MAKING A CASE FOR ONLINE EXAMS

EFFICIENCY, INTEGRITY AND INSIGHT

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UNIVERSITY OF NEW SOUTH WALES

UNSW

Outline

- Proposed DA Strategy at UNSW (Mathew)
- DA Framework (Patrick)
  - Authenticity
  - Efficiency
  - Integrity
  - Insight
- DA pilots and examples (Mathew)

A holistic digital assessment strategy is needed

Pedagogic alignment across and within curriculum − formative to summative.

Technical Architecture −

A common core capability with the ability to plugin custom assessment tools used by discipline areas and connect to other services

UNSW: On campus contexts: Moodle Quiz + Safe Exam Browser

UNSW: Off-campus contexts: Moodle Quiz + Examity (remove invigilation and recording)

Additional services **–** configuration, recording, integrity checking, e-marking, analytics, reporting…

Support for academics − Professional development, training, development, exemplars: UNSW: Digital Assessment Community of Practice, Digital Assessment tool kit, technology training …

Support for students − including a broader BYOD strategy, equity, transition support.

Policy and procedure − assessment, exams, equipment…

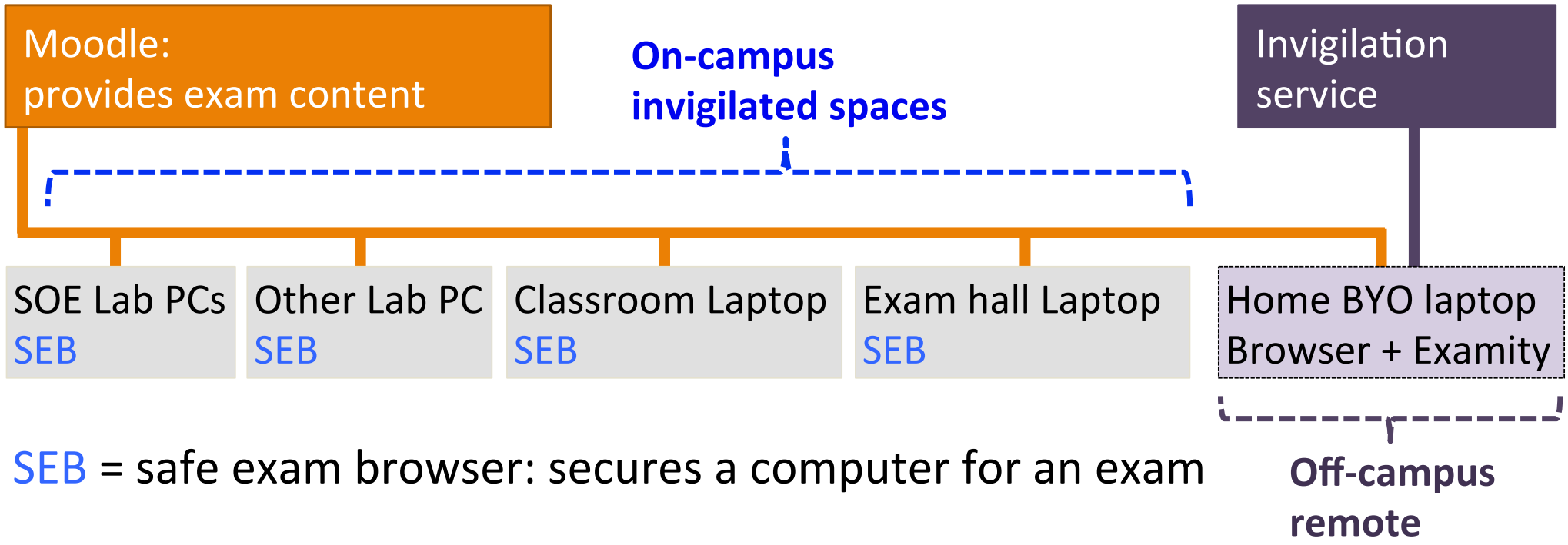
An eye to the future − student performance at the macro and micro across the curriculum needs access to data (avoid isolated black boxes).

Working together − faculties, schools, TELT admins, learning designers, PVCE, ETS, exams unit, IT, student support, disability office, … and many others!

DA strategy for UNSW (possible)

Proposal: A holistic assessment architecture across multiple contexts

Enable secure digital assessments to be done across a range of context using common core tools.

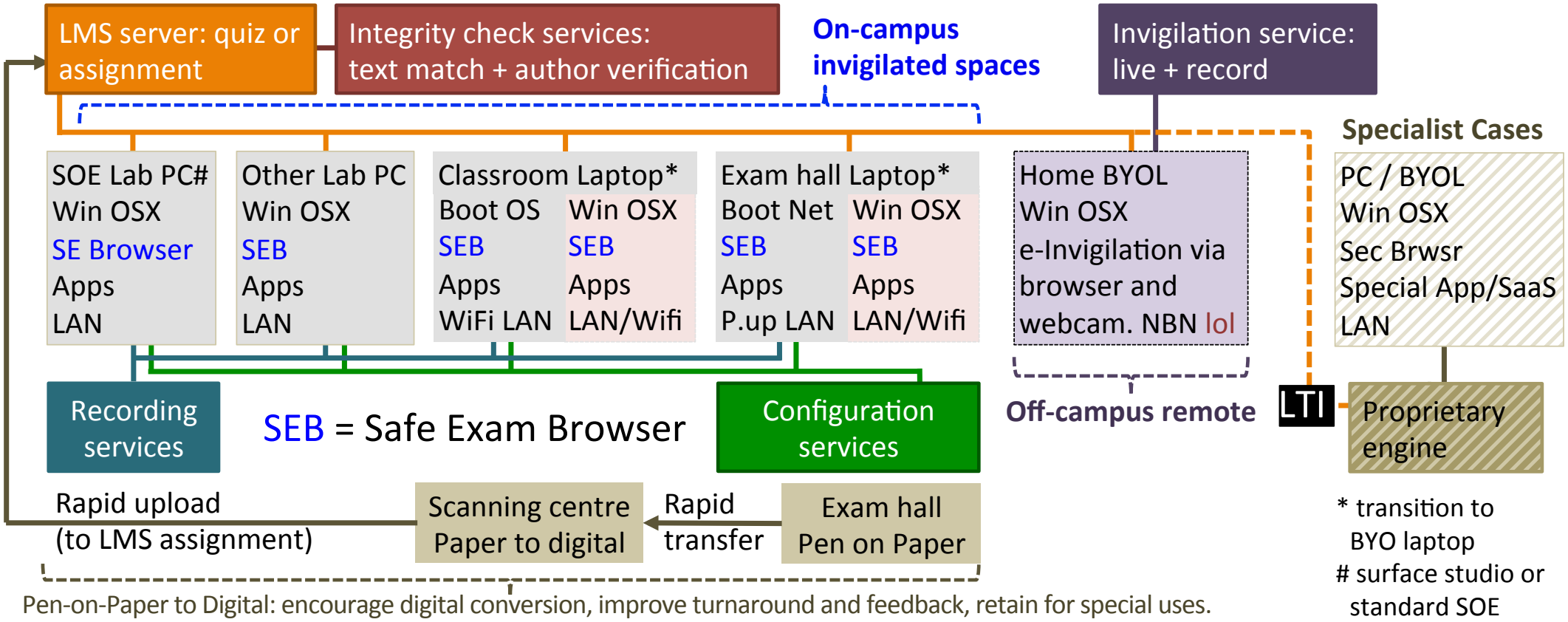


SEB = safe exam browser: secures a computer for an exam

Digital assessment anywhere, anytime, anyhow!

DA architecture for UNSW (core + extensible)

A common core that is extensible to include other assessment tools and services.
UNSW: Moodle and Safe Exam Browser or remote proctoring.



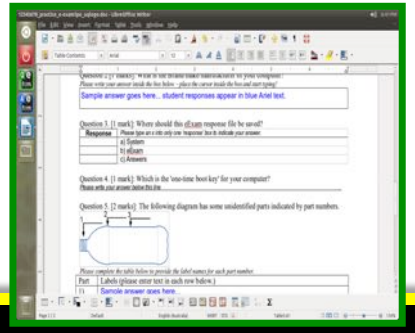
Pen-on-Paper to Digital: encourage digital conversion, improve turnaround and feedback, retain for special uses.

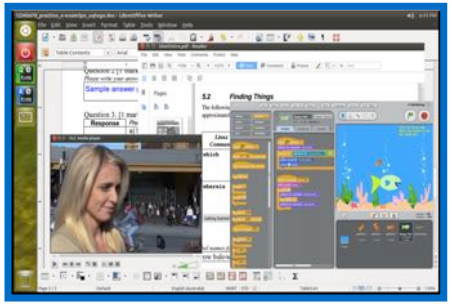
Digital assessment anywhere, anytime, anyhow!

Towards authentic invigilated e-assessment (DET BYOD roadmap)

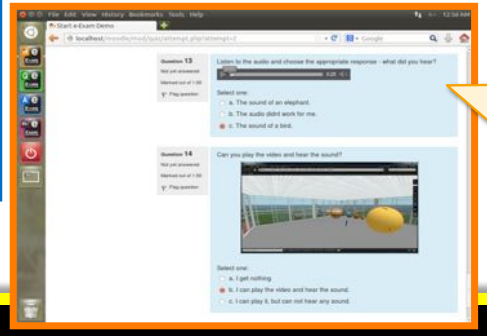
Start >	> > >	> > >	> > >	> > >	> Future >
Get Ready	**Phase 1**	**Phase 2**	**Phase 3**	**Phase 4**	**Phase 5**
Institutional approvals, research ethics, hardware and infrastructure	Paper equivalent small scale. Basic doc exams to begin!	Post-paper small to medium. Expanding the app and media landscape.	Medium to large scale. Adding the power of an LMS.	Whitelisted and logged Internet Network BYOD exam.	Open but fully logged Internet Network mixed mode BYOD exam.
	Crawling	**Walking**	**Running**	**Jumping**	**Flying!**

