Transforming Assessment with e-Assessment for e-Exams

OLT Project leader / Presenter: **Dr Mathew Hillier**,
Teaching and Educational Development Institute, University of Queensland

OLT Project Collaborator: **Dr Andrew Fluck**, University of Tasmania

OLT Project system developer: **Marisa Emerson**, University of Queensland

Get the demo, guides & these slides

http://**transformingexams.com**

Acknowledgement

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Australian Government | Office for Learning & Teaching

The University Of Queensland AUSTRALIA

TEDI Teaching & Educational Development Institute

Targeting...

- Supervised
- High stakes
- On campus
- Large scale

(image credit: Dr Fluck UTAS)

*What we are **not** specifically addressing here is off campus, online only, distance education, cross institutional students – there are some existing e-solutions to address these needs.*

Drivers

Policy

- Realising 'unfulfilled potential' in higher education
  - Also - is a lack of e-exams in higher education hampering the wider uptake of ICT in other areas of education? *Ref- TAS*
- National participation targets - Higher student numbers…
  e.g. UQ: 2007-2012 = **30K extra annual exam sittings.**
- Graduate attributes of Australian institutions - Feature current knowledge, skills for the modern world... this means ICT skills.
- Strategic & E-learning plans - significant activity with MOOCs, online learning, blended learning, flipped classrooms all depending on ICT success.
  - A recent internal UQ survey of senior teaching leaders placed 'e-assessment / online marking' and 'e-exams' at the top of their priority list for development.

Drivers

Practical

- Hand written assessment decreasing
- Technology provides and opportunity to enhance exam questions and scenarios
  - Some examples to follow later
  - More Examples at **TransformingAssessment.com**
- Increasing use of ICT, study, work social
  - 98% ownership of mobile WiFi enabled devices
  - **91%** (2012 UQ survey), **97%** (2013 UQ survey) **laptop ownership** highest of any device
  - 80% of students accessing online LMS weekly

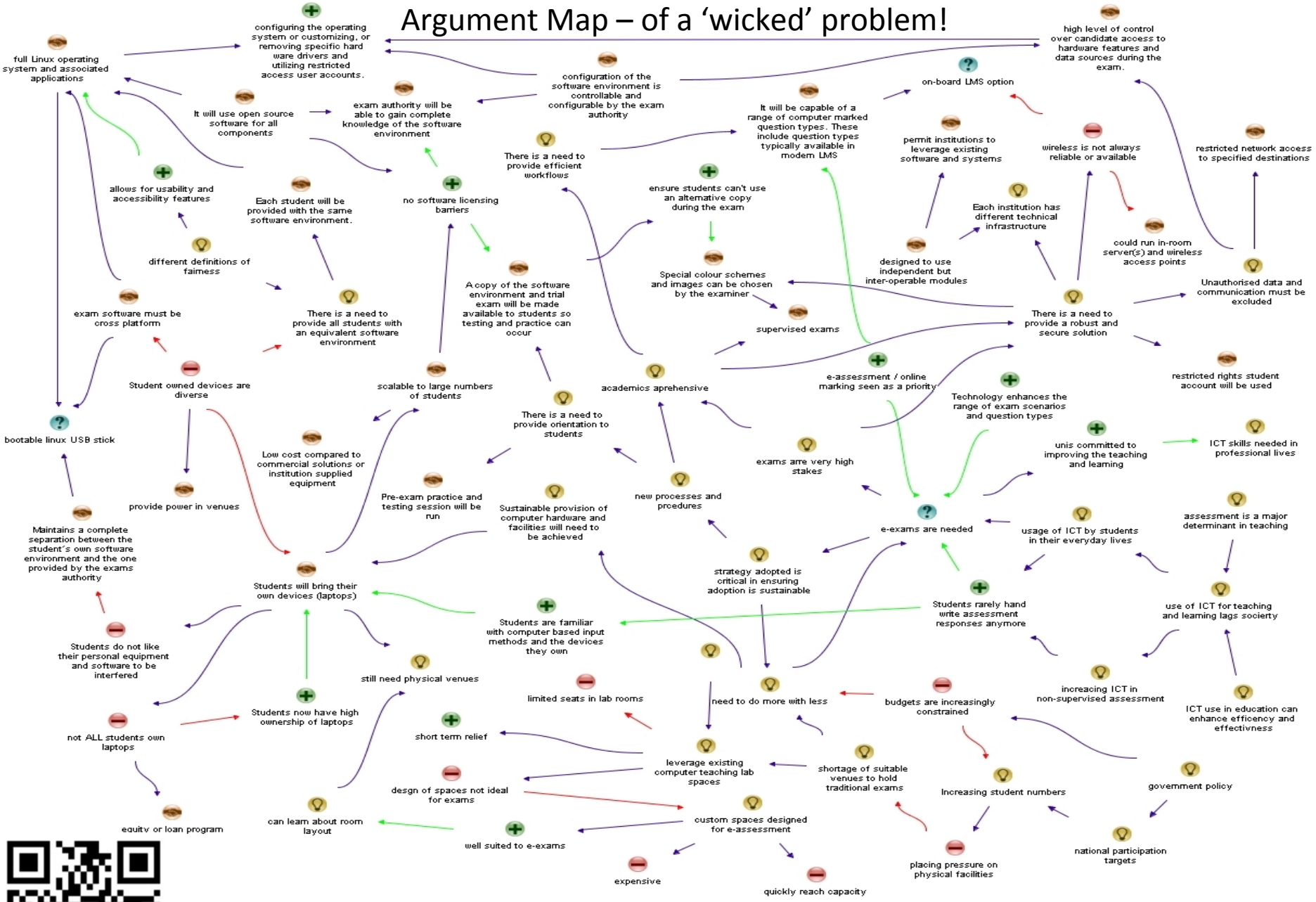
So?

