

# Do old habits die hard? Testing an assessment model that encourages greater student engagement in learning



Raoul Mulder & Therésa Jones  
School of BioSciences



FACULTY OF  
**SCIENCE**

## Problem and motivation for change

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Academics generally expect that students

- a) **come** to lectures and
- b) come to lectures **well-prepared**

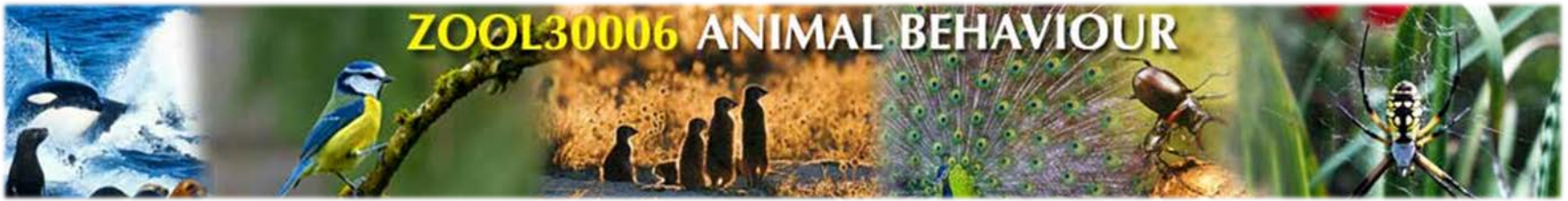
Instead, a common complaint is that students

- a) **do not** attend lectures and they
- b) **do not** do the pre-reading

*How can we motivate students to **prepare** and **participate**?*



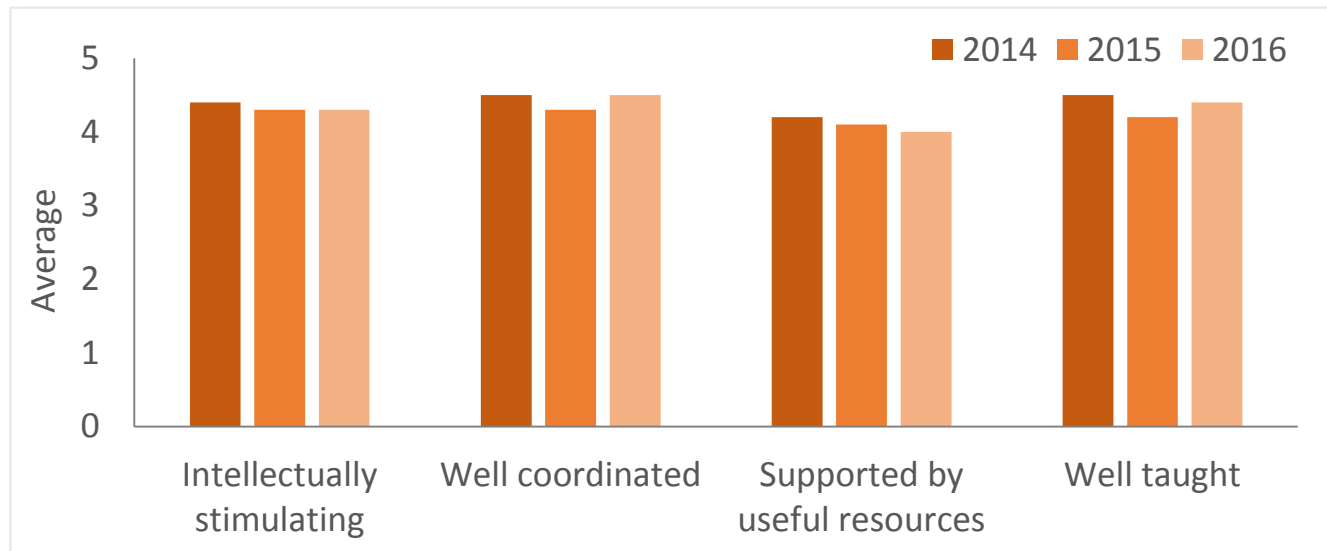
**Case study: Animal Behaviour, Semester 1, 2017**