http://ta.vu/e-exam-roadmap



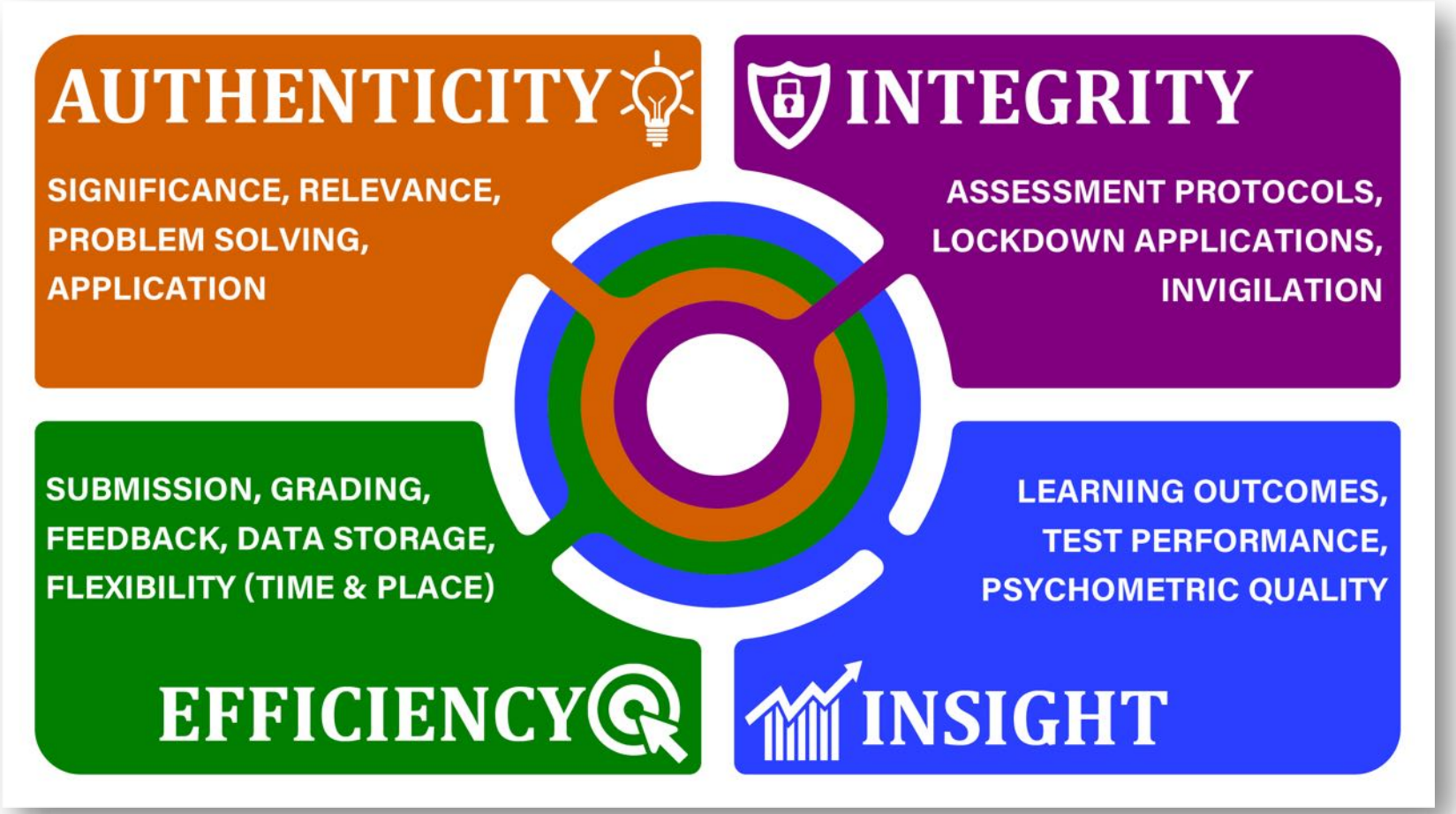


Extension work:
An offline e-learning platform see **moleap.org**



Moodle resistant to network outages + encrypted autosave.

Digital Assessment (Online Exams) Framework



DA Authenticity

Authentic assessment* = realism, contextualisation and problematisation (Villarroel et al 2018). Means offering worthwhile, significant and meaningful tasks for students.

Learning Objectives	DA Ideas and Tools
Ability to access and manage information (collecting data, observing and interpreting)	Research tasks (using Library resources), Create a digital artefact (image, audio, video, blog)
Knowledge and concept understanding (recalling, describing, relating)	Online quizzes, Oral presentations (via Zoom), Create online glossaries, Online discussion forum
Knowledge application (problem solving)	Online quizzes, Case studies, Capstone projects, Group work, **Interactive** assignments (with simulation, game-based, using software to construct responses)
Analysis (defining and solving problems, analyzing data, designing experiments)	Research proposal, Project-based tasks, Case studies
Evaluating (critical thinking, building arguments, reflecting)	Online quizzes, Literature review, Response to trigger questions posted on forums, Online discussion in professional network, Group work
Designing, creating	**Online portfolio**, **Create a digital artefact** (image, audio, video, blog)

DA Efficiency

The most important motivating factor for adopting DA (Online Exams)

- **Efficiency** (marking, anywhere/anytime, record keeping, paperless, audit)
- **Instant result and feedback** (or at least quicker)
- **More control** (randomization, overrides, exam keys, session recording)
- **Various question types** (MCQ, calculated questions, drag-drop, drawing …)
- **Practical exams** (software tools - Excel, CAD, programming …)
- **Rich resources** (webpages, multimedia, databases)
- **Data analysis**

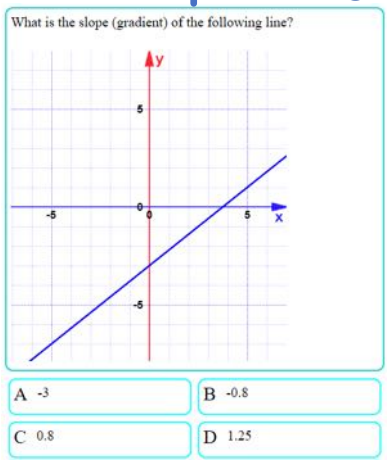
DA Efficiency - Quiz Production

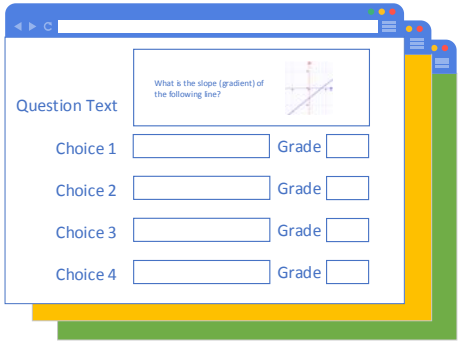
Quiz Markup Language (QML)

Patrick Tran, UNSW Canberra

http://patricktran.info/quiz-generator-for-moodle/

Using the web forms

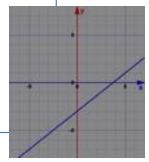




Using QML

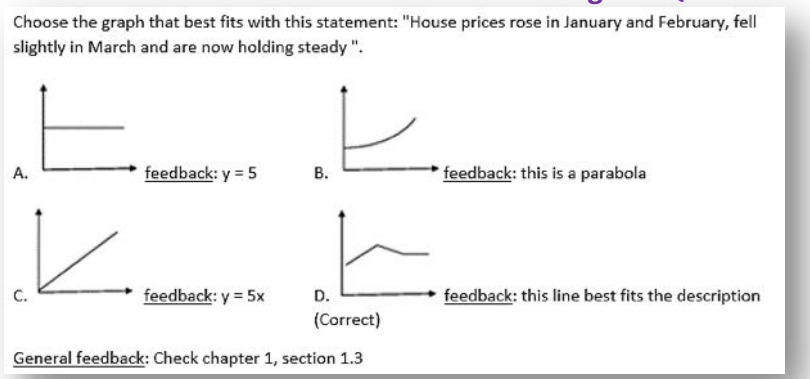
```
[[[What is the slope (gradient) of the following line?
**pic01**]]]
A. -3
B. -0.8
C. 0.8
D. 1.25 [[*]]

[[[...]]] ...
```

Quiz 01.txt



pic01.png

Original Question



Moodle XML

```
<question type="multichoice">
  <name>
    <text>I02 - Q01 - multi - G</text>
  </name>
  <questiontext format="html">
    <text><![CDATA[Choose the graph that best fits with this
    statement: "House prices rose in January and February, fell
    slightly in March and are now holding steady ".]]></text>
  </questiontext>
  <generalfeedback format="html">
    <text><![CDATA[ General feedback: Check chapter 1, section
    1.3]]></text>
  </generalfeedback>
  <single>True</singl
  <shuffleanswers>Tru
  <answer fraction=""
    <text><![CDATA[<d
    src="@@PLUGINFILE
    class="img-respon
    <file name="p01"
    iVBORw0KGgoAAAANS
    ARnQU1BAACxjwv8YQ
    AAACAgIKqqqjU1NUR
    ///8AJa2ZYgAAAAlw
```

QML Format

```
19 [[[Choose the graph that best fits with this
   statement: "House prices rose in January and
   February, fell slightly in March and are now
   holding steady ".]]]
20 {@feedback: General feedback: Check chapter 1,
   section 1.3}
21 A. **p01**####feedback: y = 5
22 B. **p02**####feedback: this is a parabola
23 C. **p03**####feedback: y = 5x
24 D. **p04**##100##feedback: this line best fits the
   description
```

Online QML Converter: http://qml2xml.pro/

Demo: https://youtu.be/dkfYsj-Hpm8

✓ External graphic files ✓Human-readable format (vs XML) ✓ Copy & Paste ✓ Find & Replace ✓ Sharing

DA Integrity

- **Assessment protocols** (exam rules from central office + online context)
- **Online Proctoring** (live, recorded, automated)

