



University  
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# Exploring the impact of gamification in a statistics classroom

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**WORLD  
CHANGING  
GLASGOW**

**A WORLD  
TOP 100  
UNIVERSITY**



## Background

- School of Mathematics and Statistics, University of Glasgow.
- Level 1 Statistics courses.
- Typically taken in year 1 or 2 (of 4 year degree).
- ~260 students.
- Active learning introduced into these courses in 2020-21.
- Teaching consists of:
  - 3 weekly lectures, weekly tutorials & fortnightly labs
- Assessment:
  - 10 weekly quizzes (2% each), 4 lab group tasks (1.25%) each. Final online exam (75%)



## Flipped learning

“Less ‘sit and listen’, more ‘do and learn’”.

Benefits include:

- Students can learn at their own pace.
- More efficient as students enter the lecture room prepared.
- Makes lectures more enjoyable, productive and engaging.
- Doing exercises in class allows students to help each other.



## Flipped learning

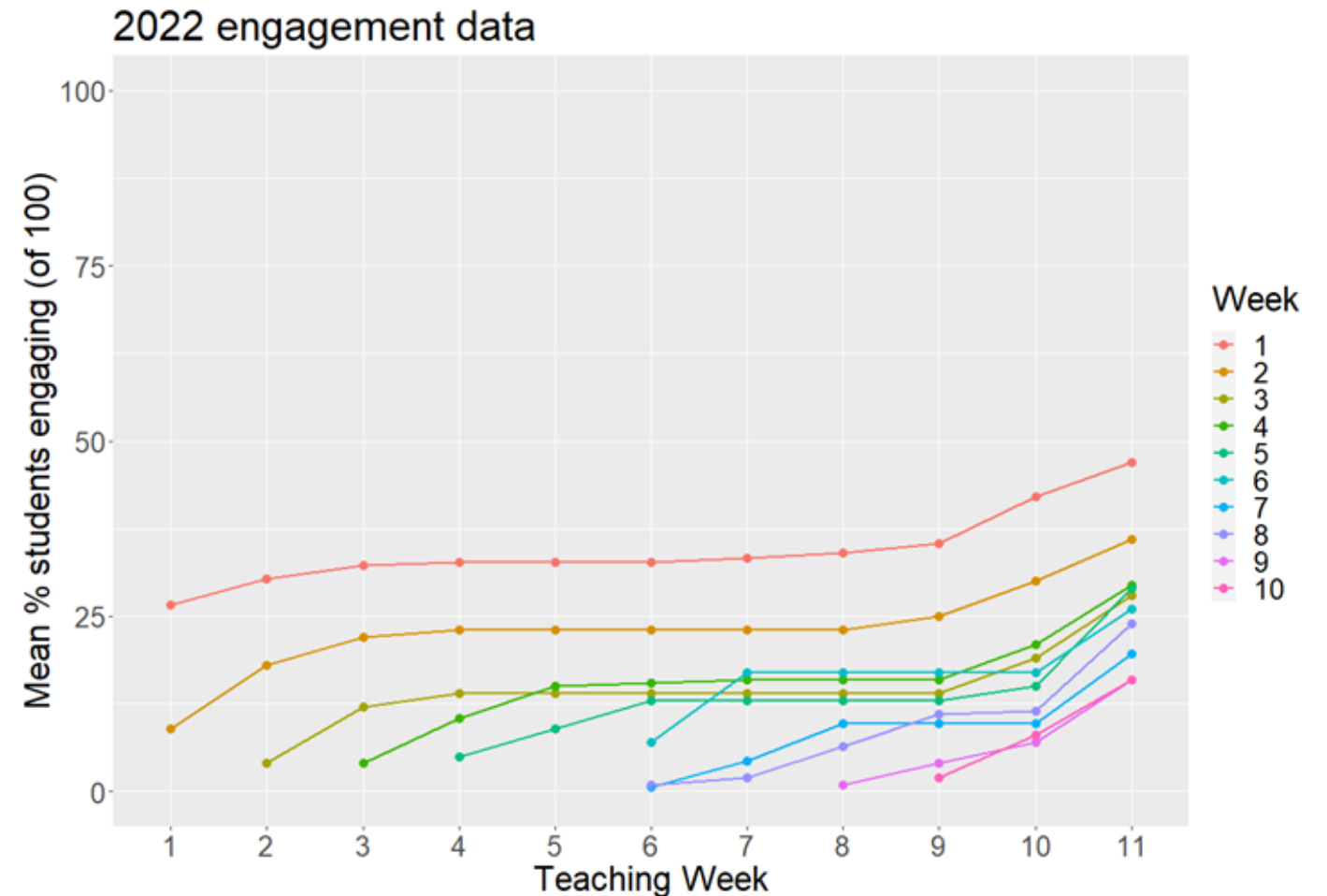
- Pre-lecture reading and quiz to introduce topics to students.
- Focus on active learning in lectures motivated by interesting examples.
- Lots of activities for students to work on themselves or in groups during each lecture with answers submitted via polling software.
- Making use of learning spaces in James McCune Smith Learning Hub.