All of this ....leads to a growing disconnect between the way high stakes testing is conducted using pen on paper exams and students' everyday experiences.

Are e-exams are the next step on from computer assisted marking and e-assessment of progressive assessments?

An e-exams solution is needed ... But!

Argument Map – of a ‘wicked’ problem!



bit.ly/eexam-map

Made with Compendium

Get the argument map

bit.ly/eexam-map

Some More Issues

- Fairness & Equity –> ***equivalent*** environment
- Highest stakes –> must be reliable and robust
- Many stakeholders - needs/concerns
- Security (end-to-end ref IT security principles)
- Invigilation (easy to identify misconduct)
- Administration (reduce manual/double handling)
- Sustainability, efficiency, facilities, spaces, equipment, set-up, logistics, processing, workflows...

Sustainable facilities

Provision of facilities must be sustainable

- How to provide computer hardware and facilities for large infrequent e-assessment events (exams):
  - Use existing campus computer labs? (Finite in number, small 20~ish room size, problematic layouts/poor design [Dermo, 2012] – these need mgmt solutions too [Warburton & Robinson, TA 2014)
  - Build dedicated e-exam space? (good design, but costly, although capital cost done once, still finite, potentially low utilisation out of exam periods)
  - Hire / build temporary lab space? (costly and reoccurring)
  - Share facilities between institutions? (scheduling issues)
  - Provide each student with hardware? (costly ~ give or rent to students? - reoccurring, maintenance?, low utilisation?)
  - *Rent or build options are not scalable or sustainable.*
- Given the already high ownership of suitable equipment by students -> how can we make use of this equipment?

Issues - BYOD

- Given high ownership of laptops – we can leverage these
  - But ...
    - Diversity of devices - hardware, operating systems (Windows, Mac, Linux), software applications.
      - Need a 'cross platform' solution
      - Need to provide same (equivalent) software environment
    - A potential source of unauthorised assistance
      - Need ability to completely control student owned equipment for the exam duration – ref to 'security principles'.
    - Students have a lot 'invested' in their devices (for work, for study, for personal and social uses, etc – *ethical dimension*)
      - Need to respect this domain, maintain privacy and integrity of student equipment.
      - Need to return student equipment as 'untouched' when done - separation of the exam environment and the student owned 'host' equipment.
    - Equipment does fail on occasion
      - Need appropriate back-up facilities and processes, data progressively saved, provide power, spare laptops etc

Issues

Varying technical infrastructure between / within Institutions

- How to:
  - Be applicable across the higher education sector
  - Fit into existing software and hardware landscapes
  - Leverage existing infrastructure
  - Cater for flexible needs
  - Not be a nightmare to support...

e-Exam System v5

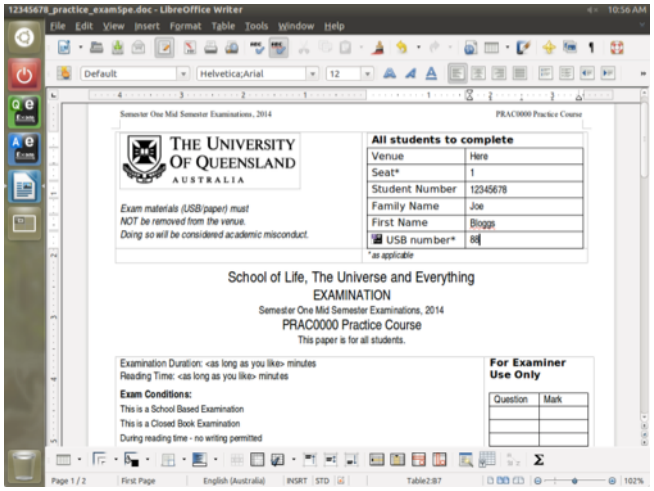
Some ideas...

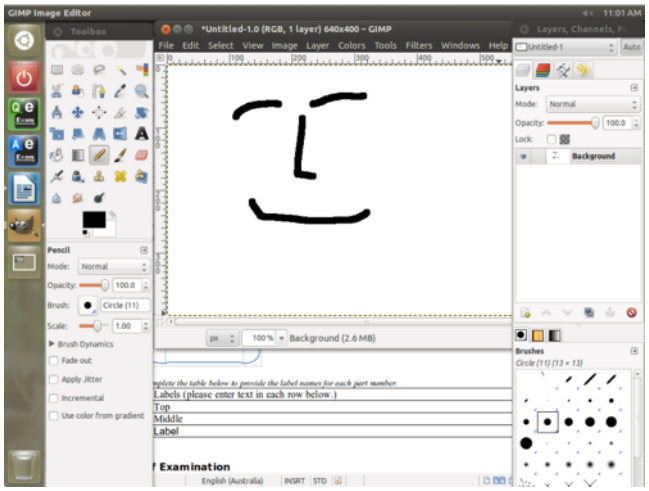
- Bootable USB sticks.
- Full operating and application suite onboard.
- Typed student responses via
  - Word processor -human marked
  - On-board learning management system quiz
- Student owned equipment used as host and left untouched.
- Open source code base, commodity components.
- Works on most Intel based laptops (apple, windows etc)

eExam (v4) Modes

- Modes (phases of introduction)