proctorio

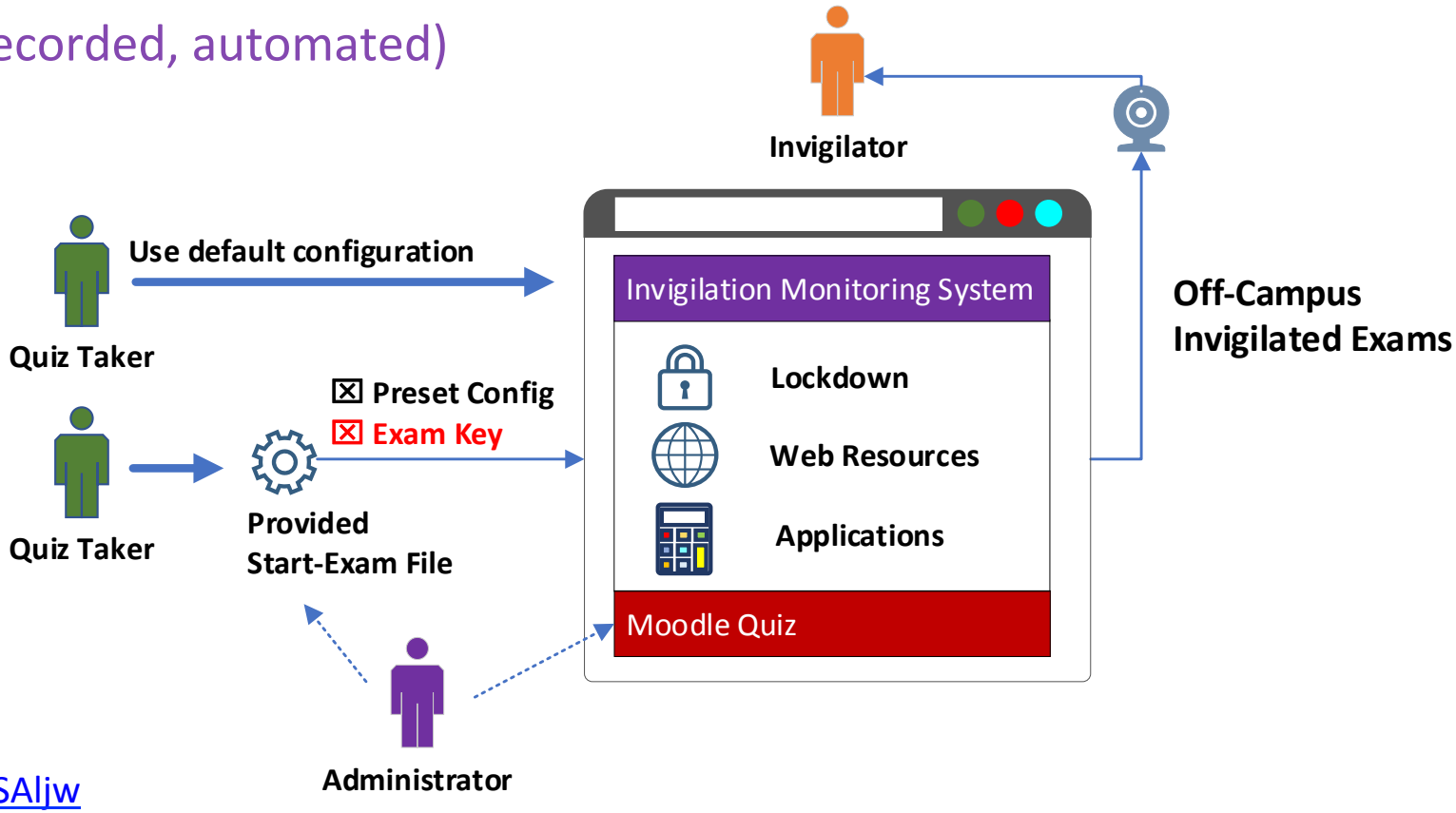
examity BETTER TEST INTEGRITY.

ProctorU

- **Lockdown Application**

SEB Safe Exam Browser www.safeexambrowser.org

Demo: https://youtu.be/K_4-IkSAljw



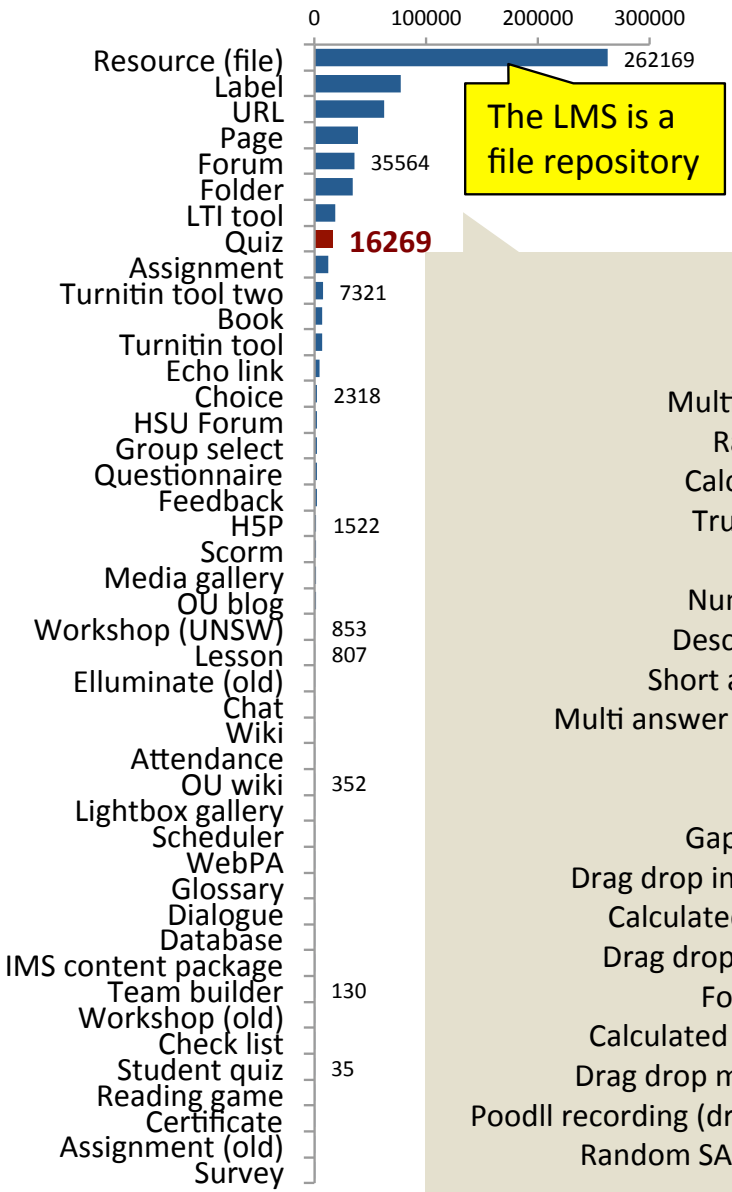
DA Insights: usage patterns

Snapshot taken 25 Oct 2019 UNSW Moodle prod.

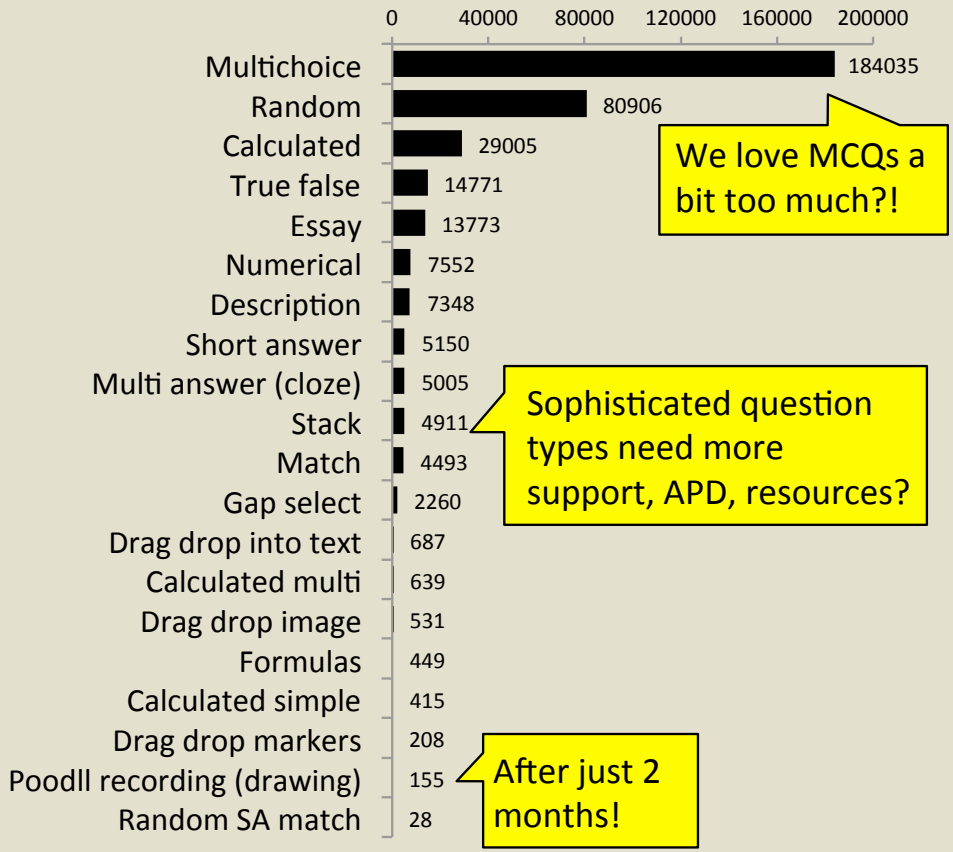
Filtered to teaching courses with > 5 enrolments during 2015 to 2019.

Mathew Hillier & Samuel Zhang (Student as partner, ETS)

