To keep up
or to fall behind and catch up later?

Study patterns
and how we support our students

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IMPERIAL
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Mech Eng undergraduate learning activities

Lectures

Tutorials

Labs

Workshop

Writing lab reports

Design projects

Independent study

A module that I teach – first year maths for mechanical engineers

- Lectures and tutorials - autumn and spring term
- Revision and exams - summer term

A module that I teach – first year maths for mechanical engineers

- Lectures and tutorials - autumn and spring term
- Revision and exams - summer term
- **Coursework deadlines from OTHER MODULES get prioritised over maths lectures and tutorials**
- Students stop attending maths lectures or stop attending the tutorials
- **Students fall behind, they catch up later in the holidays without support of tutors or other students**

The ‘problem’– 4 study patterns

	1 Synchronous			
Lectures and lecture content	Keeps up			
Tutorials and problem sheets	Keeps up			

The ‘problem’– 4 study patterns

	1 Synchronous	2 Semi-synchronous		
Lectures and lecture content	Keeps up	Keeps up		
Tutorials and problem sheets	Keeps up	Falls behind, catches up later (in the holidays)		

The ‘problem’– 4 study patterns

	1 Synchronous	2 Semi-synchronous	3 Asynchronous	
Lectures and lecture content	Keeps up	Keeps up	Falls behind, catches up later (in the holidays)	
Tutorials and problem sheets	Keeps up	Falls behind, catches up later (in the holidays)	Falls behind, catches up later (in the holidays)	

The ‘problem’– 4 study patterns

	1 Synchronous	2 Semi-synchronous	3 Asynchronous	4 Not engaged
Lectures and lecture content	Keeps up	Keeps up	Falls behind, catches up later (in the holidays)	Falls behind, does not catch up
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MEd research project

Explore what **motivates** first year Mechanical Engineering students at Imperial to keep up or fall behind with their maths at the end of spring term?

I hoped to implement changes to my teaching to motivate more students to study synchronously (keep up)

Expectancy-value theory (applied to learning activities)

- The individual appraises

  To what extent they **expect** the activity will be **successful**

  To what extent they **value** the activity

- Determines motivation

What my research told me

- Our students **value** a wide range of aspects of learning maths

Prerequisite for other modules on the course

Solving problem sheets

Passing exams

What my research told me

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Prerequisite for other modules on the course

Acquiring knowledge, skills and understanding

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Passing exams

Application to engineering and the real world

What my research told me

- Our students **value** a wide range of aspects of learning maths

Prerequisite for other modules on the course

Acquiring knowledge, skills and understanding

New and beautiful mathematics

Solving problem sheets

Passing exams

Application to engineering and the real world

Becoming an engineer

What my research didn’t tell me

- How to motivate students to keep up
- How to stop students falling behind

What I realised

- Learning well = happy learners, teaching well = happy teachers

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Short term fix

- Teachers need to reframe ‘falling behind’

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Long term fix – 20(?) years away

- AI tutor-bots: on-demand bespoke 1-1 support for asynchronous studiers

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In conclusion

My problem

- How to ensure Mechanical Engineering first years keep up with their maths
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My solution

- Let it go
- Short term (< 20 years): reframe ‘falling behind’ as ‘asynchronous learning’
- Long term (20 years +): AI tutor-bots for on-demand bespoke 1-1 support

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My suggestions to teachers

- Embrace the asynchronous learners equally
- Survey your students, ask ‘what do you value about learning XXX?’

Thank you for listening