Fundamentals Statics and Stress 15/16
Mastering Engineering

Gail Capper | Pearson

Background

Mastering Engineering was introduced into this course in 2011-2012. Over 15 years the largest class size was up to 170 students and is now about 100 students. The course team identified a number of challenges they wanted to address to make the course more successful:

- Engaging and motivating students (**increasing attendance and therefore knowledge level).**
- Modern and worthy of tuition fees (**student satisfaction**)
- Accessible outside the classroom (**flexible learning**)
- Allowed for even more practice (**increased practice, increased knowledge, increase achievement**)
- Allow a snapshot in time of student performance and identify areas students were finding difficult to understand (**improve support and feedback**)
- Automating marking (**manage increasing class sizes**)

The course usually had 82 students in 2015-16 over two semesters. Each semester is worth 50% of the total course mark. Mastering Engineering is integrated fully into each week with a homework assigned and then discussed in tutorials. It is used for practice and summative assessment. Each week the students follow the same structure:

Lecture 1 (Tuesday, new concepts and introduce problems set for the week)

Problem Class (Tuesday start problems in PC Lab, support on hand)

Lecture 2 (Tuesday go over last week's problems)

Work Due (Problems due Sunday 11.59pm)

Non-engagers e-mailed (Monday, identify problem questions)

Participation was consistently high on this course: 90% in Semester 1 and 81% in Semester 2**.** The course assigned credit and had a clear structure and an engaged teaching team who monitored, supported and discussed the work on Mastering Engineering.

Summary of Findings

This study showed that higher student attainment on Mastering Engineering correlated with: higher performance in other parts of the course (exam and coursework); the total time spent on the resource and to the relative difficulty with which students completed their assignments. High participation in the course allows a degree of confidence around these findings. These findings are useful in order to actively support teaching and learning as well as targeting support for students.

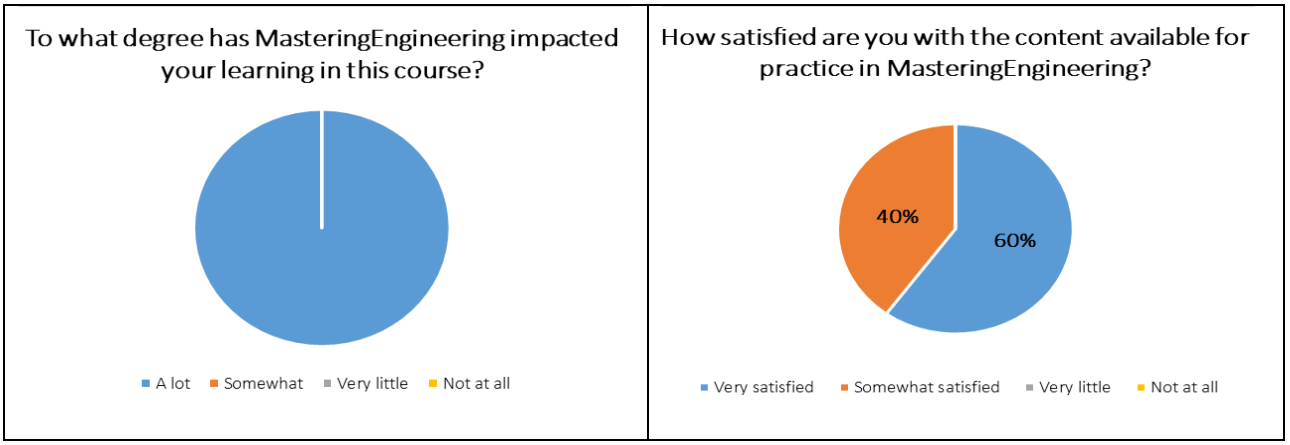
- Student performance on Mastering assignments had a positive correlation with student performance on other written coursework and the course exam. That is to say, students who performed better on Mastering performed better in the coursework and exam.

- Students who spent more time on Mastering Engineering performed better on the course.

- The better a student did on the course, the less difficult they had found the assignments on Mastering Engineering, and vice versa.

- In answer to the question 'How likely are you to recommend MasteringEngineering to another student?' Mastering Engineering scored **8.2 out of 10**

- Student feedback from the class survey reported:



Statistics:

1. The better a student did on Mastering, the better they did in their Exam
   Strong – medium correlation Exam Semester 1: r=.80, p<.01; Exam Semester 2: r=.41, p<.01
2. The better a student did on Mastering, the better they did in their Coursework
   Strong, positive correlation Coursework r=.73, p<.01
3. The more difficult a student found the assignment, the lower their course mark
   Inverse, weak relationship Difficulty r=-.32, p=.004
4. Students who spent more time on Mastering performed better on the course
   Significant, medium relationship Time r=.40, p<.01

Implications

Target student support

A connection between student performance on Mastering and student performance at the end of the course assists teachers by allowing them to pinpoint students who may perform less well at the end of the course as early as possible. Spotting low scoring students on Mastering earlier allows for additional support to be put in place for them so that they might achieve the best possible result on the course.

Students who found assignment questions more difficult performed less well on the course overall. This information can be used to target revision around the most difficult content e.g. problem 6.4 below where this class score a 2, but the 'system' expectation was 1 (least difficult).

#	ITEM TYPE	TITLE Show Descriptions	STUDENTS COMPLETE	DIFFICULTY	
				This Course	System
1	End-of-Section EOS	Problem 6.4	70	2	1

The rating can also be used to identify and support students who are struggling struggling before course assessments e.g. student numbers 4 and 5 below who had the highest average difficulty rating and who are therefore likely to do the least well on the course.

Student ID	Semester 2 week 2	Semester 2 week 3	Semester 2 Ass	Semester 2 week 6	Semester 2 week 7 s	Average Difficulty
1	4	1	1	1	3	2
2	1	1	2	1	1	1
3	1	1	1	1	1	1
4	5	3	1	2	3	4
5	5	5	4	1	1	3
6	1	2	2	2	1	2
7	2	2	2	1	4	3
8	5	2	1	1	1	2

Strategies to engage students

Assigning credit and having consistent deadlines is likely to impact on the high levels of participation. The teaching team supported and motivated students in class whilst also contacting those students who failed to complete work. The teaching team demonstrated their commitment to learning on Mastering to the students. This effect has also been shown in other studies such as Lancaster MyAccountingLab and Exeter MyAccountingLab.