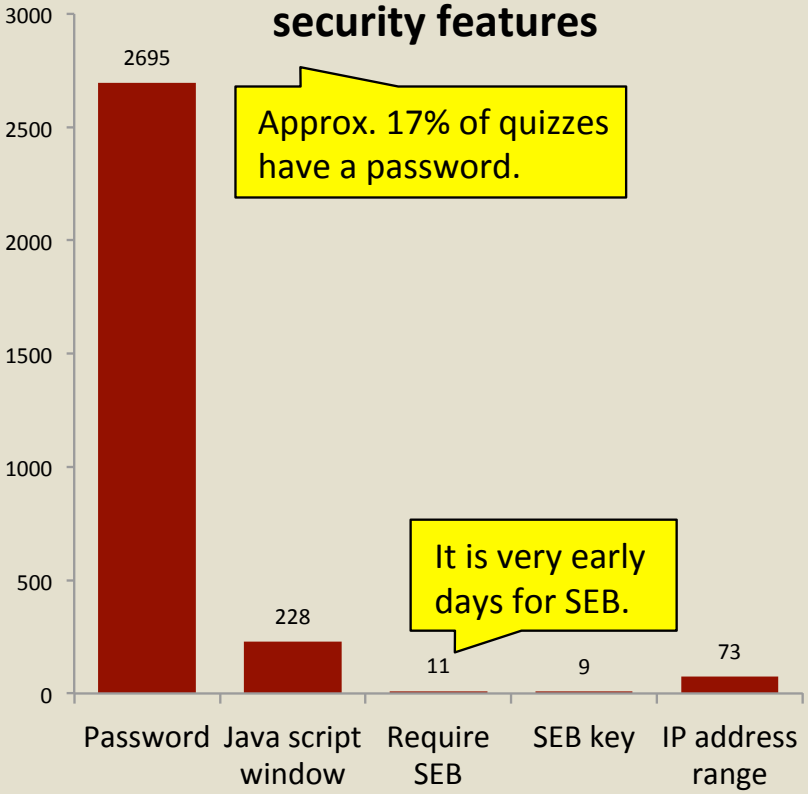
Moodle tool use



Quiz question types

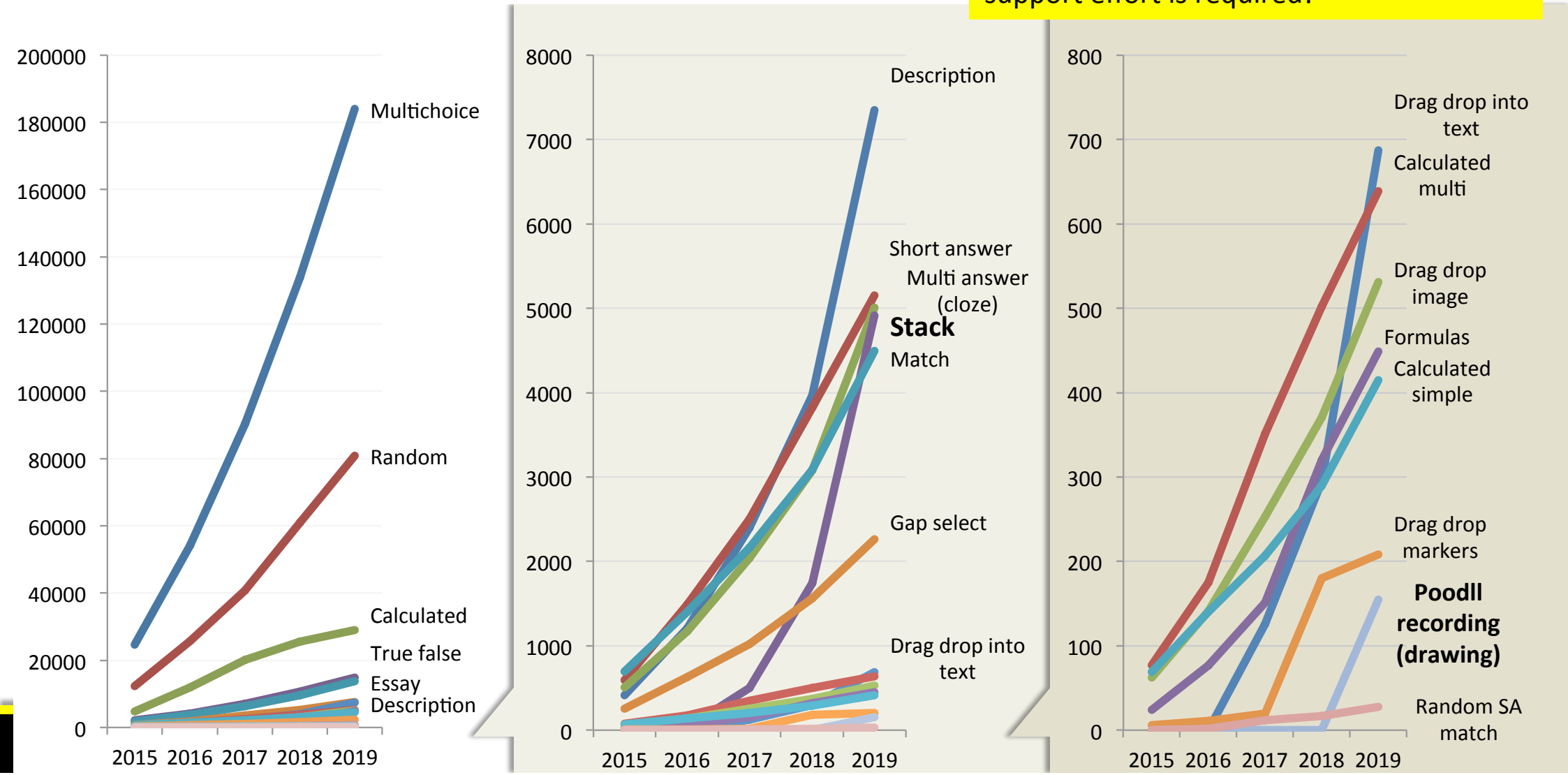


Moodle quizzes using security features



Quiz question types (2015-2019)

Moodle is a rich tool set for assessment but is much under utilised. A holistic support effort is required!



DA Insights
Assessment Analytics

- Psychometric quality
  - Facility index (question difficulty)
  - Discrimination index/coefficient

Total Score (%)	Q1	Q2	Q3
90	1	0	1
90	1	0	1
80	0	0	1
80	1	0	1
70	1	0	1
60	1	0	0
60	1	0	1
50	1	1	0
50	1	1	0
40	0	1	0

17	I17 - Q17	167	95.21%	21.42%	20.00%	5.00%	3.70%	27.58%	49.98%
18	I18 - Q18	167	62.87%	48.46%	20.00%	5.00%	5.77%	20.84%	25.80%
19	I19 - Q19	167	80.24%	39.94%	20.00%	5.00%	5.63%	30.12%	40.92%
20	I20 - Q20	167	62.28%	48.62%	20.00%	5.00%	6.21%	27.19%	34.55%

Statistics for question positions

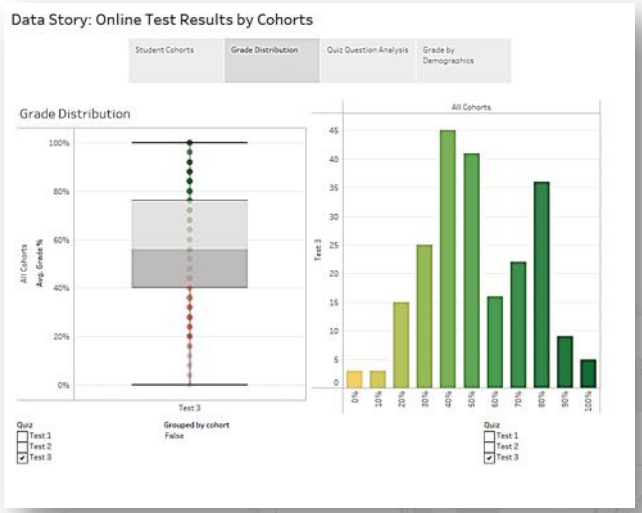
Moodle: Quiz>Results>Statistics

Show chart data

Q3 Difficulty = correct / all = 6 / 10 = 0.60
Q3 Discrimination = (high.correct – low.correct) / group size = (5-1)/5 = 0.80

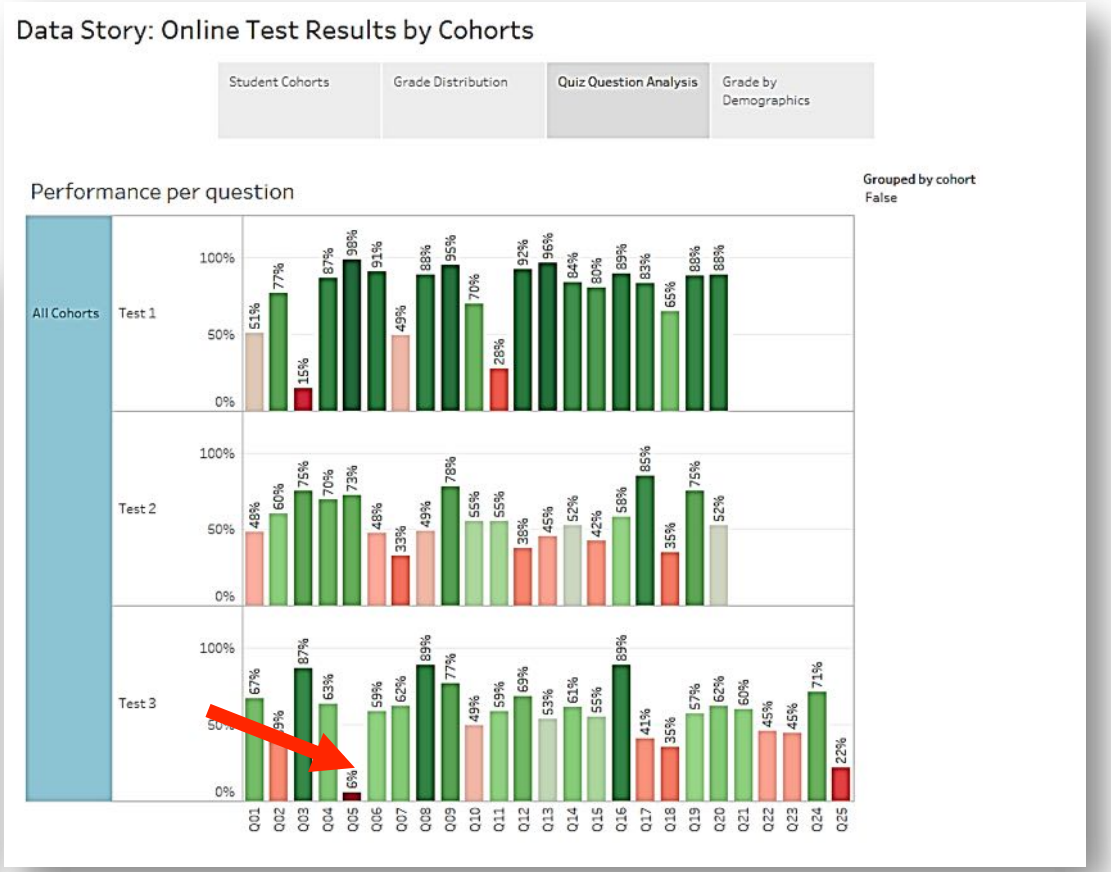
DA Insights – Visual Analytics

Moodle quiz: Grade distribution and confidence intervals (Export from Moodle into Tableau)

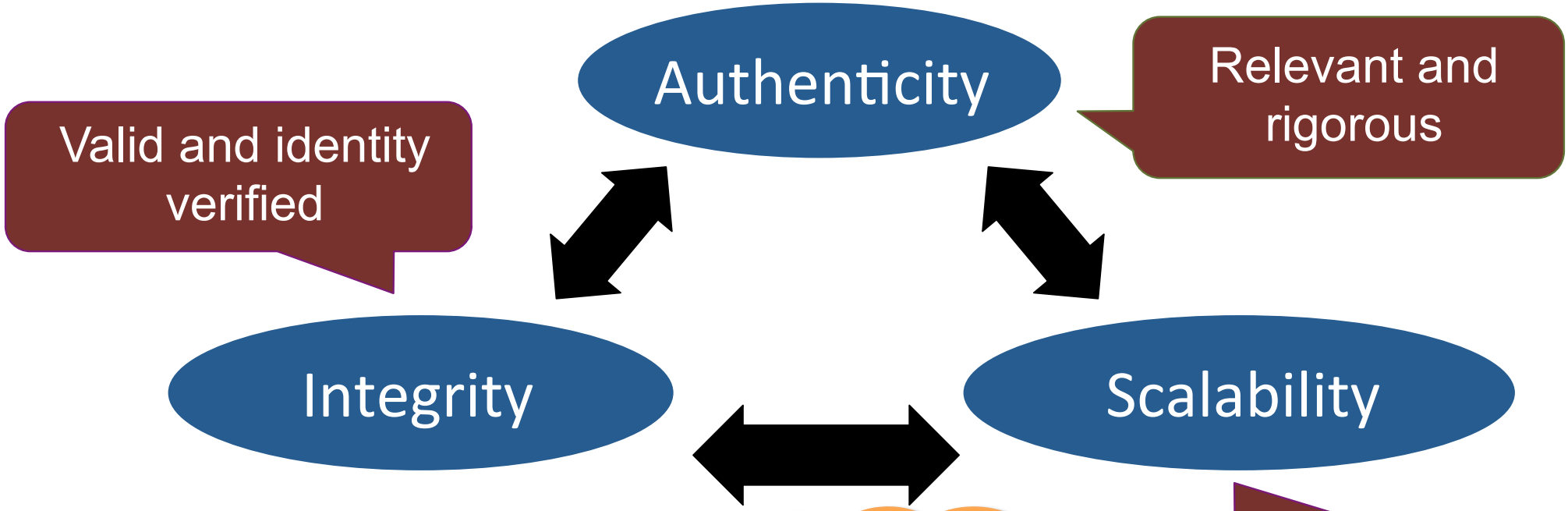


Students demographics

Moodle Quiz: Question performance by cohort



Picking DA tech: Good e-Exams – Three dimensions – A trade off?