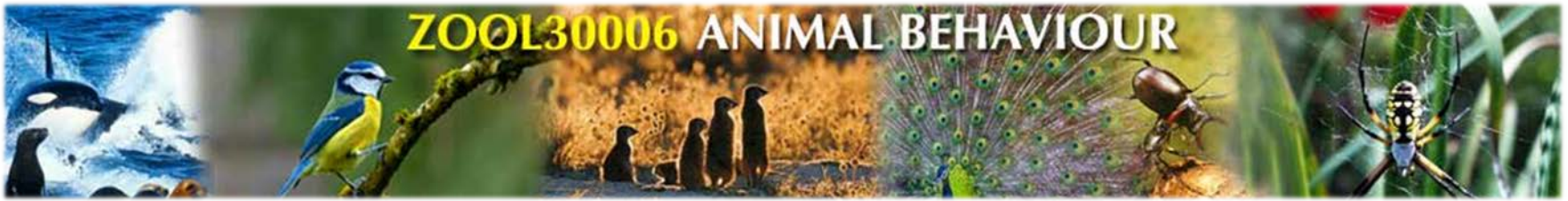
Level 3 (third year) subject

Enrolment ~70

2014-16 SES data paint an apparently rosy picture



There was ostensibly nothing “wrong” with this subject. And yet ...



Low levels of lecture attendance

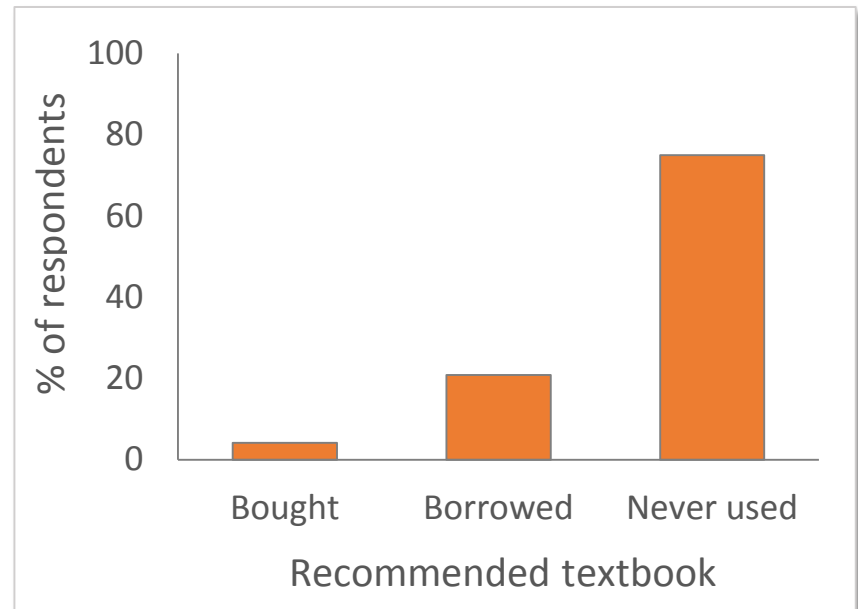
- est. 65% attendance by most motivated 30% of class

