Do students do their homework last minute

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Introduction

I am a teaching fellow on the STEM Foundation Year at the University of Leicester. The majority of the coursework is done using the Numbas e-assessment. The particular implementation we have used (a so-called 'LTI') records lots of data, including timings of when students do the e-assessments. I realised this is a good opportunity to obtain hard data regarding students' study habits, as previously we would have to rely on asking students.

In the rest of this document, you will find:

- The Modules and the Deadlines. Brief description of structure and timing of modules and assessments.
- The Data. Brief description of data.
- Charts. The various charts are here, with my observations and explanations.
- Conclusions. Main lessons from the analysis.
- Limitations of Data. Sources of error or bias.
- Future work.

The Modules and the Deadlines

On the STEM Foundation Year, there are 8 15-credit modules. Two of them are year-long Study Skills and Lab Skills modules. The organisation of the other six modules are summarised below.

<table>
<tr><td rowspan="2">Semester 1</td><td>Physics 1</td><td rowspan="2">Maths 1</td></tr>
<tr><td>Physics 2</td></tr>
<tr><td rowspan="2">Semester 2</td><td>Physics 3</td><td rowspan="2">Maths 2</td></tr>
<tr><td>Physics 4</td></tr>
</table>

- Physics
  - Each module lasts 5 weeks.

  - 4 weekly e-assessments. Released each Monday. Deadline 10am the Monday after.
  - Various other assessments. Details not relevant.

- Maths
  - Each module lasts the whole semester.
  - 8 weekly e-assessments. Released each Monday.
  - Various other assessments. Details not relevant.
  - Maths 1. Single deadline, weekend before exam-week.
  - Maths 2. Weekly deadlines, like in Physics.

The inconsistency in deadlines for weekly assessments is because we are trying to find out what works.

The Data

The LTI for Numbas records lots of data, including data about what times students are doing the e-assessment. As this is the first time I am attempting to analyse the data, I decided to focus on only one variable:

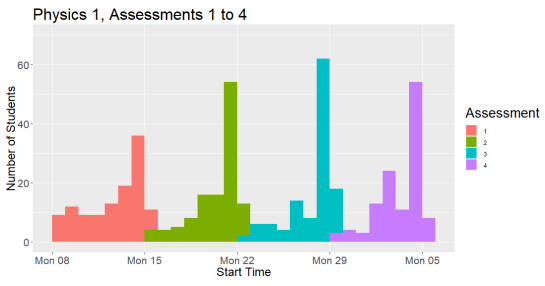
- Start Time: The time a student first *opens* the e-assessment.

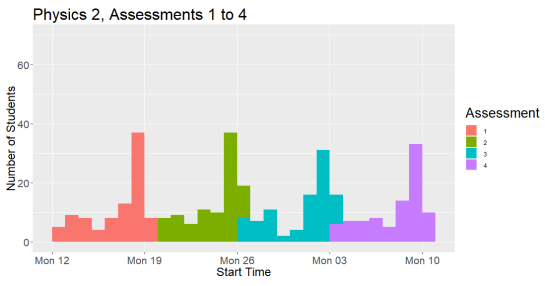
The End Time, the time a student clicks 'End Assessment', is recorded. Most students did not actually click this button so this information was unreliable/inconsistent.

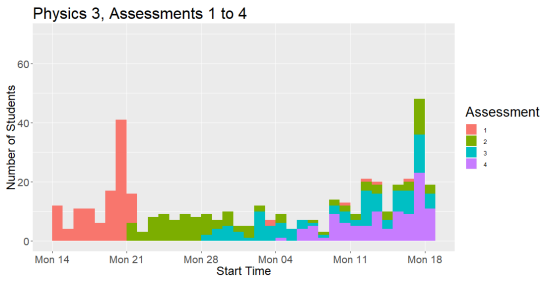
I would like to acknowledge Paul Howes contribution to this analysis, as they obtained the raw data from the University servers.

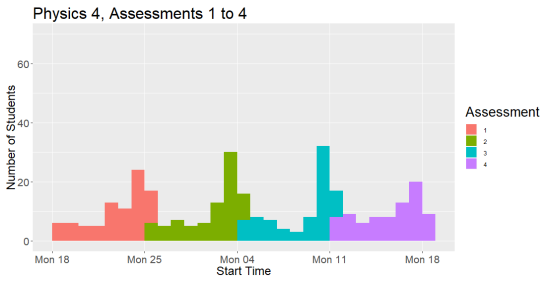
Charts

Below are the charts for the Physics modules. The x-axis shows the day a student opened an e-assessment and the y-axis shows the number of student who started on each day. The different colours correspond to the different assessments.