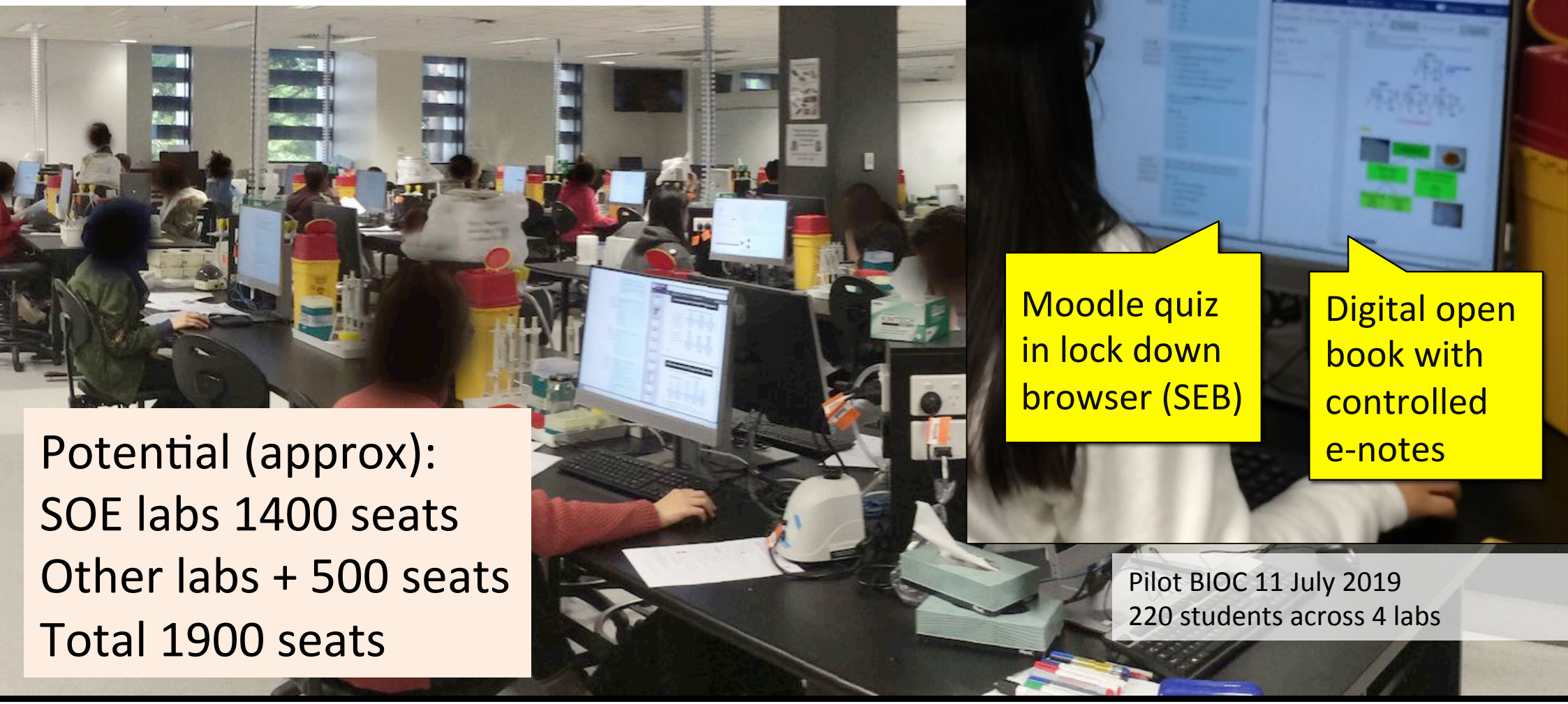
Must acknowledge the tensions,

Pick two? ….

We need to strive for all three.

UNSW Pilots: PC Labs: SEB + Moodle (or other)

Safe Exam Browser can be used to secure other tools such as Ed



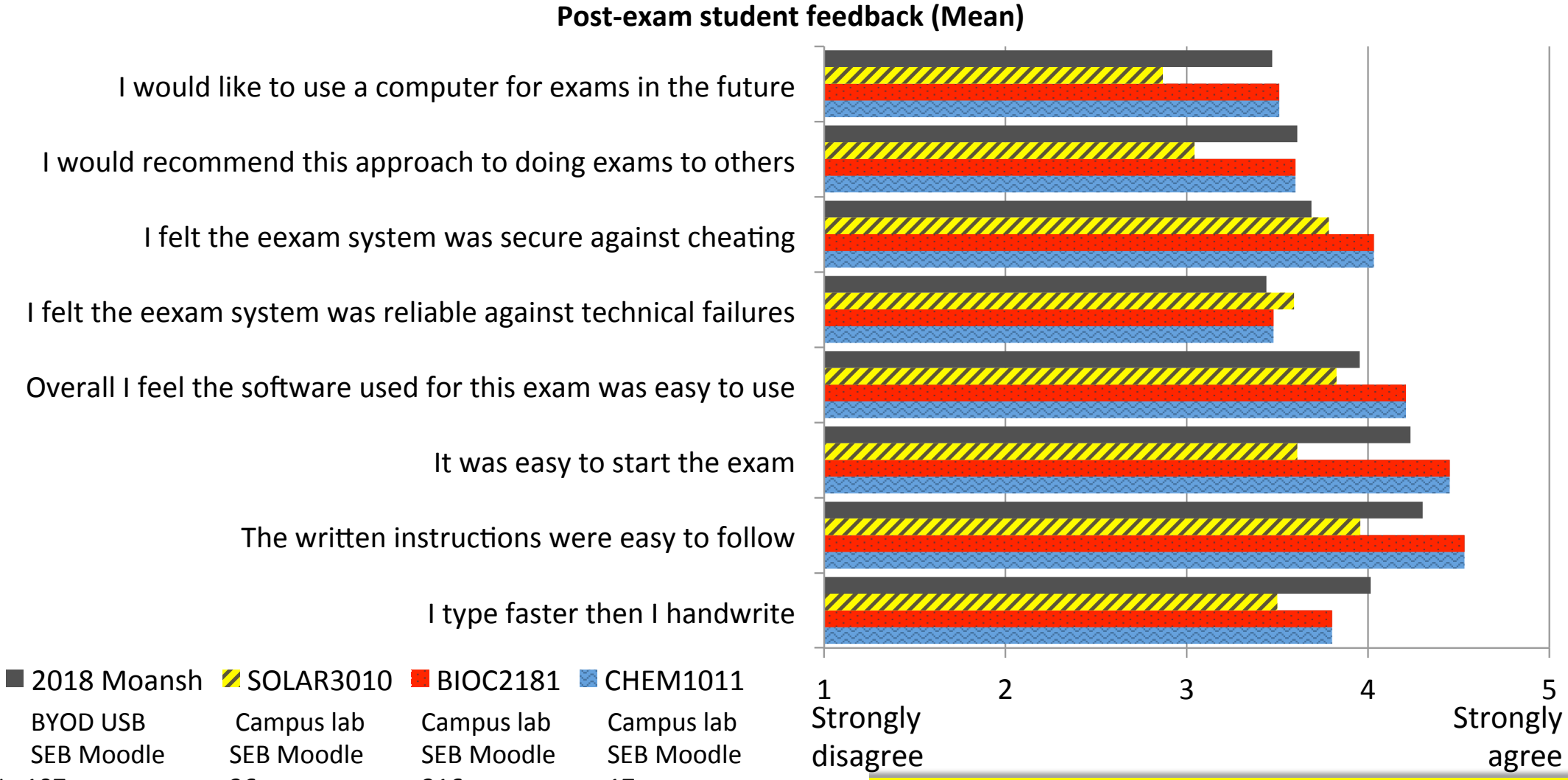
Moodle quiz in lock down browser (SEB)

Digital open book with controlled e-notes

Potential (approx):
SOE labs 1400 seats
Other labs + 500 seats
Total 1900 seats

Pilot BIOC 11 July 2019
220 students across 4 labs

UNSW Pilots 2019



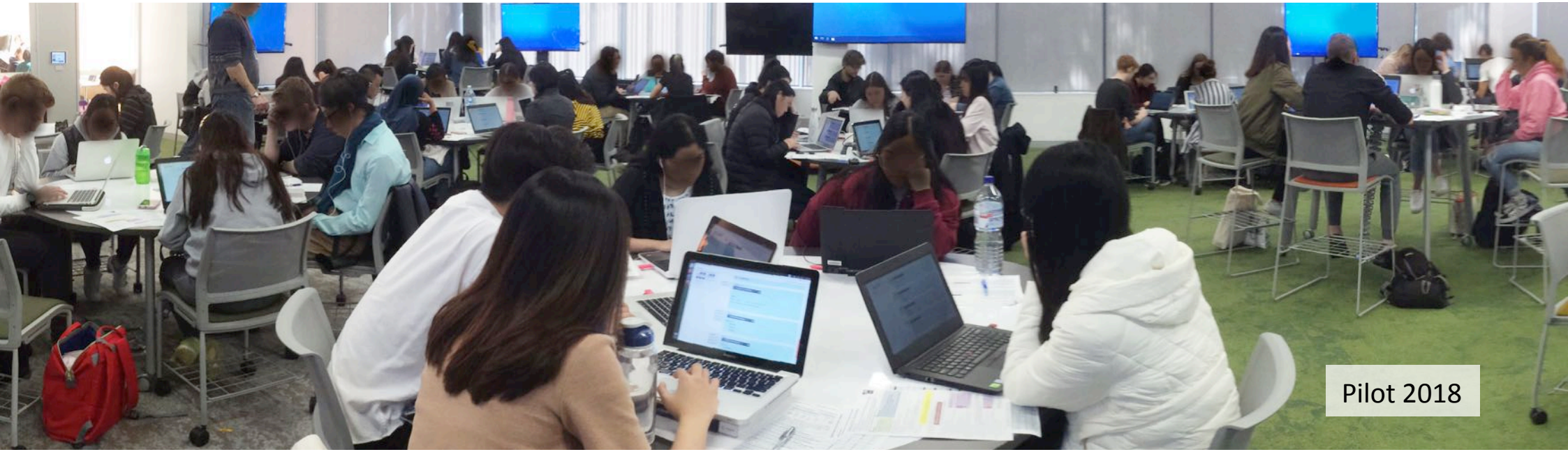
In-class BYO Laptops. SEB + robust Moodle

Option A: SEB installed in student's OS (Windows / MacOS) − less secure than Labs or option B.

