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Online Assessment & Feedback:

How to square the circle

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The Problem

- Level 2 Mathematics:
  - over 400 students
  - 8 modules
  - each week 80 tutorial groups meeting
- Level 1 Mathematics:
  - over 700 students
  - 4 modules
  - each week 50 tutorial groups meeting

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The Problem

- Not enough feedback to students
  - Level 1 (Maths 1R):
    - **4 workshops**
    - **One class test**
  - Level 2:
    - **Only a single piece of work with 3-4 questions (the Class Test) was marked and returned**
  - Plenty of formative assessment, but limited opportunity for feedback

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The Problem

Feedback given had no demonstrable positive effect:

- Class tests returned near end of semester
- Poor attendance during class test weeks
- Class test disrupted learning; students disengaged with course

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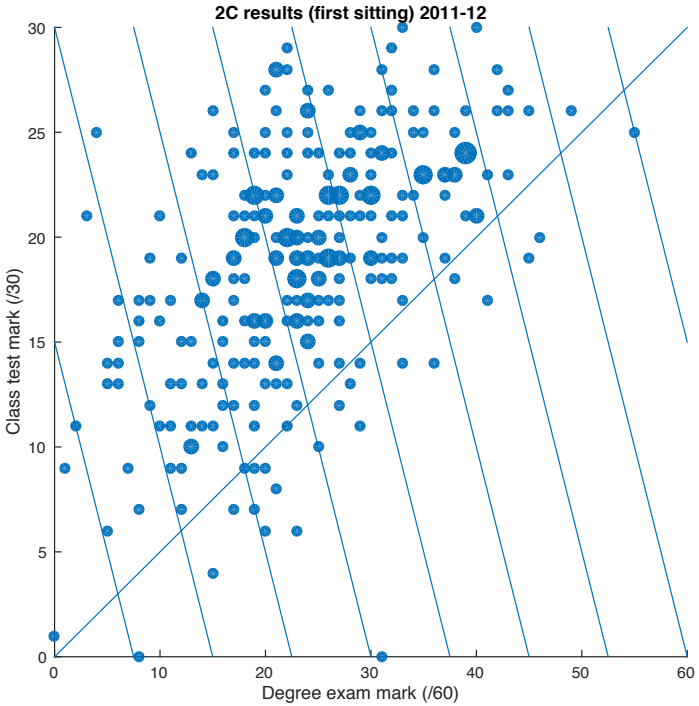
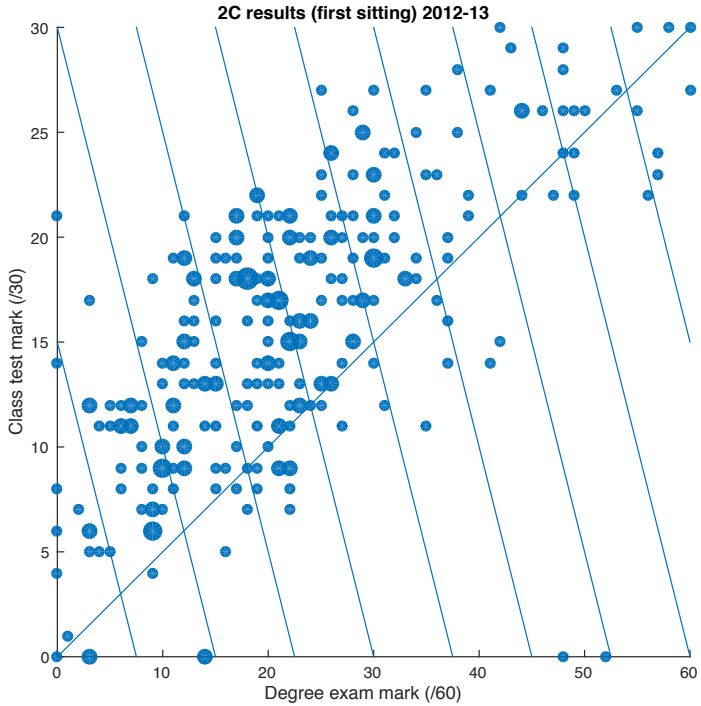
The Problem: No positive effect from class test





