The magic trick to increase attendance: Numbas formative e-assessment

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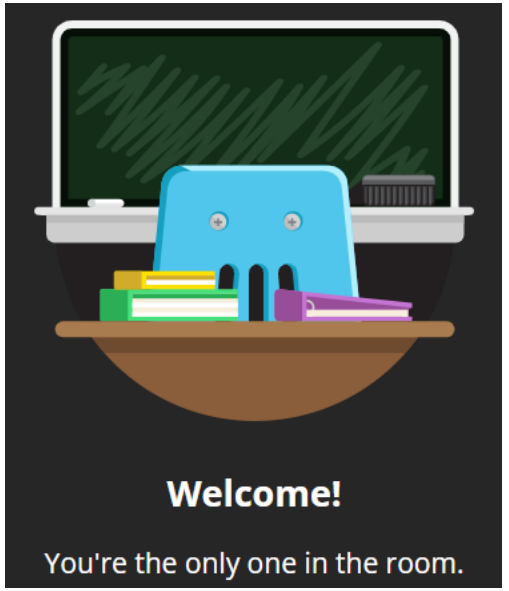
Talk overview

- Student attendance
- Literature background
- Our study on attendance changes after introducing Numbas:

M Orsi, L Juliano: “Impact of Formative E-Assessment on Attendance”, Journal of Higher Education Theory and Practice 21 (15), 218-225

Background: student attendance

- Attendance strongly correlates with performance and satisfaction
- Attendance is universally promoted and monitored
- Yet attendance keeps decreasing (work commitments, recordings, travel costs…)



Can e-assessment help?

- Evidence of increased engagement following the introduction of low-stakes continuous e-assessments (Carroll et al. 2017; Holmes 2015, 2018)
- However, in the studies above there is an extra incentive of introducing a summative element combined with the e-assessments themselves
- Our study: the e-assessment we use as comparative factor is *formative* (i.e., it does not contribute a mark), so we can more clearly isolate any specific effect of e-assessment on attendance

Our hypothesis

- We propose the hypothesis that the replacement of pen and paper formative assessment with e-assessment correlates with changes in student attendance.
- We treat this as a two-sided hypothesis, in that we do not make an a priori assumption on the direction of any significant change (i.e., an increase vs. a decrease in attendance).

Module (course) details and context

- The module considered in our study is a compulsory second year undergraduate course on introductory statistics, part of the 3-year Healthcare Science BSc degree apprenticeship programme at the University of the West of England (UWE Bristol), UK.
- A specific feature of this programme is that students are employed in the UK National Health Service (who provides the funding) and are at an early (apprentice) stage.
- The module is delivered with a blended approach: out of the fourteen teaching and learning sessions in total, twelve sessions take place online while two sessions are delivered on campus. In this study we focus on the online sessions only; in these sessions attendance is not compulsory, as is conventional in higher education. We do not include campus sessions because in this case attendance is compulsory.

The two groups (cohorts) under study

***"No e-assessment"* group**

- 2018-2019
- 21 students
- Traditional pen and paper formative assessment activities

***"E-assessment"* group**

- 2019-2020
- 31 students
- Numbas formative e-assessment activities

No change in module content, delivery, teaching staff, and session timetables (relative to the specific academic year).

Example comparison

No e-assessment

An independent random sample of size $n = 20$ is selected from an approximately normal population with unknown standard deviation.

a. What is the critical t-value (t^*) for a 95% confidence level?

b. Assuming a two-tailed test, what is the p-value for a statistic $T = 2.74$?

E-assessment

An independent random sample of size $n = \mathbf{11}$ is selected from an approximately normal population with unknown standard deviation.

a. What is the critical t-value (t*) for a **99%** confidence level?