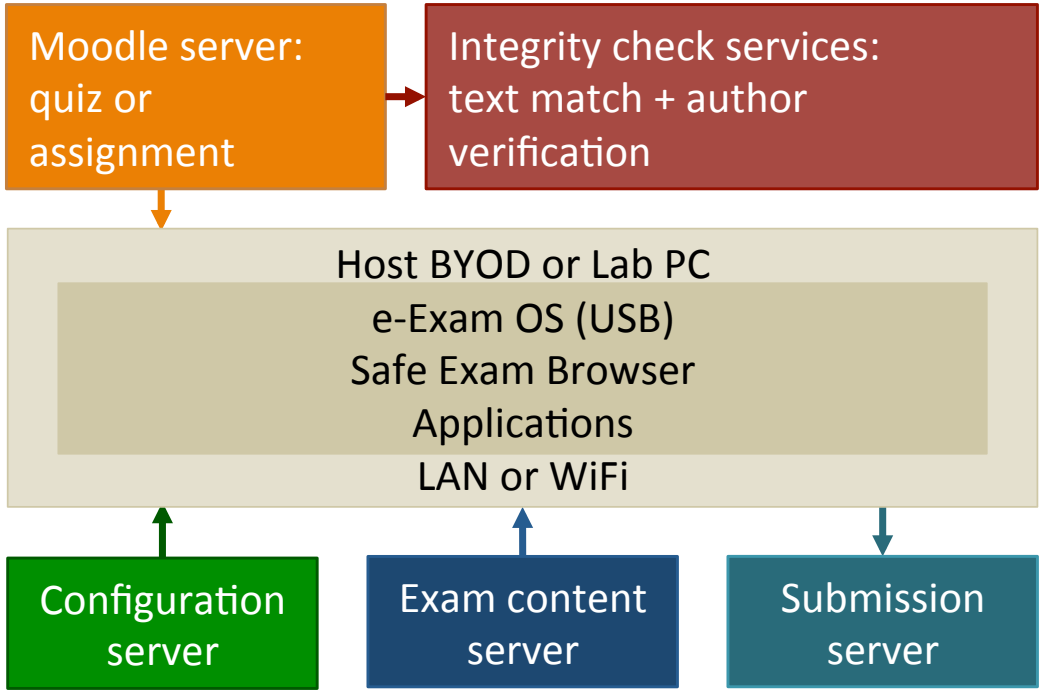
Option B: Boot from alternative operating system (Network or USB).

Example: DET e-Exam project pilots. Robust to network outages with offline autosave (student work can continue regardless of the network conditions).

- Tables + chairs in standard 'collaborative' layout classroom.
- Power sockets in tables + WiFi (Ethernet can be used too, but not in this case).



DET BYOD: Dynamic, robust, networked e-Exams (2019)



e-Exam OS USB provides the lock-down environment.

* Manual data retrieval is possible in cases of total network failure. Use Admin tool and USB hub.

1. Boot host computer with e-Exam USB.
2. System starts up in a minimal locked state.
3. Logon to network (via user credential or auto logon).
4. Download configuration settings from configuration server.
5. Apply new configuration to system.
6. Download exam content and settings from exam content server (or Moodle server).
7. Deploy exam content, apply exam setting.
8. Launch exam and do the exam.
9. Progressive upload of response data and monitoring data during the exam to Moodle or submission server. Includes offline backup during network outages*.
10. Exam ends. System finalises data upload then cleans-up the USB (wipes user and exam data), then shuts down.

Digital Exams for Halls

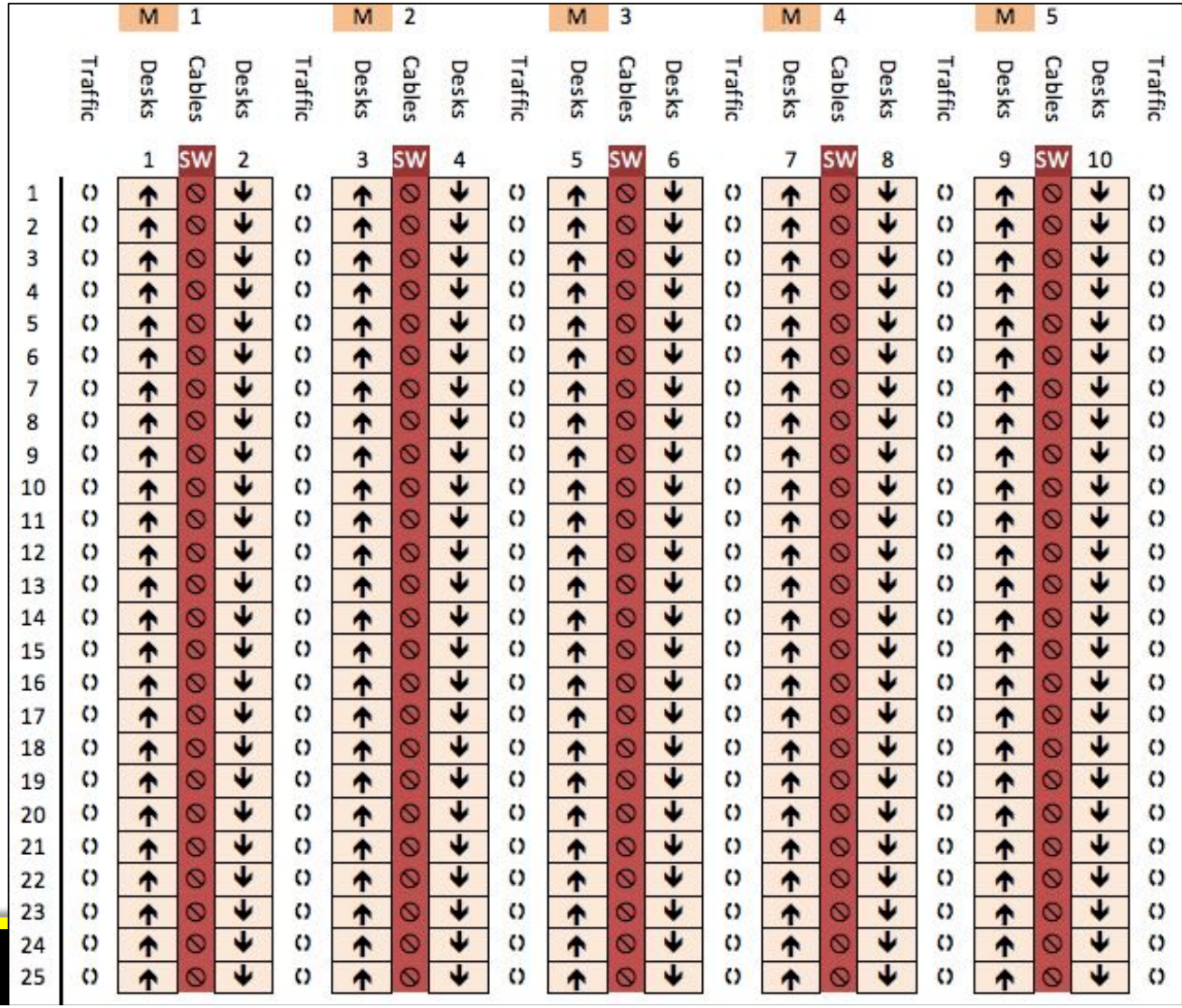
Pop-up lab

a) Networking: wired LAN then move to WiFi.

b) Computers: Uni laptops then move to BYOD.

Isles for power cables (no access).

Inverted seating.

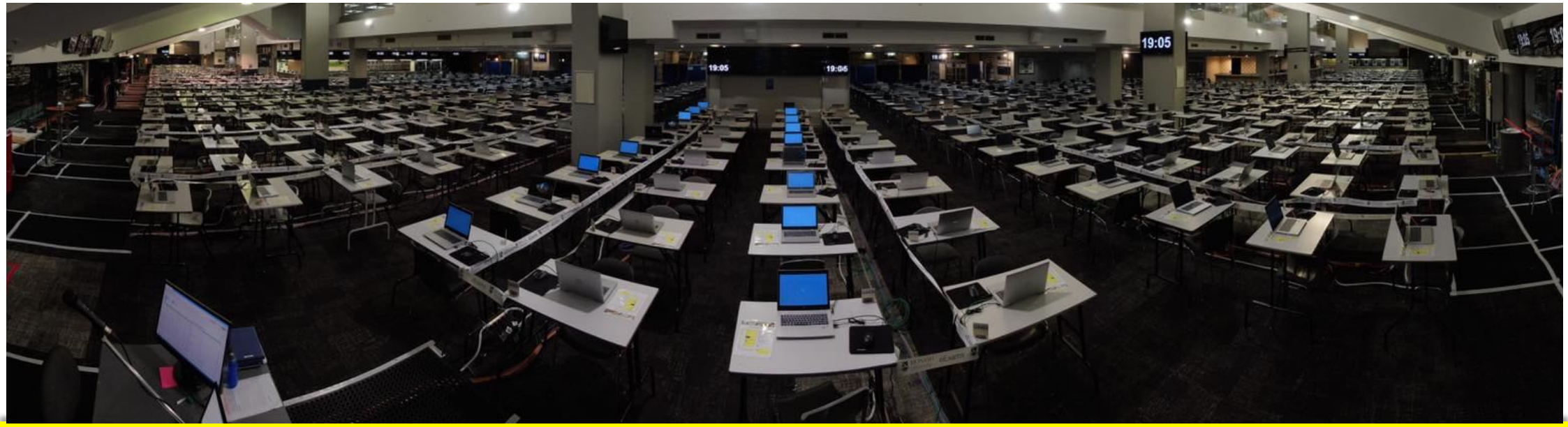


DET e-Exam pilots in halls (phase 1 and 2): BYOD + USB boot + no network.

Digital Exams for Halls

Towards more authentic assessments in exams.

- We first start with Moodle quiz with SEB.
- Then add other apps to the white list e.g Word, excel, calculator… simulations.