1. Paper equivalent – computer optional (a typewriter), essay, short answer, basic drawing, limited MCQs (manual marked)



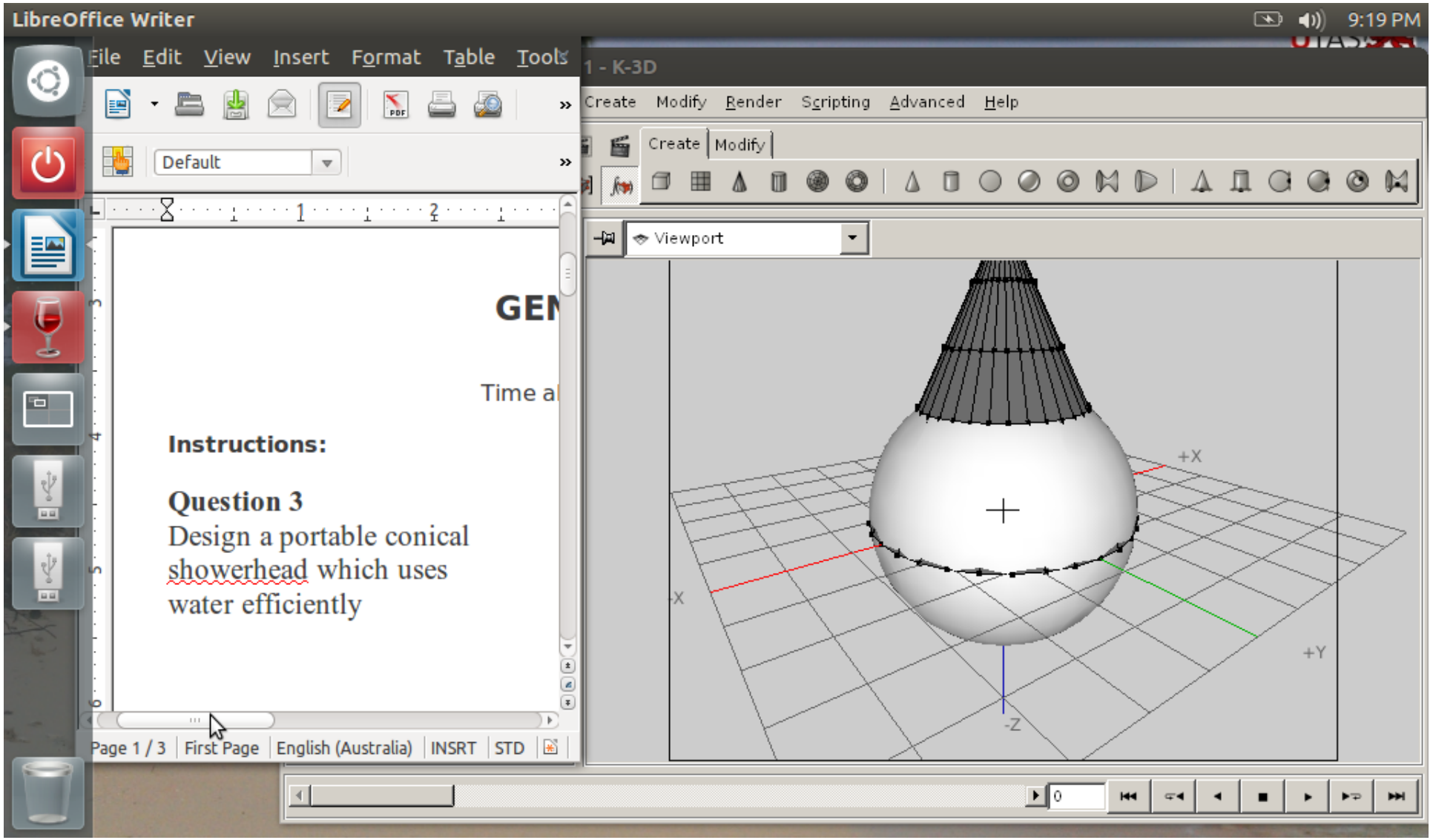


2. Post-paper – a computer becomes compulsory
   - Adds multimedia prompts, video, audio and software tools can be made available in the exam so that ***students can construct a response*.**

