

Flipping large lectures!

Philip Walker

School of Mathematics, University of Leeds
P.Walker@leeds.ac.uk

E-assessment in the Mathematical Sciences
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Section 1

Introduction

Flipped classroom

Core concepts

- Active and passive learning
- Inside and outside class
- Feedback and discussion

Flipped classroom

The challenge

- Large enrolment (ca. 160 students)
- Inappropriate room (raked lecture theatre)

MATH1400

Modelling with Differential Equations

- Second-order ...

MATH1400

Modelling with Differential Equations

- Second-order ...
- ... linear ...

MATH1400

Modelling with Differential Equations

- Second-order ...
- ... linear ...
- ... constant coefficient ...

MATH1400

Modelling with Differential Equations

- Second-order ...
- ... linear ...
- ... constant coefficient ...
- ... ordinary differential equations

Section 2

Design

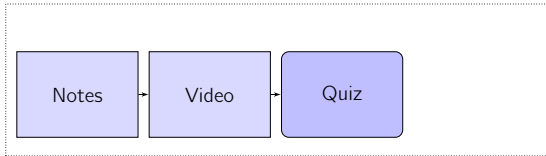
The ends

Reducing the drag

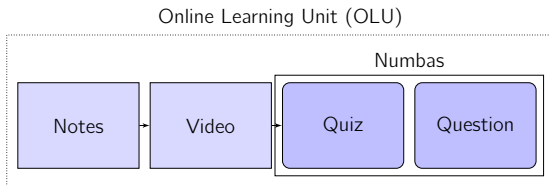
- Eliminate repetitive examples from class
- Allow more time for interaction

The means Structure

Online Learning Unit (OLU)

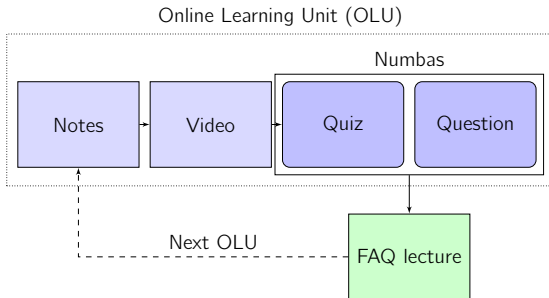


The means Structure



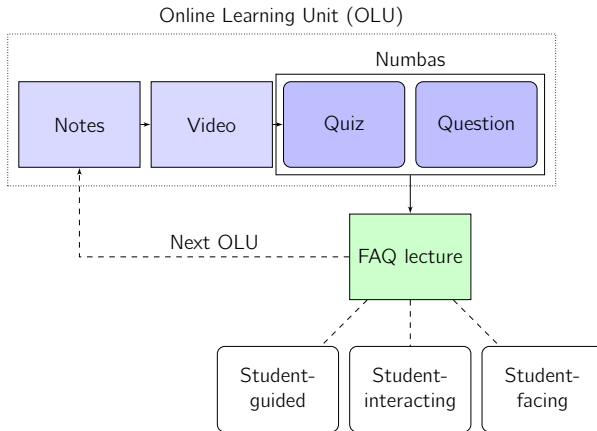
The means

Structure

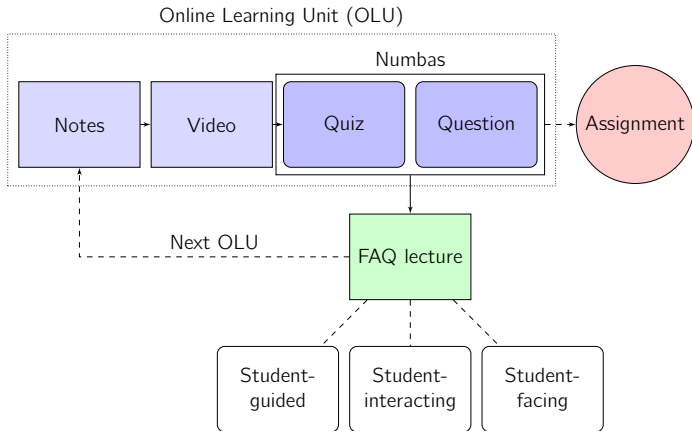


The means

Structure



The means Structure



Section 3

Results

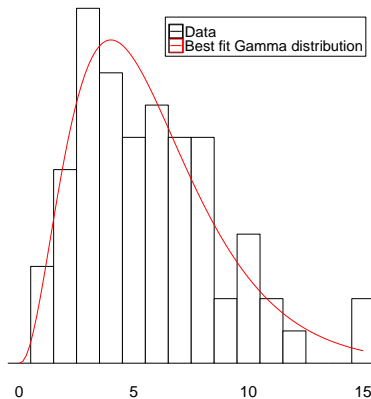
Data sources

- Online survey in OLU 3 ($n = 74$)
- Socrative exit tickets
- Assessment data ($n = 157$)

Experience

The students

In hours, how long did the OLUs take you?