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The Solution: Increasing feedback, not workload

- Over 2,000 individually assessed pieces of work per week
- Integration of technology and assessment:
  - e-assessment software: WebAssign
  - Scanning technology: written assignments
- Efficiencies: team work
  - School office
  - IT
  - Academic staff

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The Solution: Efficient teamwork

	Course Head	Lecturers	Tutors	Markers (2B and 2F)	Office	IT	Students
Monday	Check whether any announcements are needed for the week. (2B) Post solutions for sheet $n-1$ and new exercise sheet n at 12pm.		Attend tutorials, (2ABFP).	Submit marked feedback exercises (2B or 2F) by 4pm.	After marking is returned, notify IT that scripts are ready for scanning. Pass information on total number of submissions and marking allocation to IT.	Upload 2A, 2B WebAssign results to Sharepoint.	Attend tutorials. WebAssign 2A (deadline 3am).
Tuesday	Upon notification by IT, make visible the access to feedback on Moodle, forum announcement for students.	Deliver lectures (2A and 2F).			Photocopy relevant feedback exercise sheet for distribution to 2B or 2F lecturers.	Scanning. Upload `.pdf` feedback to Moodle, upload completed grading worksheet to Moodle, upload marks to Sharepoint. Notify completion, send raw data (with marker initials) to course head.	Attend lectures.
Wednesday	Post feedback exercise at 12pm (one week before deadline). Reveal solutions to the submitted feedback exercise at 3pm (sharp).	Deliver lectures (2B 2P). Distribute feedback ex cise forms (2B), spares t submission cabinet.			Collect feedback exercises (3pm deadline). Allocate marking, notify markers for collection.		Attend lectures. Submit feedback exercise (2B or 2F).

Office

After marking is returned, notify IT that scripts are ready for scanning. Pass information on total number of submissions and marking allocation to IT.

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The Solution: Live SharePoint database

studentID	name	fb1	fb2	fb3	fb4	wa1	wa2	wa3	wa4	wa5	wa6	wa7	wa8	wa9	wa10	degree mark (out of 60)	Comments
Count= 431																	
[redacted]		19	20	12			100	96.5	98.831	75.625	80	85.9895	59.5	79.64	60.125	37	
[redacted]		17	11	15		81.5	76.5	86.5	61.4135	84.75			90	66.18	43.62	34	
[redacted]	*** Unenrolled	20					76.9										
[redacted]				6	7	71.25	56	56.5		26.888	50			33		30	
[redacted]		18	19	20	20	89.5	70.5	79	94.1655	93	100	91.143	79.5	96.5	97.2105	50	
[redacted]		17	15	17	14	81.831	90	100	93.0035	30	94.75		93	95.919	68.001	44	
[redacted]		13			8	63.8615	78.3345	46	58.161	38.032	64.375	65.419	69.5	69.04	36.1625		Medical
[redacted]		12	11			78.0845		69	73.169			21.8245	63		34.775	21	
[redacted]		16		12		68.25	89.5	86.5	60.669	50	100	75.41				31	
[redacted]		20	11	15		77.75	94.75	96.5	81.8345	93	96.5	47.312	72.5	56.2335	39.7	42	Medical
[redacted]		15		13	16	78	63.4	56	78.2445	38.506	89.125	67.621	72.5	69.82	54.863	46	Medical
[redacted]		18	12	17	6	83	80.75	73	79.7475	71.494	86.5	86.68	63	67.216		28	
[redacted]		11	19	17	13	93	84.1345	76	78.7455	86	83	87.051	86.5	94.826	46.193	42	
[redacted]		9	10	15			86	49.5	81.581		96.5	80.18	79	89.279	17.95	39	

