

Active learning and e-assessment in STEM Foundation Year Maths

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About me

- ▶ Leeds, Pure maths. Leicester, FY Maths.
- ▶ Hopes from giving this talk
 - ▶ I say something useful...
 - ▶ Make connections. Help each other. Please talk to/email me!

Main suggestions or ideas

- ▶ Highly recommended reading. A must-read for lecturers.
 - ▶ *Tilting the classroom*, by Alcock
 - ▶ *Ideas from Mathematics Education*, by Alcock and Simpson
- ▶ Don't need big/dramatic changes. Start small
 - ▶ Active lectures: add a true/false question every 15 minutes
 - ▶ Numbas e-assessment: unassessed revision questions

Lectures. Asking questions throughout. How, why

- ▶ How do I ask questions?
 - ▶ Warm-up questions at the start
 - ▶ I do a question then they attempt a similar one
 - ▶ True/false questions
 - ▶ 'Self-explanation' tasks (highly recommended)
 - ▶ Timing: 30% to 40% of lecture is them doing questions
- ▶ Why?
 - ▶ Cannot learn mathematics passively
 - ▶ Compare with other skills:
 - ▶ Dance class
 - ▶ Stay seated whole time
 - ▶ Watch the teacher dance and talk about dancing
 - ▶ Obviously awful
 - ▶ Is it the same for maths?

Lectures. Asking questions throughout. Advice

- ▶ Provide adequate time. 'It will feel like an age'
- ▶ There will be less content per lecture
 - ▶ Use assessments to introduce new content
- ▶ Starting point: true/false question every 15 minutes
- ▶ Starting point: one 'self-explanation' task per lecture

Lectures. Other.

- ▶ Interaction: directly asked individuals, thumbs up/down
 - ▶ Thumbs up for thumbs, directly asking possible but risky
 - ▶ More for your benefit than theirs
- ▶ Provided printed notes, with gaps interspersed for activities
 - ▶ Thumbs up!
- ▶ Used data projector/visualiser/document camera
 - ▶ Thumbs up! Can be recorded by lecture capture systems

I have skipped over lots of nuance and detail, so please ask if you're interested.

Numbas e-assessment. What is it?

- ▶ “Really versatile maths e-assessment”
- ▶ Created by people at the University of Newcastle
- ▶ Live demo: <https://numbas.mathcentre.ac.uk/numbas-previews/exam-38607-demo/index.html>

Numbas e-assessment. How do we use it?

- ▶ ~80% of coursework
- ▶ Each week, an assessment is made available
- ▶ Unlimited attempts, only maximum mark counts
- ▶ One deadline for all assessments: the weekend before exams
- ▶ Boost: if $>80\%$ in an assessment, we give them 100%
- ▶ Include two/three questions from previous assessments in current week's assessment

Numbas e-assessment. Review

- ▶ Overall, highly positive
 - ▶ No marking, provides instant feedback, integrates with VLEs, it's free,...
 - ▶ Many students do make multiple attempts
 - ▶ Majority of students do aim for 80%
- ▶ Negatives
 - ▶ Up front cost in time and effort
 - ▶ No feedback on written work/explanation
 - ▶ Some students did leave work till last minute

Numbas e-assessment. Advice

- ▶ Worth using NUMBAS e-assessment
 - ▶ More important though: what you ask vs. how you ask
- ▶ Start small
 - ▶ Zero stakes practice questions
 - ▶ Use other people's questions
- ▶ The boost with unlimited attempt seems like good incentive
- ▶ Including previous questions seems like a good idea