Ref: Dr Fluck, UTAS

Post-paper - Can Include Software Tools

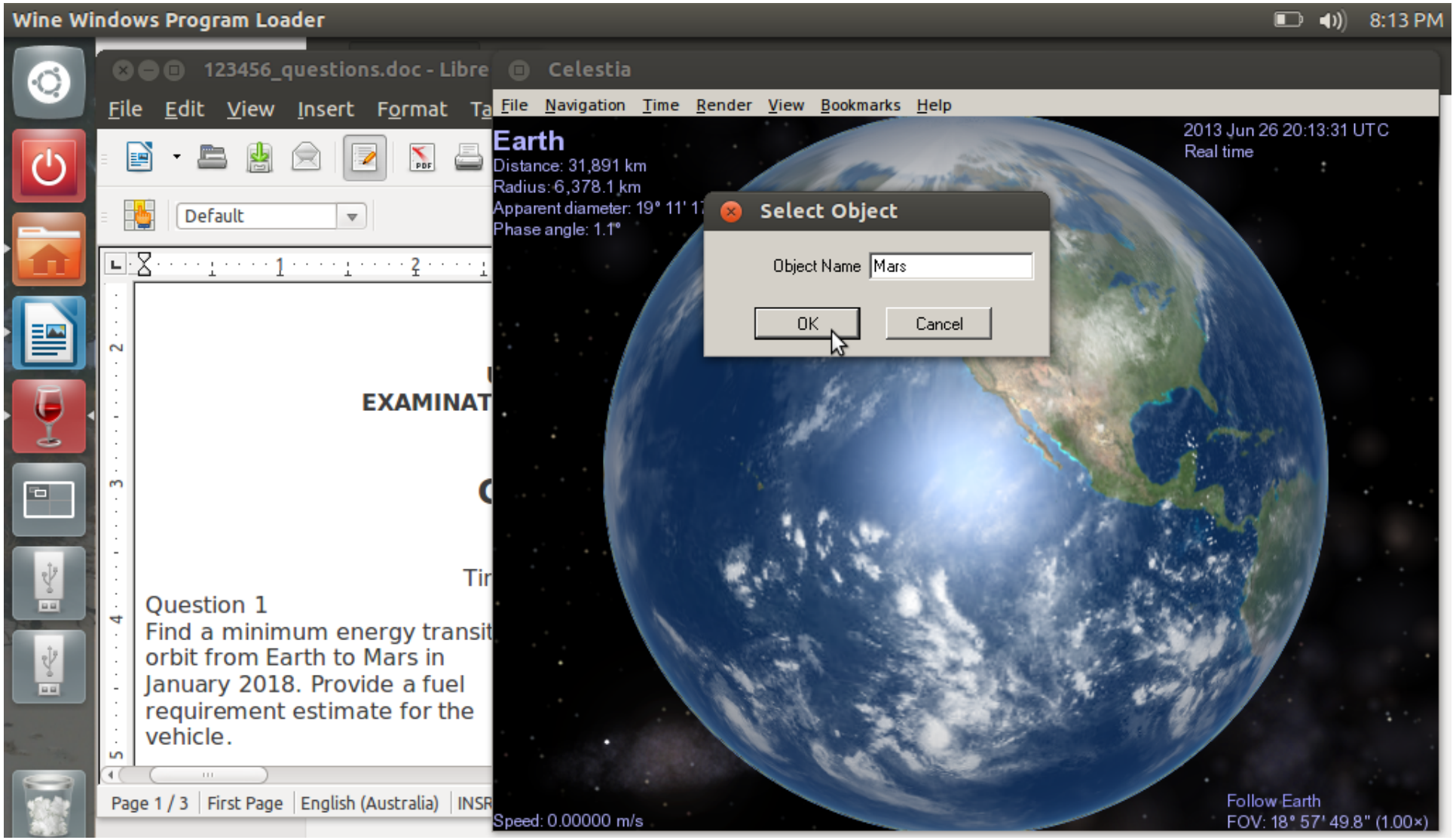
- Software tools can be made available in the exam



Ref: Dr Fluck, UTAS

Post-paper - Can Include Software Tools

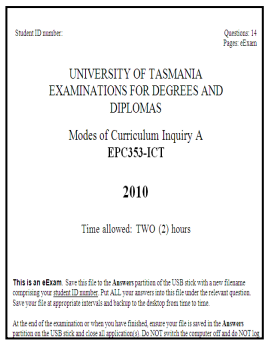
- Software tools can be made available in the exam



Ref: Dr Fluck, UTAS

The Current Process – how it works

Prep


UNIVERSITY OF TASMANIA
EXAMINATIONS FOR DEGREES AND DIPLOMAS

Modes of Curriculum Inquiry A
EPC353-ICT

2010

Time allowed: TWO (2) hours

Exam Room

Post Exam

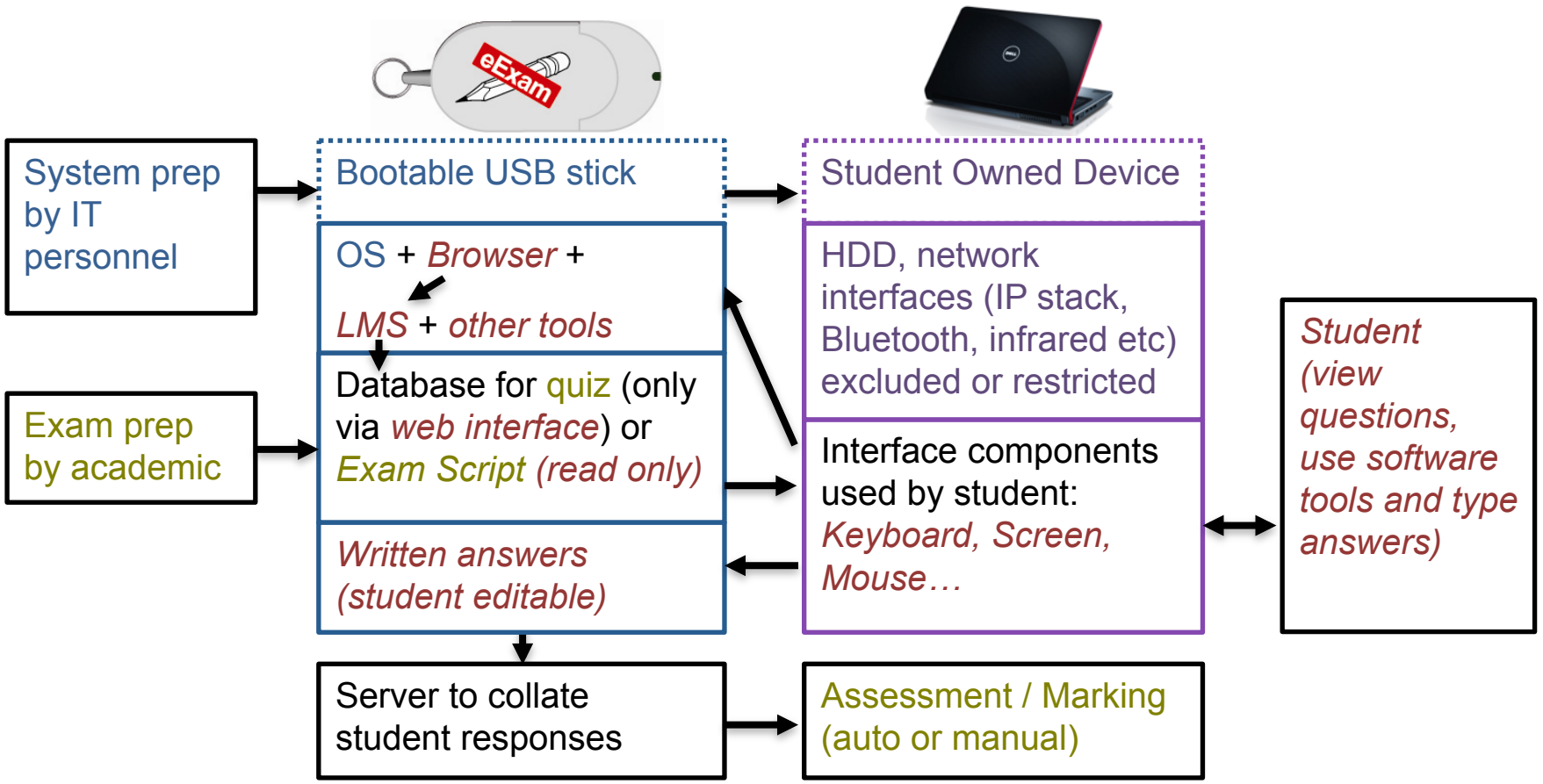
(credit: Dr Fluck UTAS)