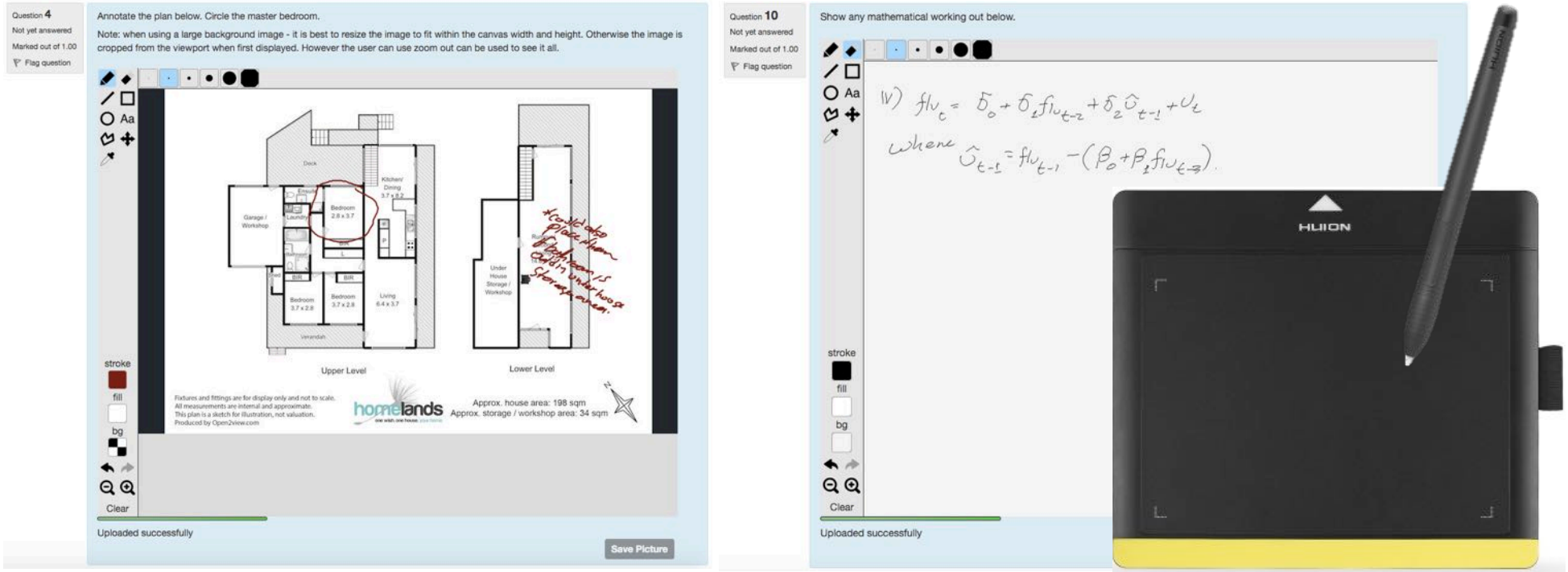
Monash University 2019 – Caulfield racetrack (limited to sub-set of LMS quiz questions)

Digital Inking for e-Exams at UNSW

Moodle free hand drawing installed 8 Aug – piloted 15 Oct remote online exam

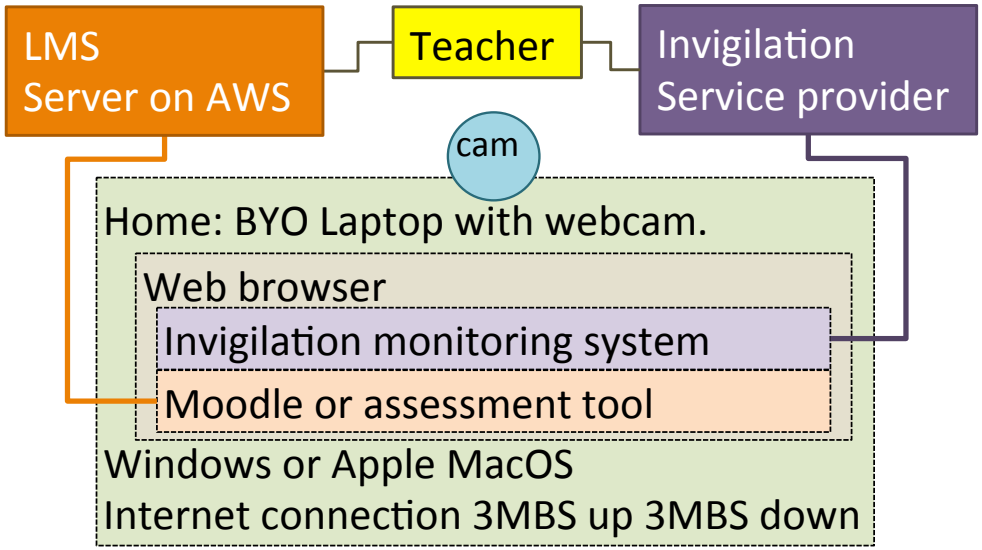
Annotate an image or free hand drawing, writing formulae and diagrams.

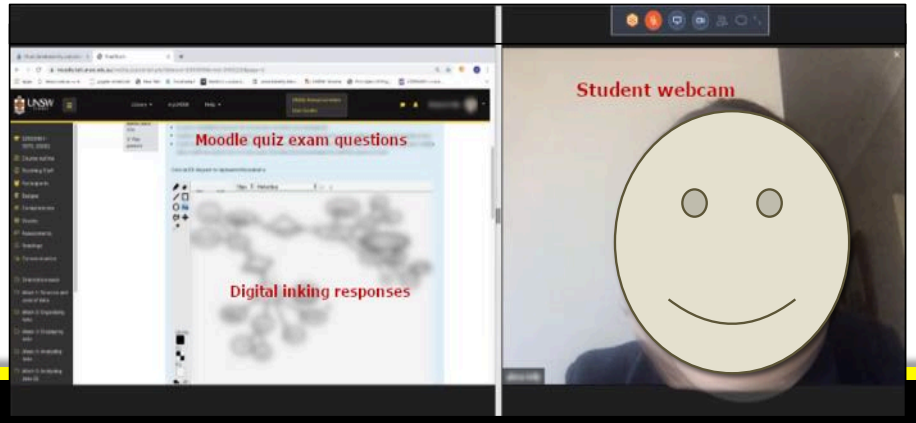
Commodity $60 USB graphics tablet works fine (with some practice) or touch screen device.



Off-campus Invigilated Digital Exams

Off-campus invigilated exams architecture





Steps:

1. **Well before the exam:**
   - **Academic prepares exam:** Set up exam in Moodle and set up exam rules and schedule in invigilation service provider site**.**
   - **Student pre-registers** at the invigilation service provider (create account, set time zone, set up ID).
2. **Before the exam:** Student books exam time with invigilation service provider and does technology compatibility checks.
3. **Exam time**: Student login to Moodle. Clicks link to exam. Lands at invigilation provider. Does technology check, pre-id checks, room scan. Invigilator does system checks. Clicks start exam. Is taken to Moodle (or other tool). Does exam while monitored by invigilation service. Follow exit steps when done (submit file, clear cache etc).
4. **After Exam**: Exam available for marking in Moodle and recording reviewed/flagged by invigilator. Video viewable by teacher..

Equipment at home: BYO laptop with webcam. Standard web browser with connections to invigilation service provider and exam materials in Moodle (or O365). Optional / add-on − USB graphics tablet (digital pen) for digital ink input.

Invigilation service: Examity provides human invigilators. Identity checks. **Session oversight via web cam and machine session recording (screen, webcam and audio stream)** and post session review.

Pilot exam: remote invigilation with inking

Data science 15 Oct 2019: 60 students simultaneous.
Mixed text and inking drawing and formulae.

Information
Flag question
Edit question

In discussion of the Google Flu Trends (GFT) failure it was noted that the simple regression model (below) did just as well as GFT in pre

$$flu_t = \beta_0 + \beta_1 flu_{t-2} + u_t$$

where flu_t = CDC estimate of flu like illness in week t.

[model answers]

Question 7
Not yet answered
Marked out of 1.00
Flag question
Edit question

Given time series data $flu_t, t = 1,...,T$ explain how you would use this model to provide a prediction of flu_{T+1}. Explain why th
published weekly but with a delay.)

Explain your response below.

Font family | Font size | Paragraph

Please see my answer below.

Path: p

Question 8
Not yet answered
Marked out of 1.00
Flag question
Edit question

Show any mathematical working out below.

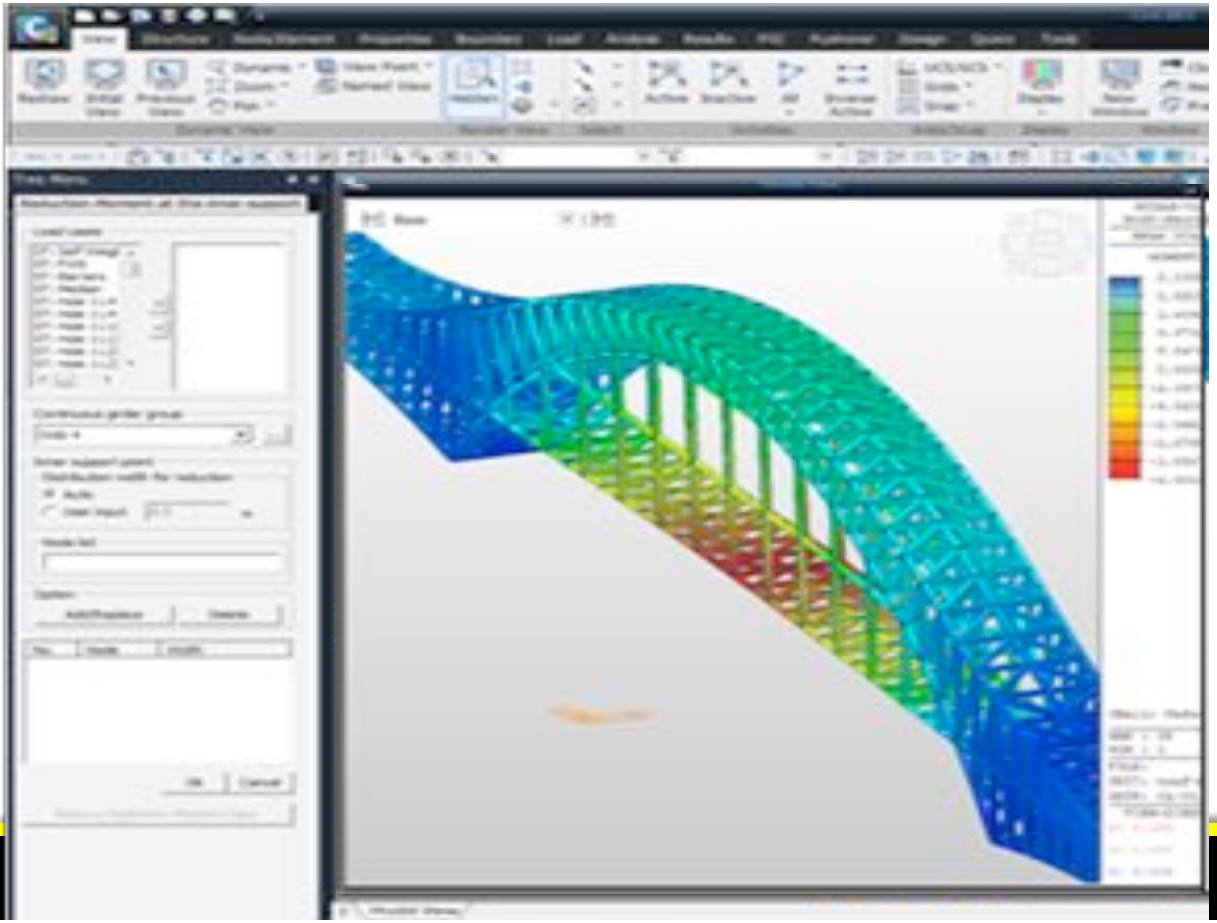
Aa

The model states that flu_{T+1} is a linear

Authentic problem solving in exams?!