# Flipped learning

Does it work...?

- It relies on preparation and trust.
- Early indications suggested many students weren't completing the pre-lecture material.



Caveat: this only shows data for students who provided consent to participate in our ethically approved study (100 of 257 students).



## Why did it go so wrong?

- Student comments like “Slides could provide general notes before worked examples”.
- Our approach needs to be tweaked:
  - Too much volume of work. Can we make the pre-lecture material less burdensome?
  - Students find it difficult to motivate themselves: fixed deadline for getting work done (requires time management skills), versus a lecture where there is a fixed timeslot dedicated to learning.
  - Not enough positive reinforcement for students who are completing activities.
  - Can we reward engagement with pre-lecture material?



## Level up!

- Participate in the course to gain experience points (xp) and level up!
- Points are awarded for participation in course via Moodle.
- Course lecturer creates rules for when/how many points should be awarded.
- In order to tackle engagement in pre-lecture activities, full points were only awarded if the activity was completed before the associated lecture with half-points awarded thereafter.
- Endeavour based not merit based.
- Prizes awarded at end of course.

### Level up!

Participate in the course to gain experience points and level up! ✕



TOTAL 60<sup>xp</sup>



### RANKING



### RECENT REWARDS

50 <sup>xp</sup>	Activity completed	Jan 12
10 <sup>xp</sup>	Activity completed	Jan 9

