, nor most things, passively
  - Feels absurd not to. Compare with other skills:
    - Violin lesson
    - Do not touch a violin
    - Watch the teacher play and talk about playing
    - Obviously awful

1. Questions throughout. Review

- Good
  - Students do attempt the questions, unless they've fallen too far behind
  - Can use downtime flexibly, e.g. observe students, check for dodgy card-swiping, etc.
- Bad
  - Less content per lecture
    - Use assessments to introduce new content
    - If not possible, there is too much content
  - Harder to judge timing of the lecture
    - How much time students need to answer a question
    - Judgement improves with practice
- Student feedback
  - Majority like this.
  - 42 positive comments, 9 neutral/blank, 2 negative.

1. Questions throughout. Advice

- Provide adequate time. ‘It will feel like an age’
- Starting point: true/false question every 10 minutes
- Starting point: one ‘self-explanation’ task per lecture
- Etc. (ask me for more)

2. Student interaction. What and why

- What?
  - Asked for thumbs up/down for binary questions
  - Directly asked individual students
    - Clarified that saying 'I don't know' or 'I don't want to' is fine
- Why?
  - To see if directly asking a student is possible
  - To learn what students have or have not understood

2. Student interaction. Review

- Good
  - Vast majority of students did interact in both formats
  - I get better understanding of students' knowledge/abilities
- Bad
  - Asking students directly causes stress to some students
  - I did not notice anything bad about thumbs up/down
- Student feedback
  - Asking directly: mixed response. 20, 5, 18.
  - Thumbs up/down. I did not ask about this.

2. Student interaction. Advice

- Starting point: true/false question every 10 minutes with thumbs up/down
- Asking students individually
  - I think it's worth doing a few times in whole module

3. Provide gappy lecture notes. What and why

- What?
  - Printed lecture notes given to students
  - Gaps interspersed, which students should fill-in
- Why?
  - Reduce time/effort spent taking notes
  - Increase time/effort spent listening to me
  - Increase time for activities, e.g. questions throughout, student interaction

3. Provide gappy lecture notes. Review

- Good
  - Intentions were met
- Bad
  - Large time to produce notes, but same as creating slides
  - Students get less experience taking notes, but is this bad?
- Student feedback.
  - Majority liked this
  - 52, 1, 0

3. Provide gappy lecture notes. Advice

- Highly recommended
- Should certain information be included or be a gap? Default: included

4. Document camera. What and why

- What?
  - Use the document-camera or visualiser
  - Work through the lecture notes I gave the students
- Why?
  - Maths is better taught live, rather than on slides
  - Avoids the disadvantages of whiteboards/blackboards

4. Document camera. Review

- Good
  - Panopto can record it
  - Face the audience more
  - Easier to point to information
  - Easier to read than whiteboard/blackboards
  - Can switch between visualiser and computer screen easily
- Bad
  - Total information on display is less than whiteboards
  - A colleague: 'It's weird seeing your hand projected'

- Student feedback.
  - Didn't ask about this

4. Document camera. Advice

- Make use of it
- (Not necessarily all the time, depends on your subject)
- Don't forget to click the record button on panopto!

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