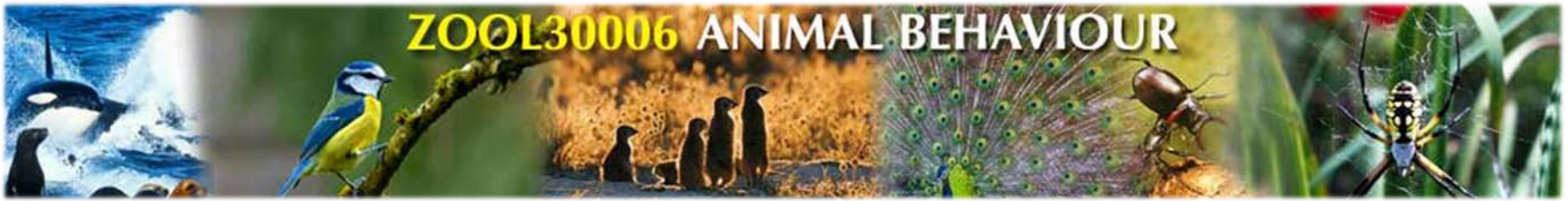
Low levels of preparation/engagement

In class, few students answered questions

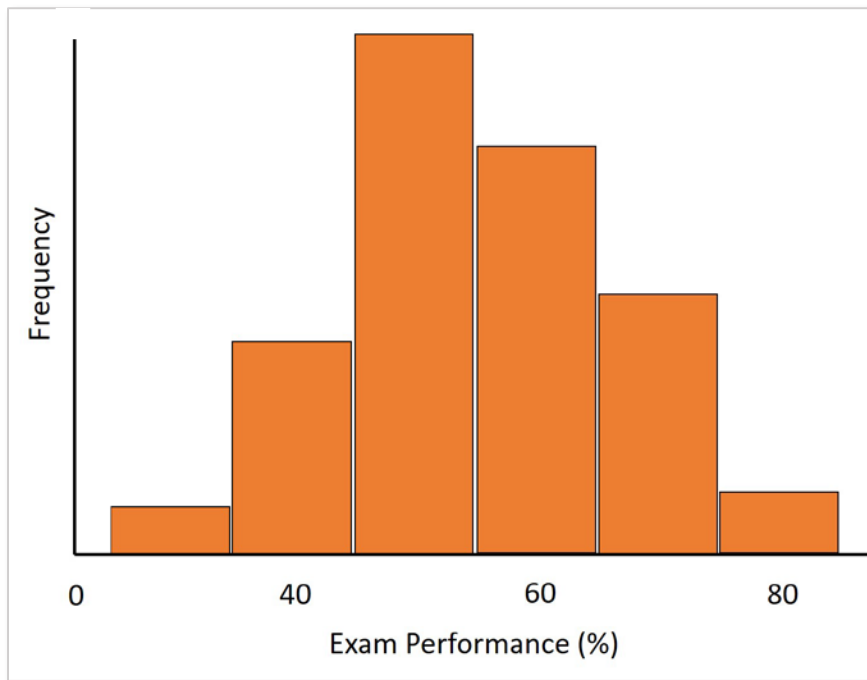
< 5% of students purchased  
the recommended text

> 90% of students said they  
never consulted it





Assessment model placed high weighting (60%) on final exam, which challenged students to apply learning to new (authentic) context



Average raw score obtained by students on the exam was 55%

## Objective

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Improve student engagement

Improve student learning/performance

**Insight:** *Assessment is a powerful driver of student behaviour*



## Key changes to the subject

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### **Reward preparation and engagement *before* class**

Social annotation of text (Perusall) – *intrinsic* and *extrinsic motivation*

### **Reward preparation and engagement *in* class**

Live polling

Randomised questions

Exam weighting reduced from 60 to 30%

# Motivating pre-class preparation

In this chapter we examine the broad array of ways that animals learn, ranging from simple habituation to complex problem solving. We also examine the physical changes in the brain that are associated with learning. We then discuss individual and social learning and see how the latter can lead to the development of animal traditions and even culture. We end by discussing animal cognition.

## 7.1 Learning allows animals to adapt to their environment

**Learning** A relatively permanent change in behavior due to experience.

**Learning** is a relatively permanent change in behavior as a result of experience. It is a process by which animals modify their behavior, or adapt to their environment, in ways that allow them to experience increased fitness. For example, the ability to successfully capture prey is a foraging skill that can affect fitness and improve with experience, as we see next.

### Featured Research

#### Improved foraging efficiency in salamanders

Red-backed salamanders (*Plethodon cinereus*) are common in the eastern deciduous forests of North America (Figure 7.2). They feed under rocks and eat a wide variety of invertebrate prey. Salamander neonates can recognize and capture prey within one week of hatching, without prior experience. Do their foraging efficiency improve with experience? Megan Gibbons, Arianna Lee, and Danielle Lee conducted an experiment to investigate the hypothesis that learning would improve salamanders' skill as predators (Gibbons et al. 2015).

Gibbons and her colleagues examined the predatory hunting skill of two-week-old individuals that had no prior opportunity to forage. They measured hunger levels, three feeding trials were separated by about 14 days, and the number of prey eaten.

