REshaping Assessment Excellence: COVID-19 and the New Now at the University of Bath

James H. Davenport & Tom Crick J.H.Davenport@bath.ac.uk & Thomas.Crick@swansea.ac.uk

University of Bath & Swansea University

19 September 2022

A common remark in commercial IT circles is that Covid did more for "digital transformation" in a month than cohorts of Chief Information Officers etc. had accomplished in a decade.

A common remark in commercial IT circles is that Covid did more for "digital transformation" in a month than cohorts of Chief Information Officers etc. had accomplished in a decade. Many businesses are not going back to "five days a week", with some research [Bin22] suggesting that "two days is optimal".

A common remark in commercial IT circles is that Covid did more for "digital transformation" in a month than cohorts of Chief Information Officers etc. had accomplished in a decade. Many businesses are not going back to "five days a week", with some research [Bin22] suggesting that "two days is optimal". There are many changes in Higher Education as well, which are not going to be reversed: we look at one area: assessment, and in particular the written examination.

Assessment pre-Covid: a frozen object?

Bath

Assessment pre-Covid: a frozen object?

Indeed, the final examination is a university institution that would appear to be off-limits as far as innovation is concerned. To put this into context, while faculty and students alike will not stray too far from a computer as they go about their daily business, it is still the norm for examinations to be conducted using pen and paper. Does this imply, therefore, that some element of modern learning theory might be sacrificed if it were abandoned in favour of some alternative instrument? Or, given it is still the most commonly administered summative assessment instrument in universities today, is there some other special intrinsic value attached to a closed-book, invigilated exam that justifies its continued use? [WW09]

James H. Davenport & Tom Crick

Bath

Trad-C Invigilated in an "examination hall". JHD has used this.

- Trad-C Invigilated in an "examination hall". JHD has used this.
- Trad-OR As above but students can bring in specified paper resources: often called "open book". JHD has used this [BDF⁺19] to reduce "memorisation".

- Trad-C Invigilated in an "examination hall". JHD has used this.
- Trad-OR As above but students can bring in specified paper resources: often called "open book". JHD has used this [BDF⁺19] to reduce "memorisation".
- Trad-OU As above with no restrictions on what can be brought it (on paper).

- Trad-C Invigilated in an "examination hall". JHD has used this.
- Trad-OR As above but students can bring in specified paper resources: often called "open book". JHD has used this [BDF⁺19] to reduce "memorisation".
- Trad-OU As above with no restrictions on what can be brought it (on paper).
- TakeHome-OU In a take-home examination, the student is given the question paper, and has to bring the answer back later (generally 24-hours). JHD had used this.

- Trad-C Invigilated in an "examination hall". JHD has used this.
- Trad-OR As above but students can bring in specified paper resources: often called "open book". JHD has used this $[\mathsf{BDF}^+19]$ to reduce "memorisation".
- Trad-OU As above with no restrictions on what can be brought it (on paper).
- TakeHome-OU In a take-home examination, the student is given the question paper, and has to bring the answer back later (generally 24-hours). JHD had used this.
 - Interim Use a VLE to deliver an examination paper, and collect answers. There are no technological constraints on the help students could acquire.

- Trad-C Invigilated in an "examination hall". JHD has used this.
- Trad-OR As above but students can bring in specified paper resources: often called "open book". JHD has used this [BDF⁺19] to reduce "memorisation".
- Trad-OU As above with no restrictions on what can be brought it (on paper).
- TakeHome-OU In a take-home examination, the student is given the question paper, and has to bring the answer back later (generally 24-hours). JHD had used this.
 - Interim Use a VLE to deliver an examination paper, and collect answers. There are no technological constraints on the help students could acquire.
- Electronic-C A university-managed examination, generally using specific software. How is "Closed" monitored?

- Trad-C Invigilated in an "examination hall". JHD has used this.
- Trad-OR As above but students can bring in specified paper resources: often called "open book". JHD has used this [BDF⁺19] to reduce "memorisation".
- Trad-OU As above with no restrictions on what can be brought it (on paper).
- TakeHome-OU In a take-home examination, the student is given the question paper, and has to bring the answer back later (generally 24-hours). JHD had used this.
 - Interim Use a VLE to deliver an examination paper, and collect answers. There are no technological constraints on the help students could acquire.
- Electronic-C A university-managed examination, generally using specific software. How is "Closed" monitored?
- Electronic-OU As above, but the students are allowed to use any Internet resources.