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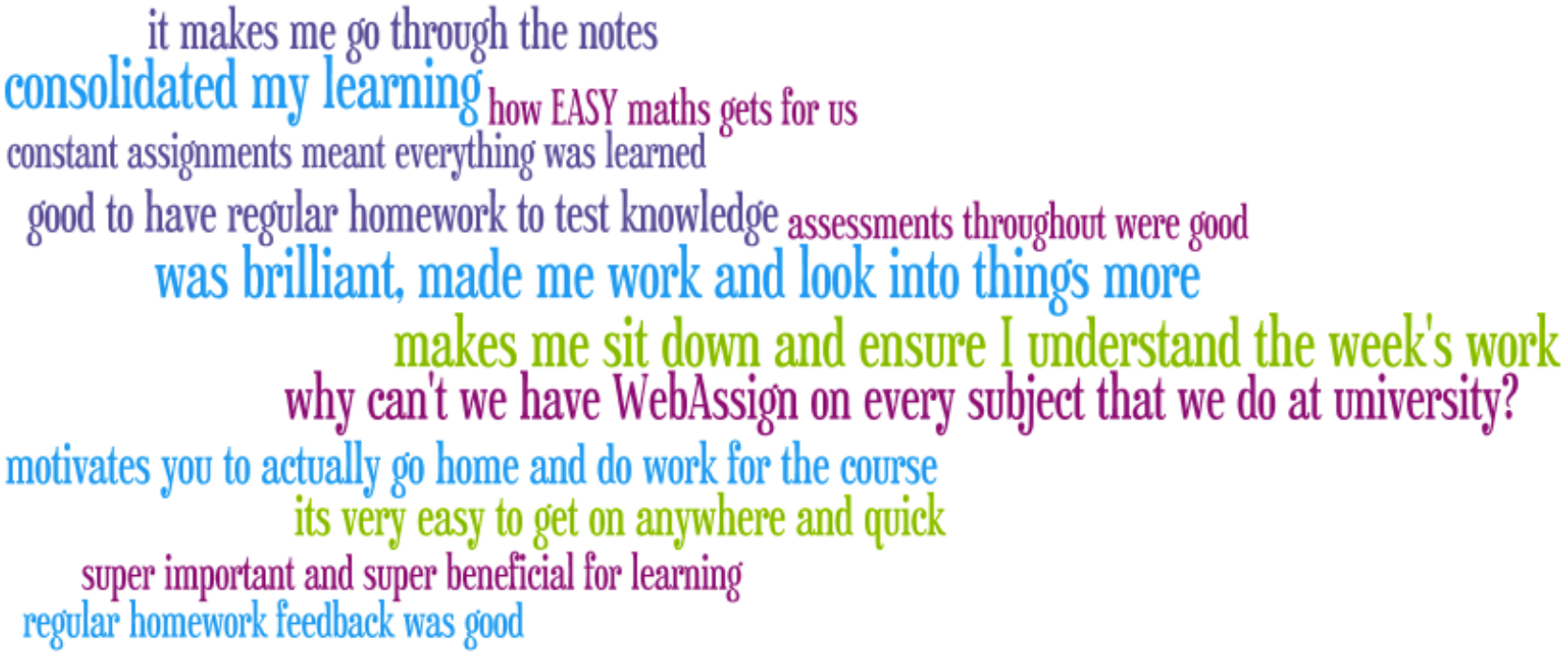
The Results: What our students say