To characterize feeding efficiency, the researchers presented four termites (*Reticulitermes flavipes*) to an individual and recorded capture attempts (a jaw snap at one termite), successful captures, and the number of prey that escaped after capture in each ten-minute trial. From these data, they quantified the number of prey captured and the salamanders' foraging accuracy (measured as the number of prey eaten, divided by the number of attacks, captures, and escapes).

Neonates captured few prey during the first trial. The proportion captured improved significantly, however, in Trials 2 and 3 (Figure 7.3). These data suggest that individuals rapidly learned to forage in a more efficient manner as they gained experience. In this example, only one learning experience was required for a large gain in foraging efficiency. Such improved performance can enhance survivorship in the wild.



Current thread

RL: Would certain learnt behaviours eventually become innate behaviours as individuals who adapt via learning have an increased fitness and will inevitably pass on their genes from generation to generation?

BR: I think it would. V... adaptations? If t... to offspring and...

TK: For a behav... regardless of the environment, therefore learn... must hold some form of genetic or epigenetic structure.

RV: I dont think learnt behaviors can become innate, because thats like saying because it is adaptively beneficial for us to learn to communicate with others we will eventually be able to know how to talk without it being learnt behaviour?

RL: Not exactly relevant but, for a behaviour to become innate does some sort of rewiring occur at a neurological level? And if so at what level, those who first learnt the behaviour or later on?

Sophie Robinson: I think that this is extremely pertinent to the main question 😊. The "rewiring" would occur over a number of generations as an evolutionary pressure, as long as responding to the whistle improved the fitness compared to other individuals who didn't. That is, rewiring would occur if the pressure to find food at the call of the whistle is strong enough to eliminate some of the population that didnt respond. However, causing this to be an innate behaviour would need many many generations of birds and is not viable for a single study group.

Ruby Vanstone: I see where you're coming from but I'm not sure I agree entirely. What about phobias? Let's take arachnophobia as an example: some people have a natural instinct to fear spiders; they associate this stimulus with danger without any prior learning. This innate behaviour (having a phobia) would have been a behaviour that was learned by people in the past and then passed down through generations, otherwise how would you explain the presence of phobias? Can a phobia be considered an innate behaviour? This might be a stab in the dark but just a though I had



# Perusal confusion report

## Confusion report for Breed & Moore Chapter 1, Entire document

### Topic 1 (Page 2)

and for manipulating the world around them.

- Be able to illustrate that four central questions drive the study of behavior. These are mechanism, utility, development (ontogeny), and evolution. Use these questions to form testable hypotheses about behavior.
- Integrate the basic principles of evolution with an understanding of animal behavior.
- Discover that the roots of contemporary studies of animal behavior are in ethology, comparative psychology, sociobiology, and behavioral ecology.

#### 1.1 Introduction: Animal Behavior

Science is the outcome of human curiosity. We want to know the “why” and “how” of almost everything. In fact, all of biology can be addressed with two types of questions: proximate and ultimate. *Proximate* means “coming very soon” or “next”; *ultimate*, in contrast, means “coming at the end” of a process. In biological terms, proximate questions ask about mechanisms—how has something developed? how does it work?—and ultimate questions ask about how something has evolved—what is its selective advantage? what is its evolutionary history?


##### Key Term


Proximate questions ask about relatively imminent causes or mechanisms responsible for a trait.

##### Key Term

Ultimate questions ask about the evolution of a trait.

This curiosity and these types of questions have framed the  of animal behavior. All of us have watched animals, laughing at the antics of pets and marveling at the aerial acrobatics of birds. Shortly, we will

**TB** So can we think of proximate questions as 'how' questions (how does it work, what is the mechanism), and ultimate questions as 'why' questions (why did a trait evolve, what is the benefit)? Maybe this doesn't quite capture it because evolutionary questions are also about 'how' something evolved. 

**AZ** Just want to clarify which questions fall under proximate or ultimate? I'm assuming the first two questions are proximate while the third and fourth questions are ultimate. 

**SL** Questions 1 and 3 would be proximate, 2 and 4 ultimate? 

Show more...