e-Exam system for BYOD

Current project improvements for v5 – adds:

- On-board LMS for computer marked question types (Moodle) [demo available]
- Electronic answer reticulation/workflows [TBA – in progress]

Modular architecture so academics / institutions can choose the features and mode of operation that suit them...



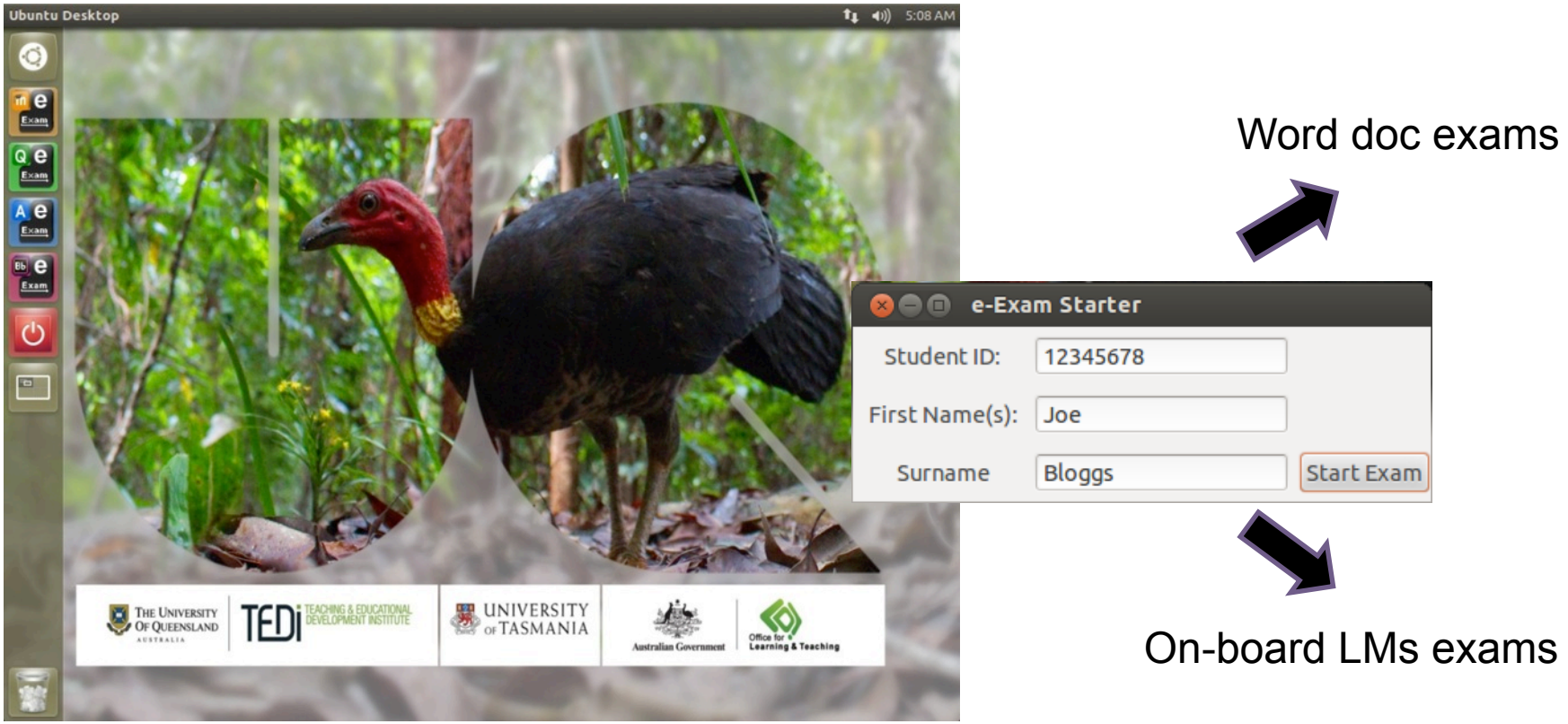
Possible Modes of Use

- **Non wireless** mode [***demo available***]
  - Exam / LMS is on-board the stick itself.
  - Duplicating equipment to reverse copy student answer files/ databases from the USB sicks to a collation location
  - Fall back in all cases - manual copying each student's answer file(s)
  - **Ad-hoc wireless** mode [*feature TBA*]
  - Exam / LMS will be on-board the stick itself.
  - Periodic connections to upload/update student answers on a collation server in background or via a student initiated final submission with confirmation shown on screen.
- **Wireless/Network always on** mode – [***demo available***]