$\mu = 5.75 \pm 0.74$ hr (95% CI)



Experience

The students

Do you agree or disagree with the following statements?





Experience

The students

Pro		Con	
Work at own pace	(×3)	Deadline: not at own pace	
Work more		Work more	(×4)
Understand more			
Good examples	(×4)		
		OLUs vs assignment	
		OLUs a struggle	
FAQ lectures	(×2)	FAQ lectures	(×3)
Quizzes: self-diagnosis			
Strong, general positive	(×2)		
		Self-directed learning	
		Didn't answer all questions	
		Too difficult	

Experience

The lecturer

Pro

Better feedback from students
Improvement in rapport
More interesting teaching

Con

Upfront cost of work

Data analysis

Class segmentation

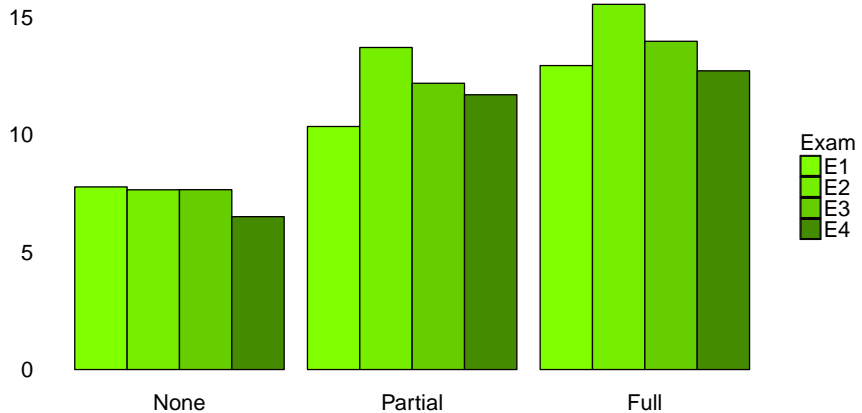
Group the class by number of OLUs completed:

OLUs	Engagement	n
0	None	22
1	Partial	16
2	Partial	26
3	Full	93



Data analysis

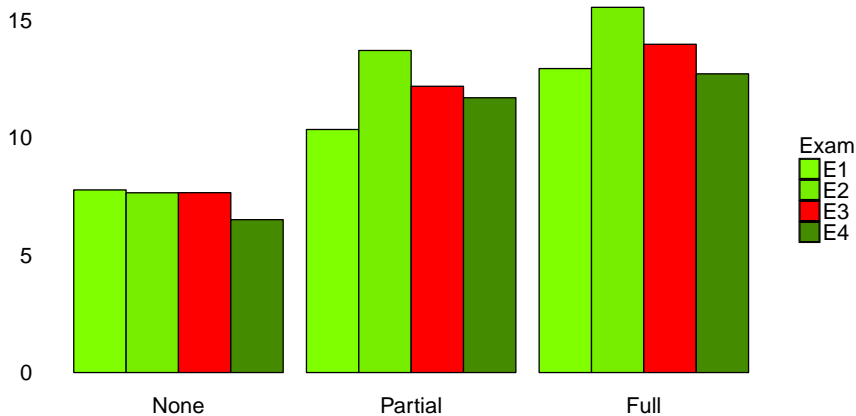
Mean performance on each exam question by segment





Data analysis

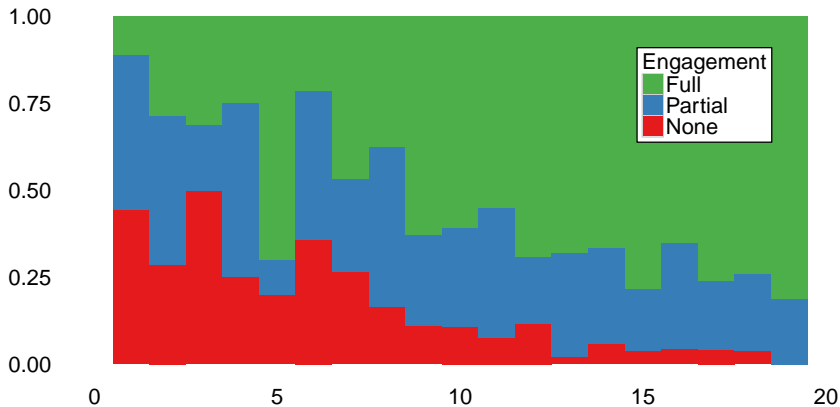
Mean performance on each exam question by segment





Data analysis

Segment scores on assignments



Section 4

Conclusions

- This is worth the effort, with caveats
- Student (and lecturer) experience is enhanced
- Student performance appears unaffected
- A useful means of identifying disengaged students?