## Motivating in-class participation

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Every student is invited to share their thoughts during the semester (via *in-class polls* and *individual questions*)

*Class polls* (~5 per class) are conducted in real time and are assessed (20% of final grade over semester)

Every class, 10-15 *individual students* are asked a question, using a randomised class list (option to be on 'do not call' list)

## Challenges

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Logistical and contractual challenges – time delays in dealing with publishers (handbook compliance issue)

*Perusall* platform is free, but all students must pay for access to e-text (possible equity, expense issues)

Assessable polls in class mean that every student must be able to attend class, and have access to a mobile device (equity issue)

Pre-reading of ~30 pages substantial (workload issue)

Calling on students in class is a major source of anxiety for some (wellbeing/equity issue)

# Measures of impact: Mid-semester evaluation (SGID)

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## What is helping you learn in this subject?

85%: Classes (addressing confusions/reinforcing of readings/examples/lecturer energy/logical topic structure)

80%: Pre-readings/Perusal (learning with peers/building understanding before class/engaging with interesting and understandable content)

57%: In-class polls (help maintain focus, attention/motivating)

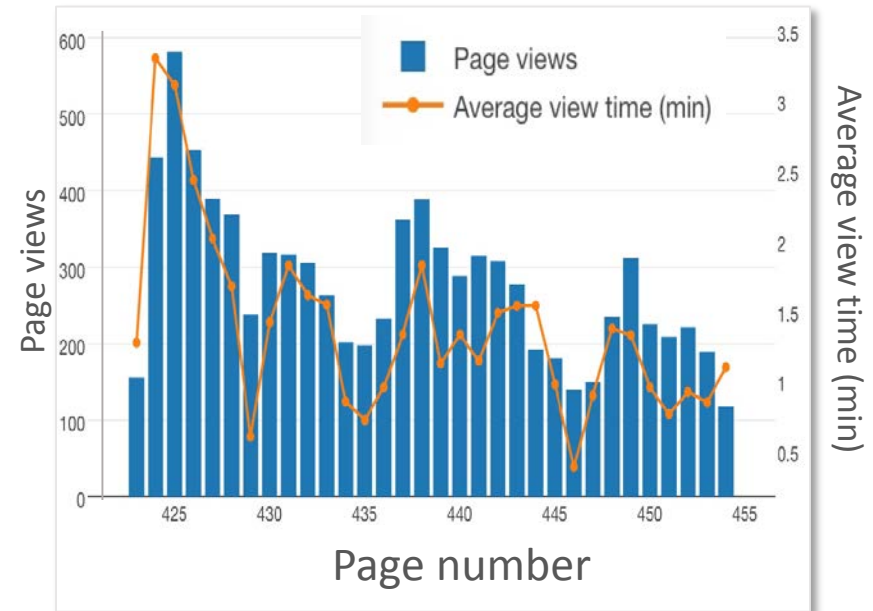
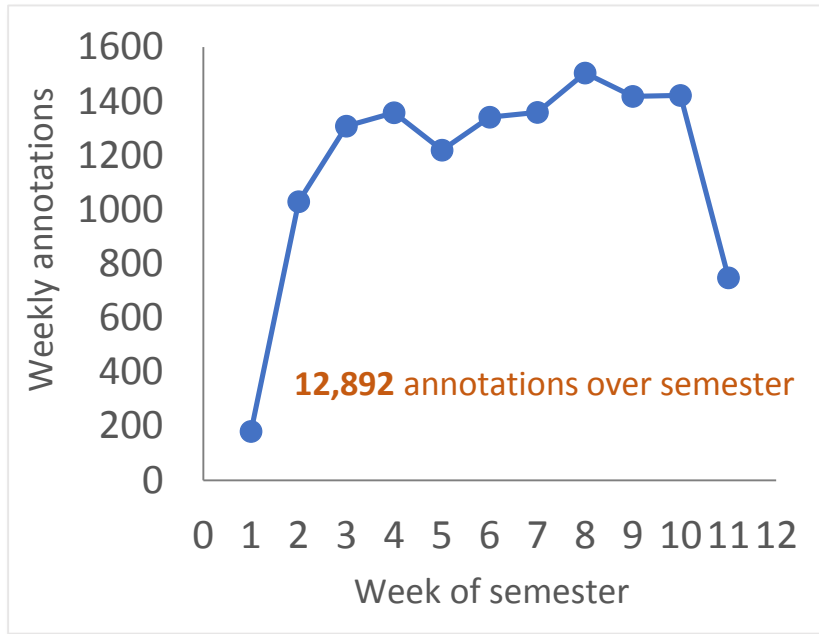
26%: Online quizzes (permanent resource)