Submit part

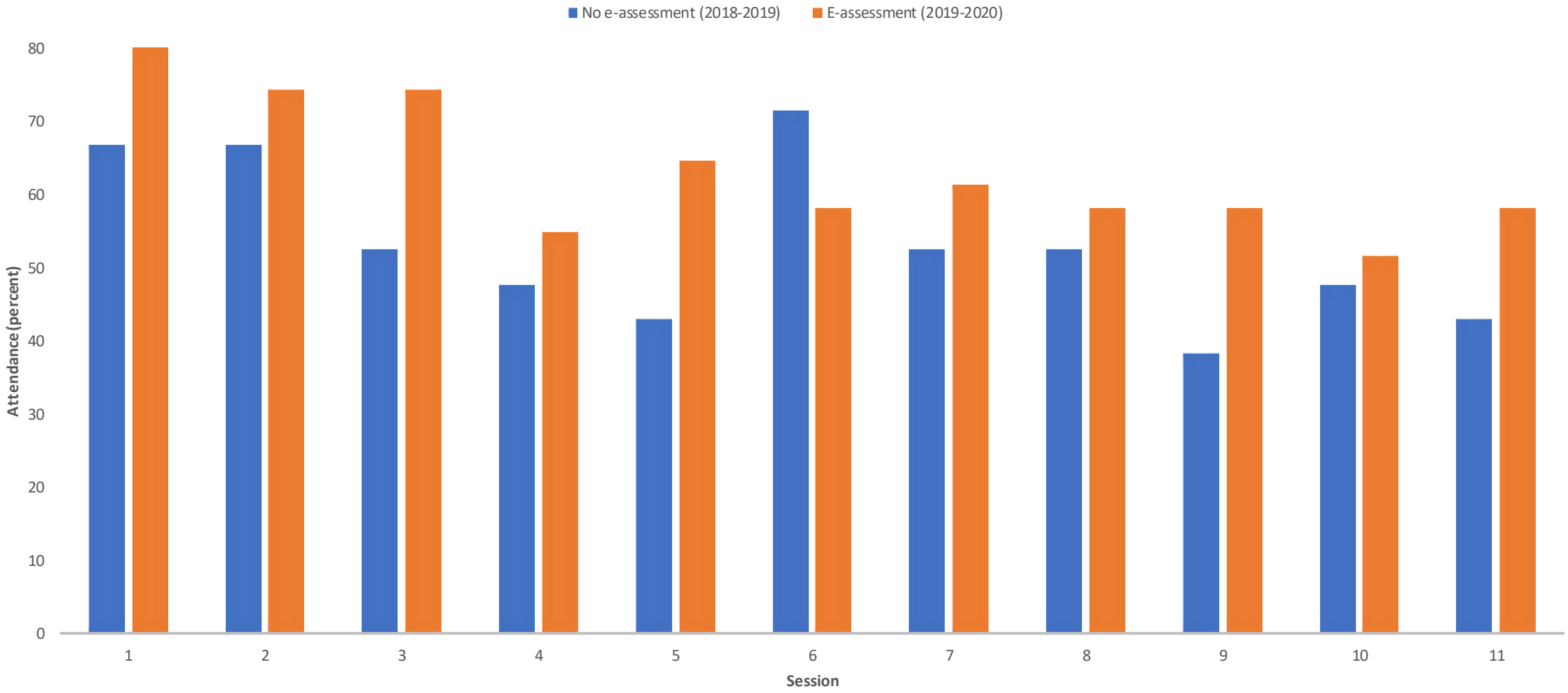
Score: 0/5
Unanswered

b. Assuming a two-tailed test, what is the p-value for a statistic $\boldsymbol{T = 1.83}$?

Submit part

Score: 0/5
Unanswered

Numbas e-assessment correlates with improved attendance



Summary statistics

	Statistics (as percentages)					
Academic year	Mean	Median	SD	IQR	Minimum	Maximum
2018-2019 (no e-assessment)	52.8	52.4	10.9	23.8	38.1	71.4
2019-2020 (e-assessment)	63.1	58.1	9.28	16.1	51.2	80.7

- Both mean and median attendance are higher for the *e-assessment* cohort
- In the *e-assessment* cohort attendance never falls below 50%, and reaches a maximum of 80.7%.
- In contrast, the *no e-assessment* cohort is characterized by a lower minimum of 38.1% as well as a lower maximum of 71.4%.

Significance

- A paired t-test confirms that there is strong evidence of a statistically significant increased average attendance in the *e-assessment* cohort with respect to the *no e-assessment* cohort ($t(10) = 3.34$, $p = 0.007$).
- Practical significance:
  - the mean attendance increase is 10.2%
  - the relative attendance increase is 19.5%
- The observed impact of introducing e-assessment corresponds to one extra student attending for every ten registered, and to one extra student attending in the *e-assessment* cohort for every five students attending in the *no e-assessment* cohort.

How to explain the increased attendance?

- Student comments are very appreciative of Numbas:
  - *The online assessments worked well and the fact that you get an instant result is also beneficial.*
  - *The online assessment is clear and simple to use. The practice questions are essential to make us put in the extra work and enable us to fully understand the subjects.*
  - *It is extremely helpful to have the randomised questions.*
  - *I must say the module content is excellent, especially the way we can practice randomised questions.*

How to explain the increased attendance?

- The comments show that students responded very positively to the introduction of e-assessment.
- Learning activities more interactive, instant feedback and advice prevent disengagement if students get stuck.
- Overall, students found e-assessment engaging, and this is reasonably expected to promote attendance.

Conclusions

- We investigated the impact of introducing formative Numbas e-assessment on student attendance.
- Upon introducing e-assessment, the average student attendance per session was found to increase by ~10% in absolute terms and by ~20% in relative terms.
- Student evaluation comments are consistent with an expectation that, compared to traditional pen and paper approaches, e-assessment can prove more authentic and engaging.