Prior Two hour Trad-C or Trad-O. TakeHome-OU disguised as "coursework".

- Prior Two hour Trad-C or Trad-O. TakeHome-OU disguised as "coursework".
- May 2020 **Interim**. All students were given a 24-hour window in which to do them.

- Prior Two hour Trad-C or Trad-O. TakeHome-OU disguised as "coursework".
- May 2020 **Interim**. All students were given a 24-hour window in which to do them.
- January 2021 **Electronic-O**, still with a 24-hour window. Maths took the option to insist that students only had three hours (2 hour exam+1/administration).

- Prior Two hour Trad-C or Trad-O. TakeHome-OU disguised as "coursework".
- May 2020 **Interim**. All students were given a 24-hour window in which to do them.
- January 2021 **Electronic-O**, still with a 24-hour window. Maths took the option to insist that students only had three hours (2 hour exam+1/administration).
 - May 2021 Success, and greater familiarity with Electronic-O, meant many more departments moved to the three-hour limit.

- Prior Two hour Trad-C or Trad-O. TakeHome-OU disguised as "coursework".
- May 2020 Interim. All students were given a 24-hour window in which to do them
- January 2021 **Electronic-O**, still with a 24-hour window. Maths took the option to insist that students only had three hours (2 hour exam+1/administration).
 - May 2021 Success, and greater familiarity with Electronic-O, meant many more departments moved to the three-hour limit.
- January 2022 three-hour (still thought of as 2+1) examinations for all, but now fixed the start time.

- Prior Two hour Trad-C or Trad-O. TakeHome-OU disguised as "coursework".
- May 2020 **Interim**. All students were given a 24-hour window in which to do them.
- January 2021 **Electronic-O**, still with a 24-hour window. Maths took the option to insist that students only had three hours (2 hour exam+1/administration).
 - May 2021 Success, and greater familiarity with Electronic-O, meant many more departments moved to the three-hour limit.
- January 2022 three-hour (still thought of as 2+1) examinations for all, but now fixed the start time.
 - May 2022 Following very substantial pressure by the academics, the university allowed some **Trad-C** examinations in first-year subjects.

- Prior Two hour Trad-C or Trad-O. TakeHome-OU disguised as "coursework".
- May 2020 Interim. All students were given a 24-hour window in which to do them.
- January 2021 **Electronic-O**, still with a 24-hour window. Maths took the option to insist that students only had three hours (2 hour exam+1/administration).
 - May 2021 Success, and greater familiarity with Electronic-O, meant many more departments moved to the three-hour limit.
- January 2022 three-hour (still thought of as 2+1) examinations for all, but now fixed the start time.
 - May 2022 Following very substantial pressure by the academics, the university allowed some Trad-C examinations in first-year subjects.
 - Future Some Trad-C, mostly Electronic-O, experiment with Electronic-O in an invigilated setting.

This has been overwhelmingly positive among final year students (as captured by National Student Survey). One of many (22 in Maths, 13 in CS):

This has been overwhelmingly positive among final year students (as captured by National Student Survey). One of many (22 in Maths, 13 in CS):

Online exams - the exams work better when they use problems to check your understanding instead of your memory.

This has been overwhelmingly positive among final year students (as captured by National Student Survey). One of many (22 in Maths, 13 in CS):

Online exams - the exams work better when they use problems to check your understanding instead of your memory.

The students show appreciation of the different things that open-book examinations test, though they assume "online" = "open book" — it was for them.

Reshaping ... Bath

This has been overwhelmingly positive among final year students (as captured by National Student Survey). One of many (22 in Maths, 13 in CS):

Online exams - the exams work better when they use problems to check your understanding instead of your memory.

The students show appreciation of the different things that open-book examinations test, though they assume "online" = "open book" — it was for them. The rare (N=2) negative ones are worth noting.

This has been overwhelmingly positive among final year students (as captured by National Student Survey). One of many (22 in Maths, 13 in CS):

Online exams - the exams work better when they use problems to check your understanding instead of your memory.

The students show appreciation of the different things that open-book examinations test, though they assume "online" = "open book" — it was for them. The rare (N=2) negative ones are worth noting.

I absolutely would not want to keep online exams, in person is much better due to an abundance of cheating. [Maths]

This has been overwhelmingly positive among final year students (as captured by National Student Survey). One of many (22 in Maths, 13 in CS):

Online exams - the exams work better when they use problems to check your understanding instead of your memory.