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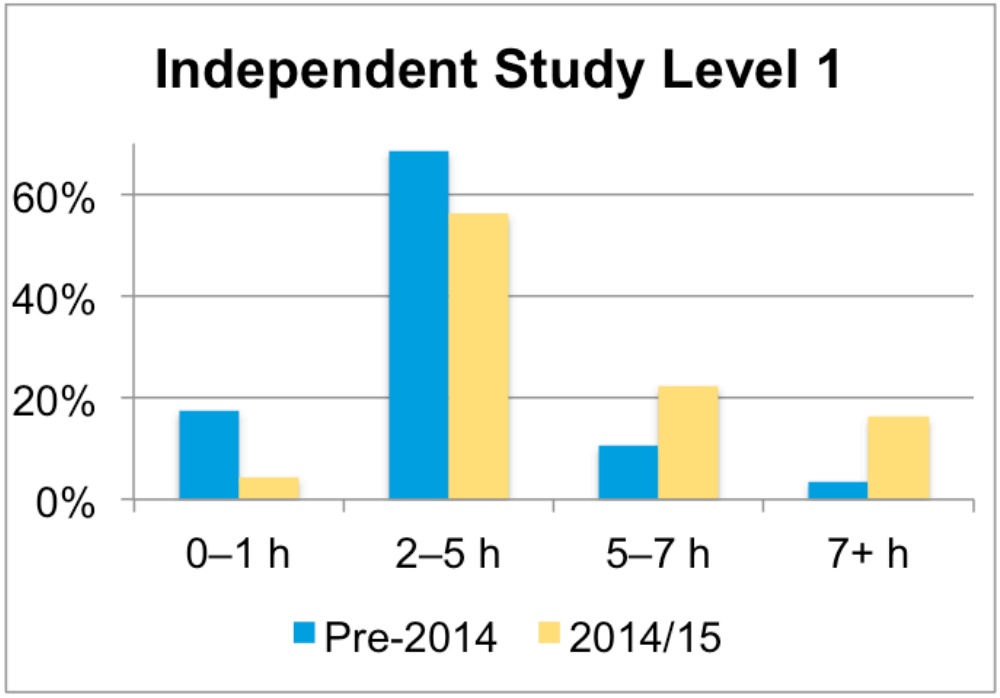
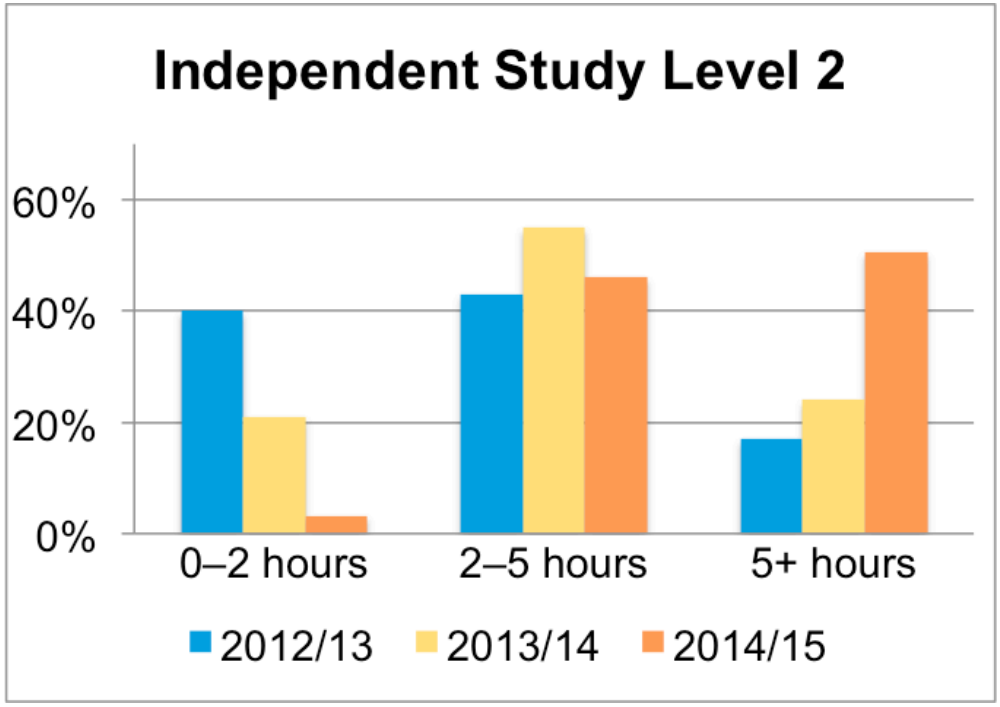
The Results: Time-on-task