  Needs reliable, redundant, high capacity wireless/network in the exam room (best to use wired!) or just use as a secure boot image for computer labs to serve as a gateway to the institution's LMS.
  - Doesn't require an LMS on-board the stick
  - Web browser to access a LMS server quiz via *restricted* connection
  - Or use local office suite then upload answer files.
  - Custom network config by institution IT (done once, reused)

Current e-Exam v5 Demo

Four-in-one demo. Choice of modes via .config file.
A unique background image for each exam for added security.
('e-Exam Starter' dialog used specific modes in real exams)



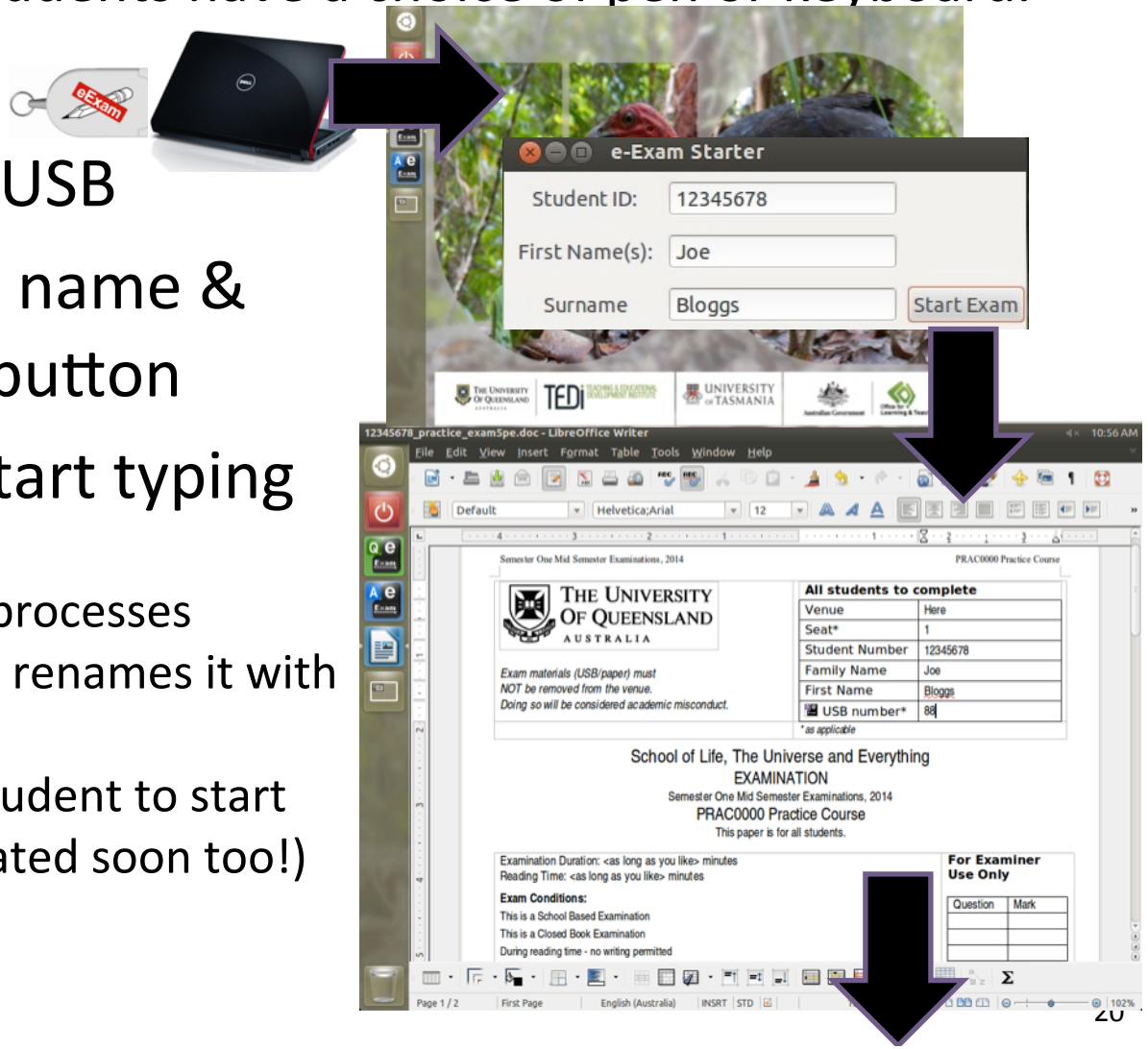
Current e-Exam v5 Demo

A real exam - Paper 'equivalent' via word processor.

UQ Semester 1 trials ~ Students have a choice of pen or keyboard.

To start an e-Exam:

1. Student boot with USB
2. Students type ID & name & clicks 'Start Exam' button
3. Student can now start typing



Note: Automated backgroun processes
The system copies Qn file and renames it with the supplied ID.
File is opened ready for the student to start
(cover page info to be automated soon too!)