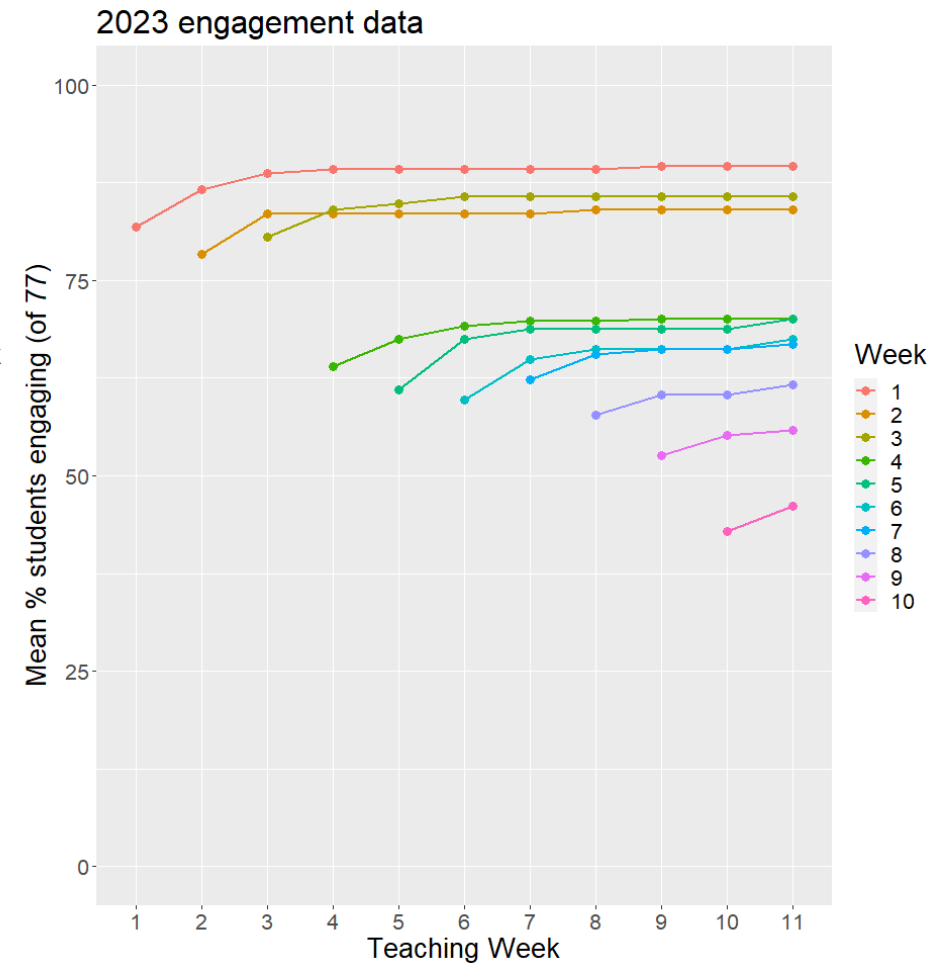
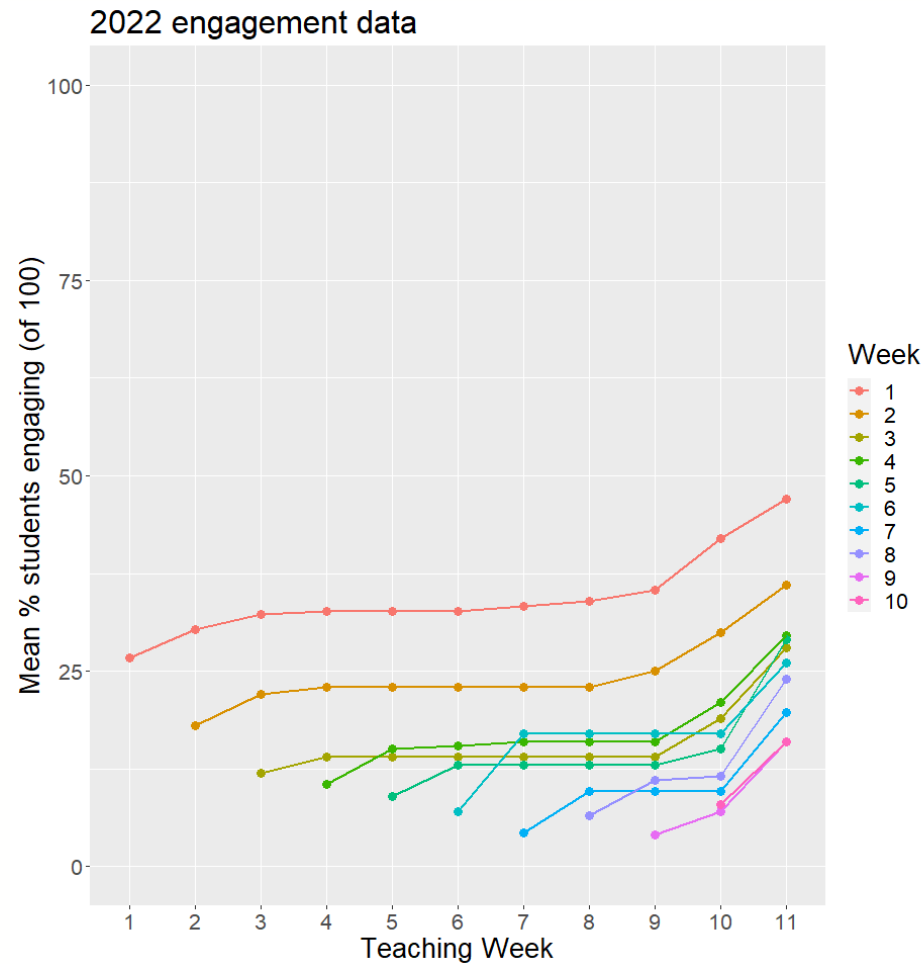


Info



Leaderboard

# Evidence: Engagement data



Caveat: this only shows data for students who provided consent to participate in our ethically approved study (100 of 257 students in 2022 and 77 of 260 students in 2023).





## Conclusion

- Flipped can work, but needs careful implementation.
- Looking at data collected on VLEs can help to give an overall picture of student engagement in real-time.
- Overburdening students, or when motivation is lacking, can be disastrous (especially for younger students), but careful scaffolding can help.
- Introducing a gamification element can help boost motivation and engagement.
- Think broader than your module: think across a programme.
  - Who are your students, and what support do they need?
  - Flipped learning puts a lot of learning burden on students. Too much might mean reduced engagement.
- Tie in the flipped learning with what happens in class (if you say that you won't go over the flipped learning material in class, then don't!).
  - Also helpful to show engagement stats to students in each class!



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## Thanks for listening!

- Jack, E. , Alexander, C. and Jones, E. M. (2024) Exploring the impact of gamification on engagement in a statistics classroom. *Teaching Mathematics and its Applications: An International Journal of the IMA*