The students show appreciation of the different things that open-book examinations test, though they assume "online" = "open book" — it was for them. The rare (N=2) negative ones are worth noting.

I absolutely would not want to keep online exams, in person is much better due to an abundance of cheating. [Maths] Certain exams are more relevant in open-book, online format, but not all. [CS]

Reshaping ... Bath

[Dic22] reports a small (N=900) survey [Alp22] of UK students.

[Dic22] reports a small (N=900) survey [Alp22] of UK students. The numbers suggest that 1 in 6 students in the UK have cheated in online exams this academic year. Over half of those surveyed knew people who had cheated in online assessments. Almost 8 out 10 believed that it was easier to cheat in online exams than in exam halls, and the methods for cheating were often laughably rudimentary - including calling or messaging friends for help during the exam, using google to search for answers on a separate device, or asking parents to read through answers prior to submission.

[Dic22] reports a small (N=900) survey [Alp22] of UK students. The numbers suggest that 1 in 6 students in the UK have cheated in online exams this academic year. Over half of those surveyed knew people who had cheated in online assessments. Almost 8 out 10 believed that it was easier to cheat in online exams than in exam halls, and the methods for cheating were often laughably rudimentary - including calling or messaging friends for help during the exam, using google to search for answers on a separate device, or asking parents to read through answers prior to submission.

The University of Bath has certainly experienced an increase in detected use of "unfair means". There is probably a larger increase in undetected use of unfair means.

James H. Davenport & Tom Crick

[Dic22] reports a small (N=900) survey [Alp22] of UK students. The numbers suggest that 1 in 6 students in the UK have cheated in online exams this academic year. Over half of those surveyed knew people who had cheated in online assessments. Almost 8 out 10 believed that it was easier to cheat in online exams than in exam halls, and the methods for cheating were often laughably rudimentary - including calling or messaging friends for help during the exam, using google to search for answers on a separate device, or asking parents to read through answers prior to submission.

The University of Bath has certainly experienced an increase in detected use of "unfair means". There is probably a larger increase in undetected use of unfair means.

[Wil22] also reports a worrying rise, but data come from an online proctoring company.

Academic Misconduct: JHD's experiences

Academic Misconduct: JHD's experiences

 JHD has sat on misconduct judgement panels, and his subjective view would be that much of this has been extempore abuse, as students get tempted in the stress of the examination, rather than pre-planned (as cheating in Trad-C examinations has to be).

Academic Misconduct: JHD's experiences

- JHD has sat on misconduct judgement panels, and his subjective view would be that much of this has been extempore abuse, as students get tempted in the stress of the examination, rather than pre-planned (as cheating in Trad-C examinations has to be).
- One of JHD's final year examination papers (in the 24-hour setting) was posted on Chegg. No responses were detected.

Academic Misconduct: JHD's experiences

- JHD has sat on misconduct judgement panels, and his subjective view would be that much of this has been extempore abuse, as students get tempted in the stress of the examination, rather than pre-planned (as cheating in Trad-C examinations has to be).
- One of JHD's final year examination papers (in the 24-hour setting) was posted on Chegg. No responses were detected.



But it might be very different for first-year examinations, and Maths (staff and students) really wanted Trad-C here.

Academic Misconduct: JHD's experiences

- JHD has sat on misconduct judgement panels, and his subjective view would be that much of this has been extempore abuse, as students get tempted in the stress of the examination, rather than pre-planned (as cheating in Trad-C examinations has to be).
- One of JHD's final year examination papers (in the 24-hour setting) was posted on Chegg. No responses were detected.



But it might be very different for first-year examinations, and Maths (staff and students) really wanted **Trad-C** here.

"I have an online Statistics Examination from 08:30 to 11:30 next Friday. Is anyone familar with "Definition of continuous random variables (RVs), cumulative distribution functions (CDFs) and probability density functions (PDFs). . . . [a screenshot of what was obviously a 1st/2nd-year syllabus]" please bid to help me.

[https://www.freelancer.com/jobs/statistics/].

• **Setting**. Open-book exams are very different, and it takes practice to get the difficulty and duration right. The entire community (examiners, mentors, externals) have had to adjust very rapidly: "blind leading blind".

- **Setting**. Open-book exams are very different, and it takes practice to get the difficulty and duration right. The entire community (examiners, mentors, externals) have had to adjust very rapidly: "blind leading blind".
- **Misconduct** note that "Al proctoring" has problems, from legal [(Un22] to practical [New22]. "Automation bias" training is probably essential.