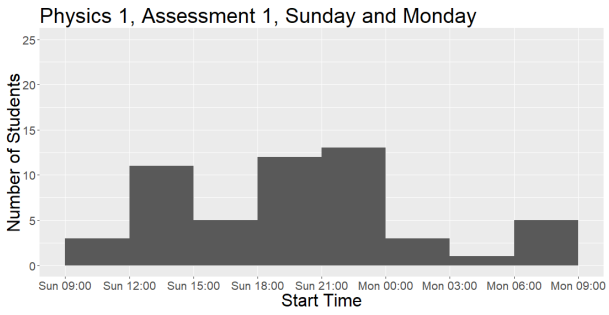


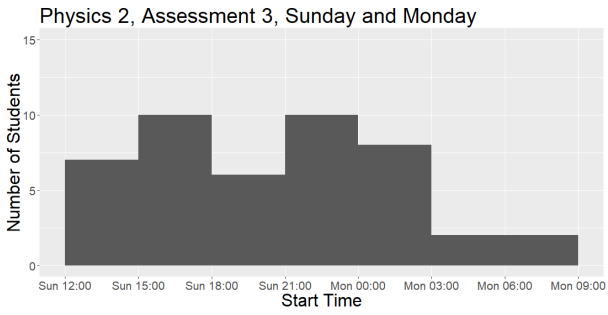
Physics 1, 2 and 4 all have the same patterns.

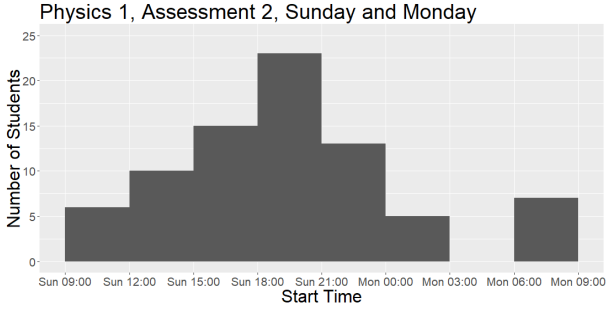
- A good chunk of students open the e-assessment before the weekend.
- The modal day to open the e-assessment is Sunday, the day before the deadline.
- Several students open the e-assessment on Monday (so after midnight on Sunday).
- The bars are shorter in the Physics 2 and Physics 4 charts because fewer students do those modules.

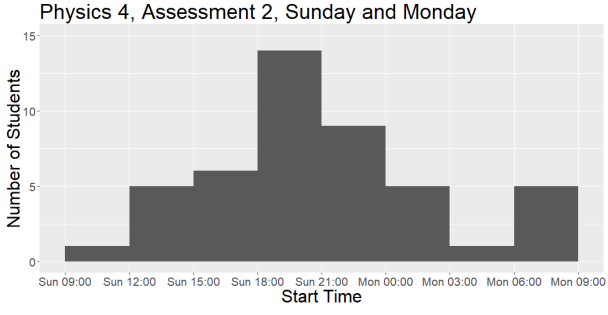
Physics 3 has a different pattern. The first assessment has the same shape as in the other three modules. The other three assessments are flat for a few weeks and then all bunch up in the week beginning Monday 11th Feb. The reason is that at the end of the first week of Physics 3, we extended the deadline for all the assessments to 10am on Monday 18th Feb. (We did this to account for unforeseen circumstances).

Below are a sample of charts showing the breakdown of timings during Sunday and Monday.