Voluntary participation = 65 students (90% of class)

# Measures of impact: pre-class reading

## Strong engagement with the e-text via *Perusall*

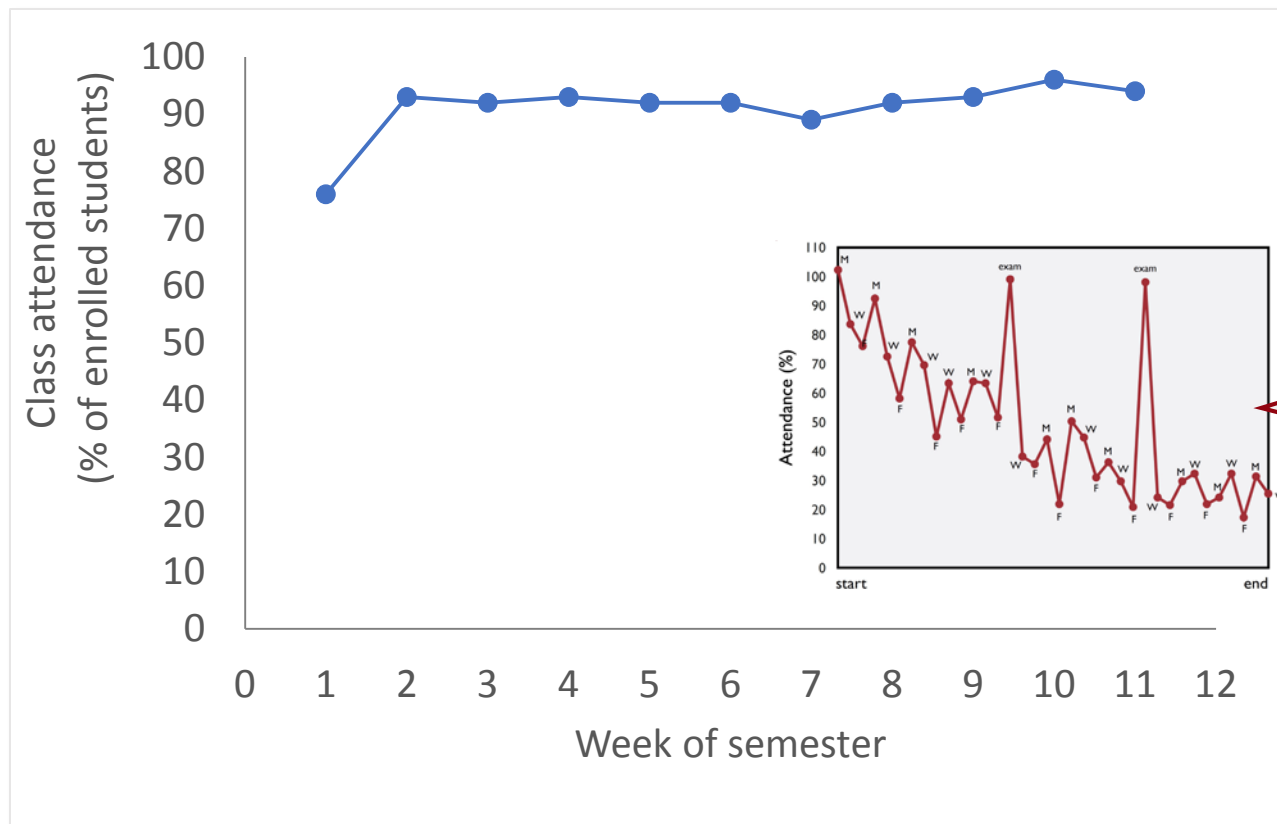
- average active reading time *before class*: **2.2 hours** (range 0-11.4h)
- average number of annotations per student per week: **15.6** (range 0-74)