- **Setting**. Open-book exams are very different, and it takes practice to get the difficulty and duration right. The entire community (examiners, mentors, externals) have had to adjust very rapidly: "blind leading blind".
- Misconduct note that "Al proctoring" has problems, from legal [(Un22] to practical [New22]. "Automation bias" training is probably essential.
- Authenticity is that the student the person we think? Some Italian universities, even pre-Covid, insisted on (short) oral examinations for the teacher to confirm identity and some knowledge. Expensive, though.

- **Setting**. Open-book exams are very different, and it takes practice to get the difficulty and duration right. The entire community (examiners, mentors, externals) have had to adjust very rapidly: "blind leading blind".
- Misconduct note that "Al proctoring" has problems, from legal [(Un22] to practical [New22]. "Automation bias" training is probably essential.
- Authenticity is that the student the person we think? Some Italian universities, even pre-Covid, insisted on (short) oral examinations for the teacher to confirm identity and some knowledge. Expensive, though.
- **Stress** on students' ethics do we prepare them for this? We have seen nothing written on this.

- **Setting**. Open-book exams are very different, and it takes practice to get the difficulty and duration right. The entire community (examiners, mentors, externals) have had to adjust very rapidly: "blind leading blind".
- Misconduct note that "Al proctoring" has problems, from legal [(Un22] to practical [New22]. "Automation bias" training is probably essential.
- Authenticity is that the student the person we think? Some Italian universities, even pre-Covid, insisted on (short) oral examinations for the teacher to confirm identity and some knowledge. Expensive, though.
- **Stress** on students' ethics do we prepare them for this? We have seen nothing written on this.
- **Definition** of proper/improper online resources. We haven't seen a good definition that will allow Wikipedia searches but not tools that write programs [FADB+22], say. JHD says "non-interactive Internet resources": this hasn't met a lawyer.

Q1 [WW09] ask "is there some other special intrinsic value attached to a closed-book, invigilated exam that justifies its continued use"?

- Q1 [WW09] ask "is there some other special intrinsic value attached to a closed-book, invigilated exam that justifies its continued use"?
- A1 The relative ease of detecting misconduct, and the lack of opportunity for extempore misconduct, are non-trivial factors.

- Q1 [WW09] ask "is there some other special intrinsic value attached to a closed-book, invigilated exam that justifies its continued use"?
- A1 The relative ease of detecting misconduct, and the lack of opportunity for extempore misconduct, are non-trivial factors.
- Q2 Won't more testing open-book exams be disliked by students?

- Q1 [WW09] ask "is there some other special intrinsic value attached to a closed-book, invigilated exam that justifies its continued use"?
- A1 The relative ease of detecting misconduct, and the lack of opportunity for extempore misconduct, are non-trivial factors.
- Q2 Won't more testing open-book exams be disliked by students?
- A2 Not on Bath's evidence, or nationally [(Un22].

- Q1 [WW09] ask "is there some other special intrinsic value attached to a closed-book, invigilated exam that justifies its continued use"?
- A1 The relative ease of detecting misconduct, and the lack of opportunity for extempore misconduct, are non-trivial factors.
- Q2 Won't more testing open-book exams be disliked by students?
- A2 Not on Bath's evidence, or nationally [(Un22].
- Q3 Won't more testing open-book exams be harder to set?

- Q1 [WW09] ask "is there some other special intrinsic value attached to a closed-book, invigilated exam that justifies its continued use"?
- A1 The relative ease of detecting misconduct, and the lack of opportunity for extempore misconduct, are non-trivial factors.
- Q2 Won't more testing open-book exams be disliked by students?
- A2 Not on Bath's evidence, or nationally [(Un22].
- Q3 Won't more testing open-book exams be harder to set?
- A3 Different, certainly, and the speed of the move caught most unprepared. But the system seems to have adjusted.

- Q1 [WW09] ask "is there some other special intrinsic value attached to a closed-book, invigilated exam that justifies its continued use"?
- A1 The relative ease of detecting misconduct, and the lack of opportunity for extempore misconduct, are non-trivial factors.
- Q2 Won't more testing open-book exams be disliked by students?
- A2 Not on Bath's evidence, or nationally [(Un22].
- Q3 Won't more testing open-book exams be harder to set?
- A3 Different, certainly, and the speed of the move caught most unprepared. But the system seems to have adjusted.
- Q4 How to define "allowed Internet usage" (?and police it)?