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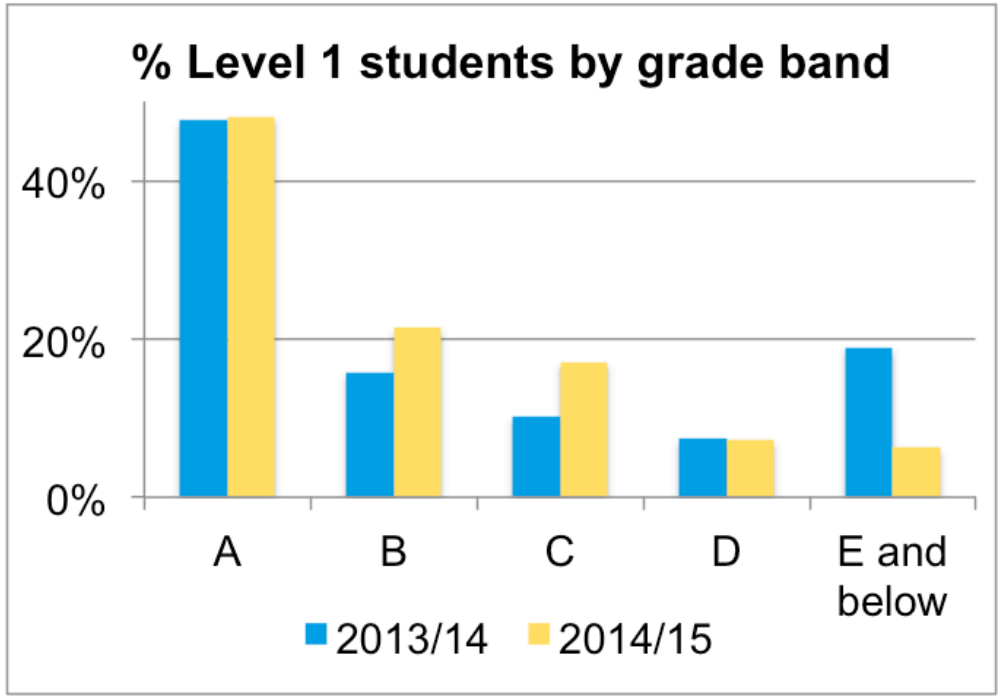
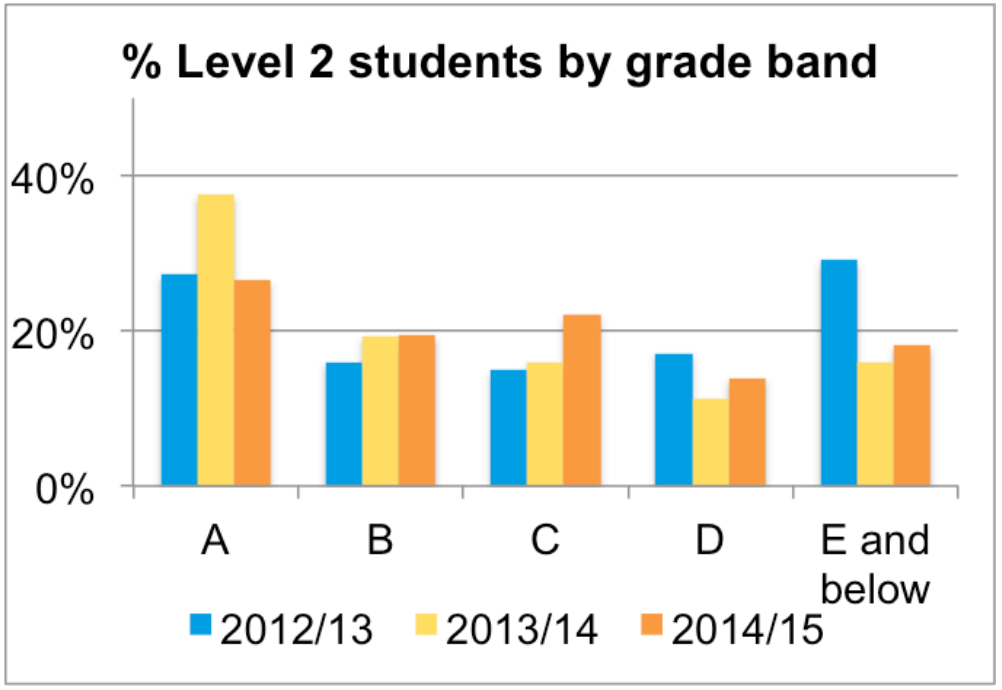
The Results: Student grades