Current e-Exam v5 Demo

Responding to questions in-line in the word processor

(note – the system keeps a read-only backup of the questions!)

Type where indicated....

Simple drawing tools...

Label a diagram...

Question 1 [1 marks]: What is your full name?

Please write your answer in a couple of words below this line - place the cursor below this line and start typing!

Joe Bloggs

Type below the line

Question 2 [1 marks]: What is the Brand/make/manufacturer of your computer?

Please write your answer in a couple of words below this line

Dell

Question 7 [4 marks]: Place a rough drawing of yourself below (you can use the drawing tools in this program, or create the image using the GIMP as described on your student eExam instruction card).

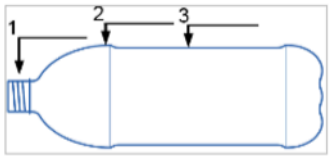
Please place your answer below this line

content face

Copy & Paste

Draw in GIMP

Question 8 [4 marks]: The following diagram has some unidentified parts indicated by part numbers.



Fill in table rows...

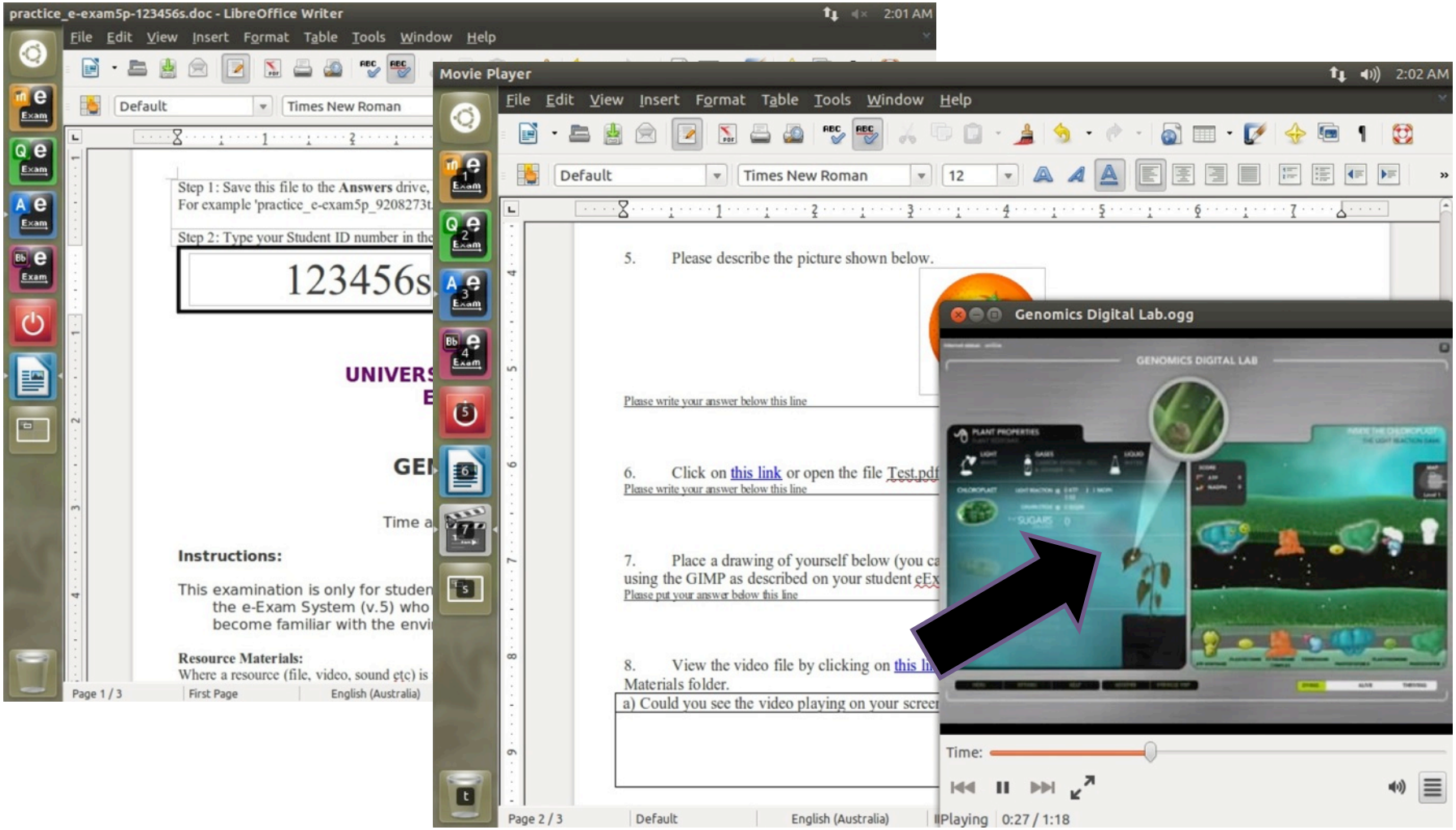
Please complete the table below to provide the label names for each part number.