- Q1 [WW09] ask "is there some other special intrinsic value attached to a closed-book, invigilated exam that justifies its continued use"?
- A1 The relative ease of detecting misconduct, and the lack of opportunity for extempore misconduct, are non-trivial factors.
- Q2 Won't more testing open-book exams be disliked by students?
- A2 Not on Bath's evidence, or nationally [(Un22].
- Q3 Won't more testing open-book exams be harder to set?
- A3 Different, certainly, and the speed of the move caught most unprepared. But the system seems to have adjusted.
- Q4 How to define "allowed Internet usage" (?and police it)?
- A4 Good question!

- Q1 [WW09] ask "is there some other special intrinsic value attached to a closed-book, invigilated exam that justifies its continued use"?
- A1 The relative ease of detecting misconduct, and the lack of opportunity for extempore misconduct, are non-trivial factors.
- Q2 Won't more testing open-book exams be disliked by students?
- A2 Not on Bath's evidence, or nationally [(Un22].
- Q3 Won't more testing open-book exams be harder to set?
- A3 Different, certainly, and the speed of the move caught most unprepared. But the system seems to have adjusted.
- Q4 How to define "allowed Internet usage" (?and police it)?
- A4 Good question!
- Q5 Are these "better" examinations?

- Q1 [WW09] ask "is there some other special intrinsic value attached to a closed-book, invigilated exam that justifies its continued use"?
- A1 The relative ease of detecting misconduct, and the lack of opportunity for extempore misconduct, are non-trivial factors.
- Q2 Won't more testing open-book exams be disliked by students?
- A2 Not on Bath's evidence, or nationally [(Un22].
- Q3 Won't more testing open-book exams be harder to set?
- A3 Different, certainly, and the speed of the move caught most unprepared. But the system seems to have adjusted.
- Q4 How to define "allowed Internet usage" (?and police it)?
- A4 Good question!
- Q5 Are these "better" examinations?
- A5 How to measure? But see [JMW⁺14] "The assessment level incorporated into the course had a significant impact on students' conceptual understanding and final achievement scores".

Bibliography I



Alpha Academic Appeals.

Press release on prevalence of cheating in online assessment, July 2022.

http://www.academicappeals.co.uk/news/05072022201747-press-release-on-prevalence-of-cheating-2022.



Jack Betteridge, James H. Davenport, Melina Freitag, Willem Heijltjes, Stef Kynaston, Gregory Sankaran, and Gunnar Traustason.

Teaching of computing to mathematics students: Programming and discrete mathematics.

In Steven Bradley and Alexandra Cristea, editors, *CEP '19: Proceedings of the 3rd Conference on Computing Education Practice*, pages 12:1–12:4, New York, NY, USA, 2019. ACM.

Bibliography II



K. Bindley.

What if the Optimal Workweek Is Two Days in the Office, Not Three?

https://www.wsj.com/articles/
the-optimal-workweek-is-two-days-in-the-office-not-thr
2022.



J. Dickinson.

Did 1 in 6 students cheat in online assessments this year?

https://wonkhe.com/blogs/did-1-in-6-students-cheat-in-online-assessments-this-y 2022.

Bibliography III



Finnie-Ansley, J., P. Denny, B.A. Becker, A. Luxton-Reilly, and J. Prather.

The Robots Are Coming: Exploring the Implications of OpenAl Codex on Introductory Programming.

ACE '22: Australasian Computing Education Conference, pages 10–19, 2022.



J.L. Jensen, M.A. McDaniel, S.M. Woodard, , and T.A. Kummer.

Teaching to the test ... or testing to teach: Exams requiring higher order thinking skills encourage greater conceptual understanding.

Educational Psychology Review, 26:307–329, 2014.

Bibliography IV



Accused of Cheating by an Algorithm, and a Professor She Had Never Met.

https://www.nytimes.com/2022/05/27/technology/college-students-cheating-software-honorlock.html, 2022.



Joint Information Services Committee (Uniwise).
Online proctoring: panacea or problem?

https://www.jisc.ac.uk/membership/stories/online-proctoring-panacea-or-problem, 2022.



T. Williams.

Levels of cheating in online exams soaring, say invigilators.

https://www.timeshighereducation.com/news/levels-cheating-online-exams-soaring-say-invigilators, 2022.

Bibliography V



B.J. Williams and A. Wong.

The efficacy of final examination: A comparative study of closed-book, invigilated exams and open-book, open-web exams.

Br. J. Educ. Technol., 40:227-236, 2009.