# Measures of impact: class attendance

Average class attendance after Week 1: **93%**

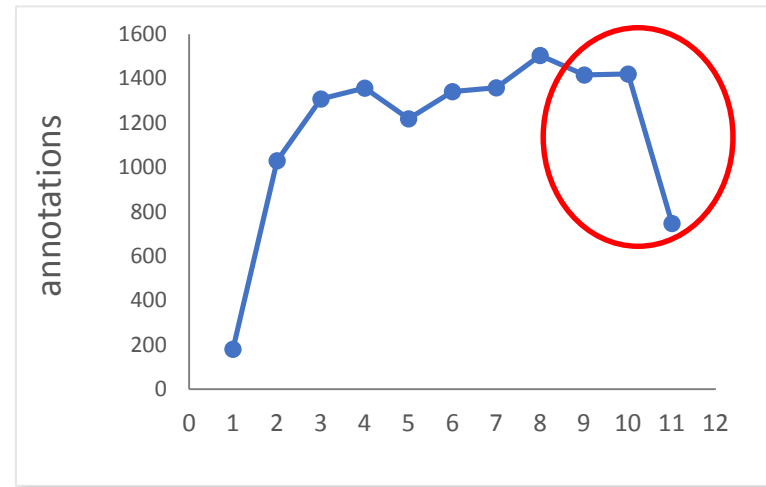
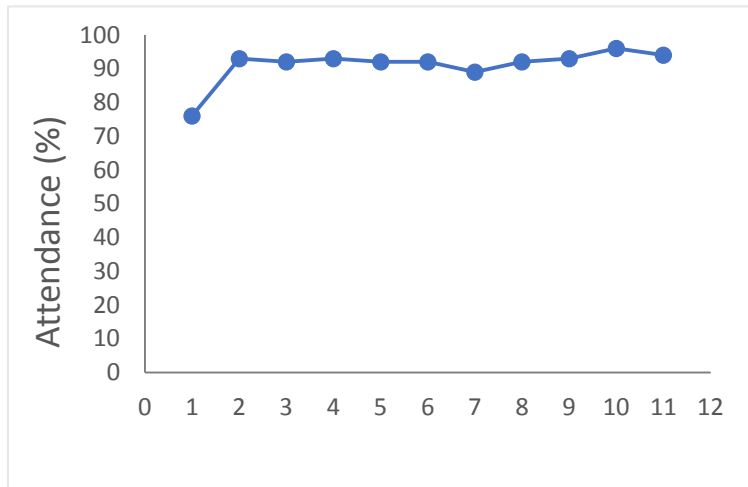


'typical' pattern of lecture attendance

## Measures of impact: sustained?

‘Best 8 of 10’ criterion allowed for test of whether student habits changed in a sustained way

Class attendance remained high, but pre-reading fell off in final week of semester



## Measures of impact: deep learning?

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Compare student performance in blind-marked exam to performance of past cohorts on identical questions



## Measures of impact: student feedback

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*I ... liked the content of the subject and how it was delivered.*

*I thought the content was very interesting and the student engagement great.*

*Perusall was surprisingly helpful. Really made the lectures easier to understand and made it feel like people wanted to help you.*

*It's probably the only subject I've done that is actively aiming to improve by asking students stuff. Hopefully you get how much we as students appreciate it, because it really helps. One other suggestion: can you please make other subjects do this?*

# Conclusions

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- The change to an ‘active learning’ teaching and assessment model in this subject has resulted in dramatic changes to levels of student engagement
- We don’t yet know whether this impact is sustained, and whether it translates to improved performance
- Students seem to welcome an assessment regime that rewards engagement
- What impact could we have if we were able to motivate greater engagement at scale and earlier in the degree?



Thank you

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Raoul Mulder [r.mulder@unimelb.edu.au](mailto:r.mulder@unimelb.edu.au)

Therésa Jones [theresa@unimelb.edu.au](mailto:theresa@unimelb.edu.au)