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New in Level 1: ‘just-in-time’ teaching philosophy

‘provide[s] a good way to understand the parts of the course that need more care when delivered to students, and to better shape tutorials.’

Level 1 Lecturer & Tutor

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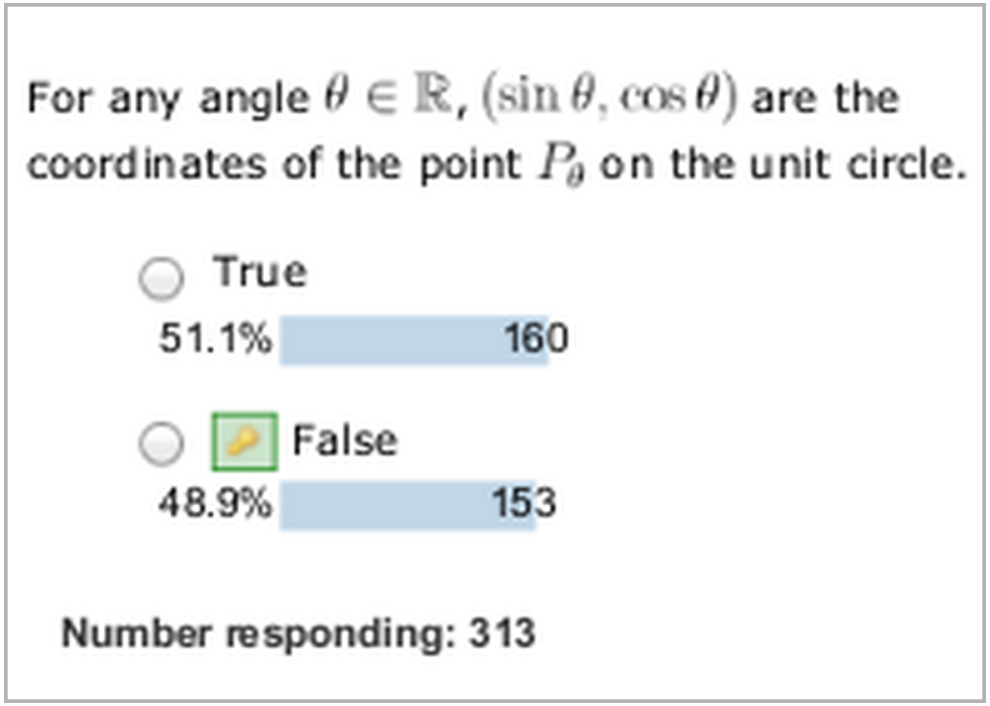
New in Level 1: ‘just-in-time’ teaching philosophy

Monday

- short online T/F quiz completed
- questions designed to
  - foster conceptual change
  - highlight concepts students may be struggling with
  - encourage student-student & student-faculty interactions



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New in Level 1: ‘just-in-time’ teaching philosophy