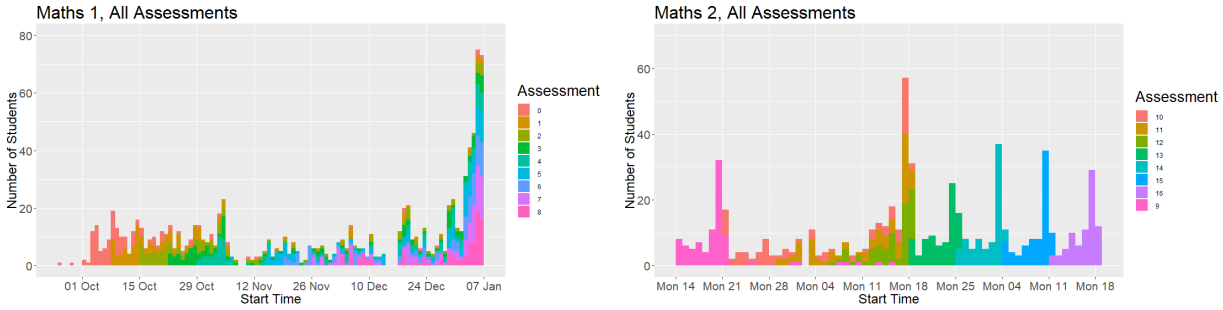






I do not think there is anything particularly noteworthy in these charts. The main pattern is that most people who started the work on Sunday did so after 6pm. The thing which struck me was that for each assessment, there were several students who started the work between 3am and 9am. There is a high chance we will adjust the deadlines to reduce the odds of students working at these inappropriate (in my opinion) times.

Below are the charts for the two maths modules.



Recall that in Maths 1, there was a single deadline for all the assessments, which was the weekend before exam week.

- In the first half of the semester, there is a decent chunk of students starting the e-assessments.
- In the second half, engagement drops significantly. My explanation for this is that the e-assessments for Physics 2 were considerably longer/harder than those of Physics 1, but there are likely various factors.
- A lot of work was done over the Christmas break. To my surprise, a few students left all the work to be done on the final weekend!

Recall that Maths 2 had weekly deadlines. Recall also that Maths 2 runs concurrently with Physics 3 and Physics 4.

- When we extended the deadline in Physics 3, we also had to do it for Maths 2.
- Like in Physics 4, the deadlines for second half of Maths 2 were weekly.
- Hence, the first half of Maths 2 resembles Physics 3, and the second half of Maths 2 resembles Physics 4.

Conclusions

- The pattern for weekly deadlines is consistent across the year: there is some activity throughout the week, with a clear peak the day before the deadline.

  - One consequence is that we cannot assume comfort with material taught on Monday during a session later in the week, e.g., on Thursday.

- Students respond to incentives, just like the rest of us.
  - Our choices have a big impact on student habits.
  - Noteworthy to point out that most students *do* know the deadlines! This means we are communicating our deadlines well.
  - Thinking about incentives is important more generally. E.g. it explains the difference between attendance in lectures and attendance in assessed sessions.

- These findings are particularly important for 'linear' subjects, where knowledge/understanding of Week 1 material is required to learn Week 2 material.

- Shouldn't judge students or label them as 'bad students'.
  - Better to label the habit, not the individual.
  - This is more to do with human nature, than students in particular.
  - This is mostly about incentives. Designing a course well includes creating incentives which result in good learning behaviours. (Compare with the famous example of opting-in or opting-out of a country's organ donation registry.)

Limitations of the data

There are several sources of noise and error in this data. I will say 'data is positively biased' to mean that data shows students working earlier than they actually are, and 'negatively biased' to say that data shows students are working later than they actually are.

- Sources of positive bias.
  - Looking at Start Time. Students may open the assessment during the week, but actually only finish it on the weekend.
  - Students have multiple attempts on the coursework and I only looked at the start time of their earliest attempt.
  - I excluded students who did not attempt the coursework or attempted it late.

- Sources of negative bias.
  - There was a 'Practice Version' of each e-assessment available. Students were encouraged to use these to practice before attempting the actual assessed version. (Practice versions are also useful as a revision tool.) Some students did this, but a brief look at the data shows that most people did not attempt a practice version for the assessed version.
  - Did not take into account mitigating circumstances.
  - Does not account for other forms of independent study. E.g. a student might review lectures/workshop questions before attempting the e-assessment.

- Sources of unknown bias.
  - Most of our students have done A-Level Maths and/or Physics, so find the year easy. This probably means that students do not need to attempt coursework in a timely manner in order to keep up with the material.
  - This data only relates to specific style of coursework. There is no data on semester long projects, essays, etc. My prediction is that similar patterns will emerge, but spread out according to the size of the task.
  - Several students suspended or withdrew or were terminated during year. Their data will be included in early modules but not in later modules.

Future Work

There are many potential avenues of exploration. Here are some possibilities I am considering.

- Whether there is a link between when students do their work and their success in the exam. My prediction is that there will not be a strong link and/or there is not enough data to tease out the links that do exist.
- Whether students' are truthful/accurate if I were to ask them when they started doing the work.
- Whether the same students are early/late every time. A quick little investigation suggests that roughly 10% of students consistently start early, 10% of students start consistently late, and the rest are mixed. Somebody mentioned I should try doing a 'cluster analysis' - if you know how to do this, please let me know!
- Whether there is a link between when students do their work and their attendance in timetabled sessions.