Authentic

Authenticity is understood as realism, contextualisation and problematisation (Villarroel et al 2018)



Not

F.E (PART-II) MCQ Test, 2012

BASIC CIVIL ENGINEERING

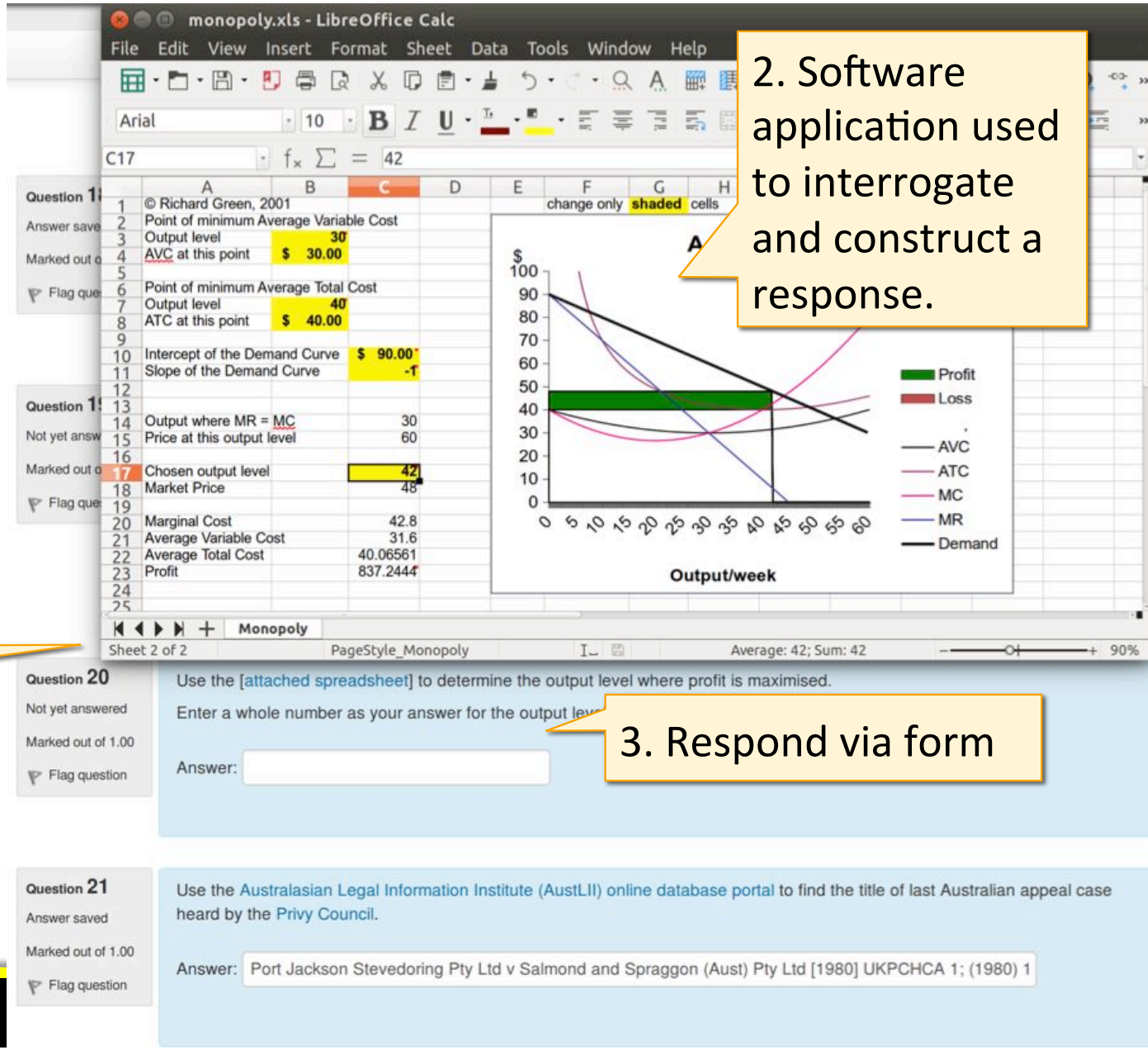
Day and Date: Tuesday, 26/03/2012 **Time: 08.50 a.m. to 09.50 a.m.** **Total marks: 50**

SECTION I

1. The curvature of earth is ignored in
   a) Geodetic surveying c) Plane surveying
   b) Hydrographic surveying d) Astronomical surveying
2. In an optical square; the mirror are fixed at an angle of
   a) 30° b)60° c) 45° d) 90°
3. The true meridian passes through
   a) Geographical poles c) Magnetic poles
   b) Arbitrary poles d) only N-pole
4. In WCB system; a line is said to be free from local attraction, if the difference between FB and BB is
   a) 0° b) 90° c) 180° d) 360°
5. When higher values are inside the loop; it indicates a
   a) Hill c)pond
   b) sloping ground d) Overhanging cliff
6. The line of collimation and axis of the telescope should
   a) coincide c) by parallel
   b) be perpendicular d) intersecting
7. The canal taken directly from reservoir is called as
   a) Main canal c) branch canal
   b) Distributary d) Field canal
8. For national highway the road way width is
   a) 9 m b) 12 m c) 7.5 m d) 25 m
9. Cumulative error is proportional to
   a) L b) 2L c) $\sqrt{L}$ d)L
10. The compass box is made of
    a) Iron b) Aluminum c) Brass d) Wood

Authentic Questions in LMS

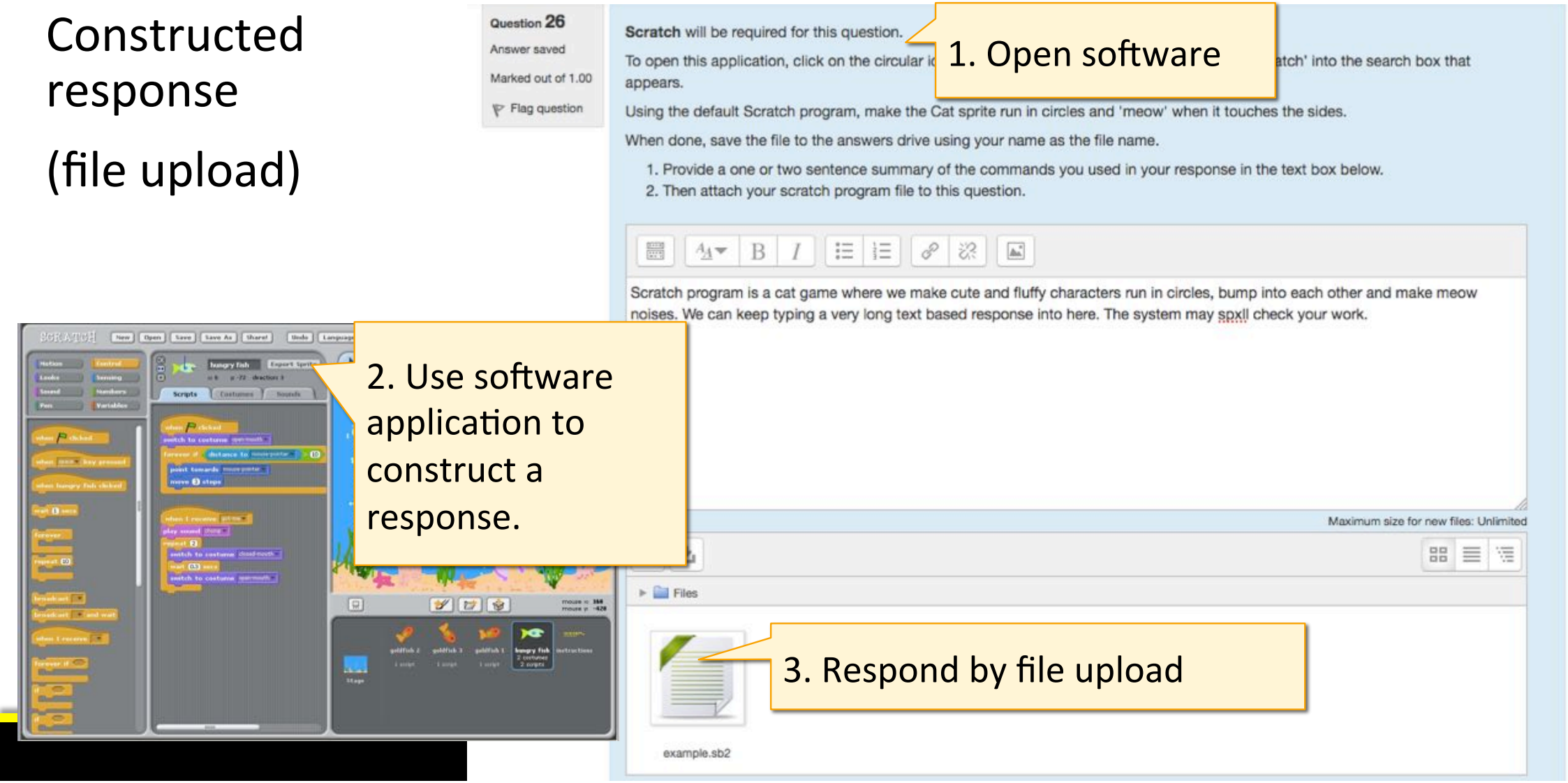
Constructed enquiry



Authentic Questions in LMS

Constructed response

(file upload)



Enhancing LMS

Possibility?

Code Runner question type:

Structured responses evaluated against test cases.

Examples:

programming languages

R statistics.

Note: Requires separate 'Jobe' server to evaluate the code responses submitted by students.

This is similar to 'STACK' (math) using scriptable question type (wx Maxima) available in UNSW Moodle.

Get in touch!

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UNSW Digital Assessment tool kit (with cases etc by DA CoP group)
https://teaching.unsw.edu.au/digital-assessment-toolkit

Other Info:
DET national e-Exam project http://TransformingExams.com