Feedback

- Q18 (false) *For any real angle θ, (sinθ, cosθ) are the coordinates of the point P_θ on the unit circle.*

  Owch! The responses to this question were split 50-50. Firstly recall that these questions are based on the lecture notes, so you needed to read through these to find the definition of P_θ as the point with argument θ and modulus *1*. Secondly, this is very close to the definition of the sine and cosine functions for all angles. To show that this statement is false it is enough to draw a quick sketch of a right angled triangle with hypotenuse *1* and other side lengths determined by the 'coordinates' given in the question – you will quickly see that this statement cannot be true in general.

Tuesday

- Provide Feedback to Students, Tutors & Lecturers
  - results & analysis (see left) shared via Moodle forum direct to all
  - further feedback on problem areas for students
  - teaching staff have ‘finger on pulse’

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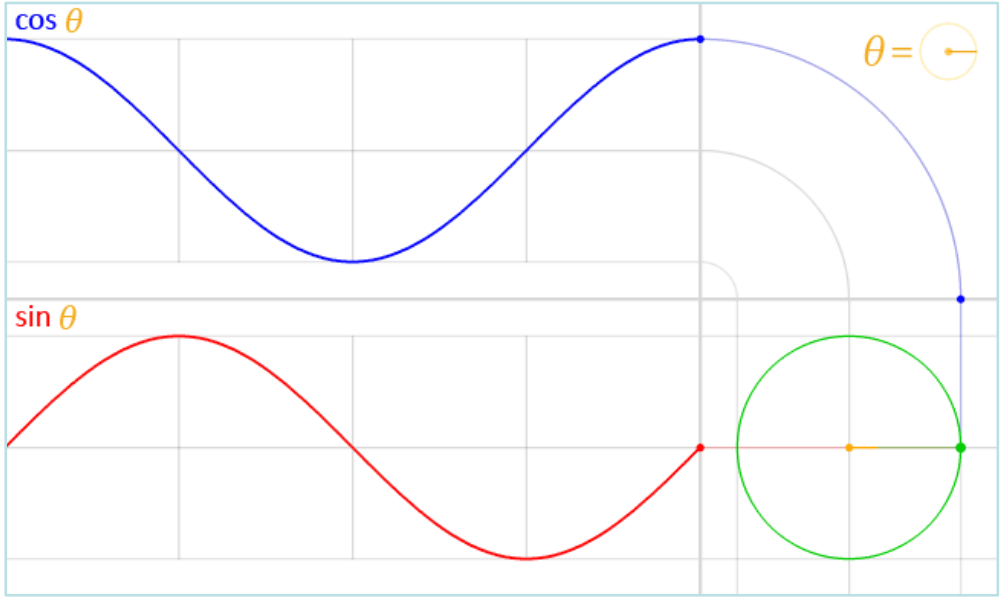
New in Level 1: ‘just-in-time’ teaching philosophy

Wednesday

- Tutorials & lectures enriched and enhanced
  - tutors address issues in tutorials
  - increased student-student & student-faculty interactions (even faculty-faculty!)
  - lecturers can revisit problem areas in later lectures



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What Next?

- Ongoing review of student support for e-assessment
  - GTAs staffing email aliases
  - ‘ask-your-teacher’ feature (bad idea)
  - coordinating with Student Learning Service
  - eliminate errors in e-assessment to alleviate student frustrations
- Use of scanning technology in exams
  - Currently used on our ‘small’ Level 1 course (12 multiple-choice questions) — rolling this out to other courses is under consideration.

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What Next?

- Identify non-engaged students and intervening
- Providing Advisers of Studies with actionable information
- Tailoring interventions accordingly
- Student retention

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Reflections: What have we learned?

- We produce large volumes of data — interrogate it!
- We can square the circle — increasing feedback without increasing workload — but this requires:
  - Efficient teamwork
  - Integration of technology
  - Enthusiasm