Part	Labels (please enter text in each row below.)
1)	top
2)	widest
3)	label

Current e-Exam v5 Demo

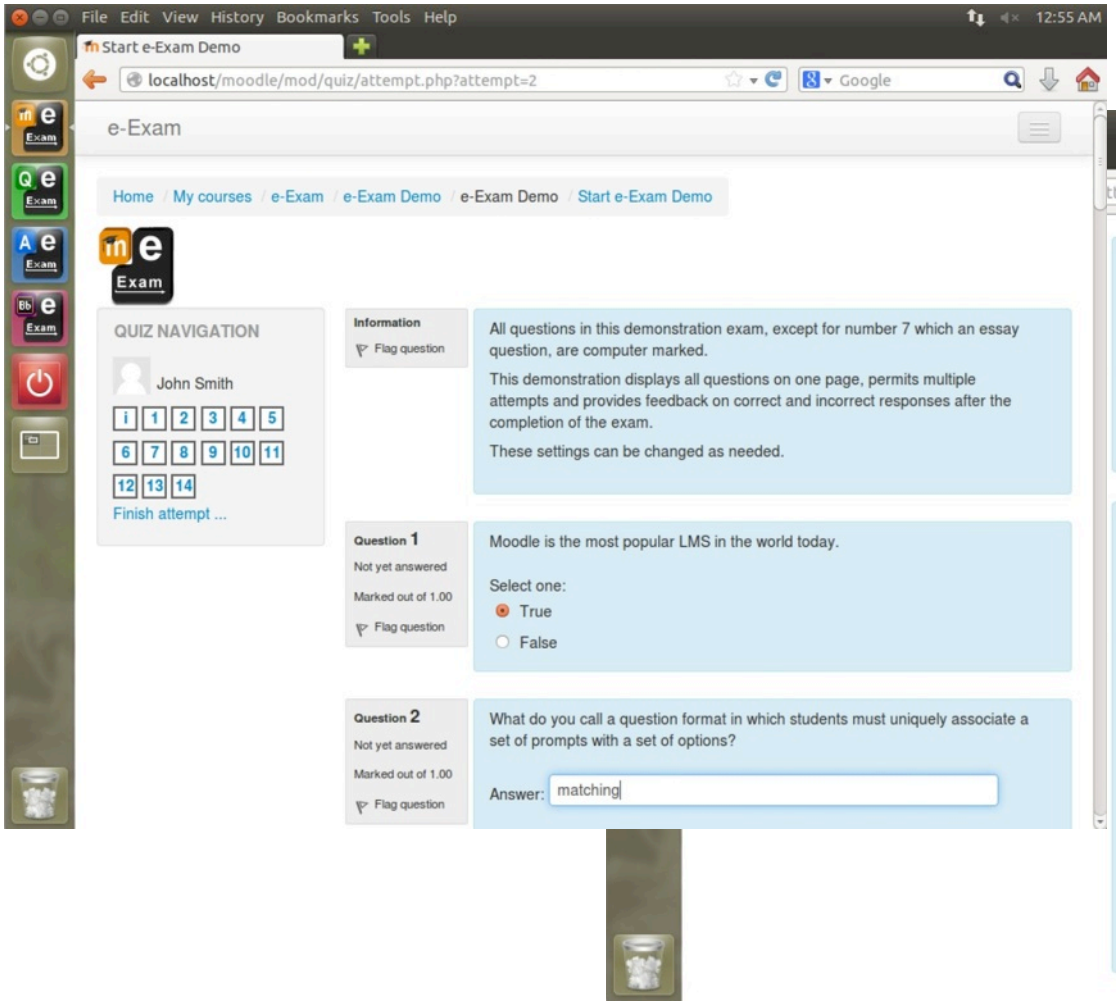
Post-paper exams via word processor.... (used at UTAS)

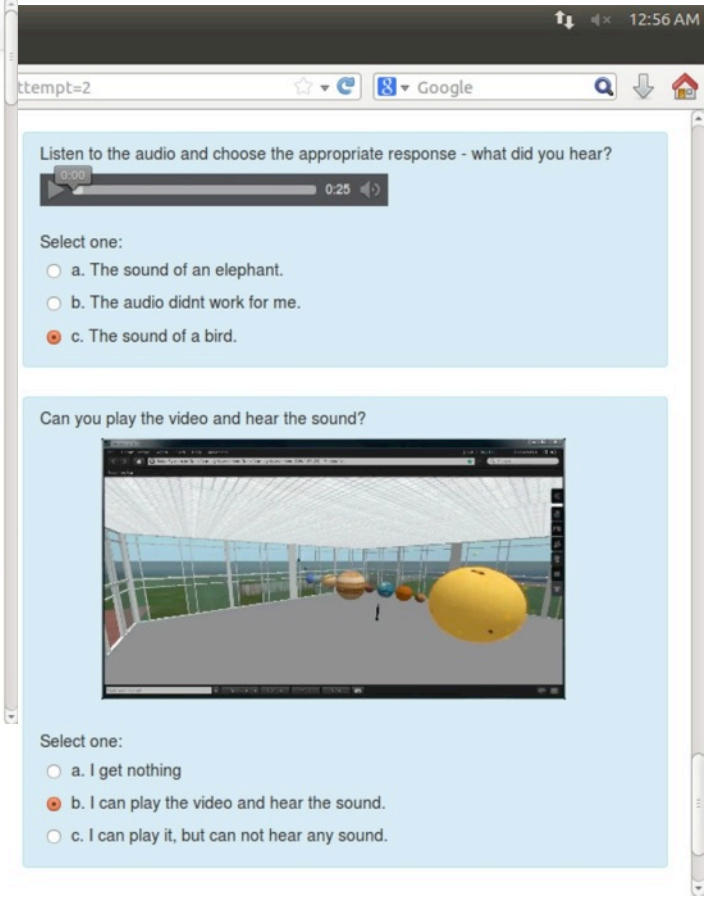
Include links to on-board media, PDFs and software tools.



Current e-Exam v5 Demo

Computer marked question types via on-board LMS (new to v5) with Integrated multimedia – high def video possible!

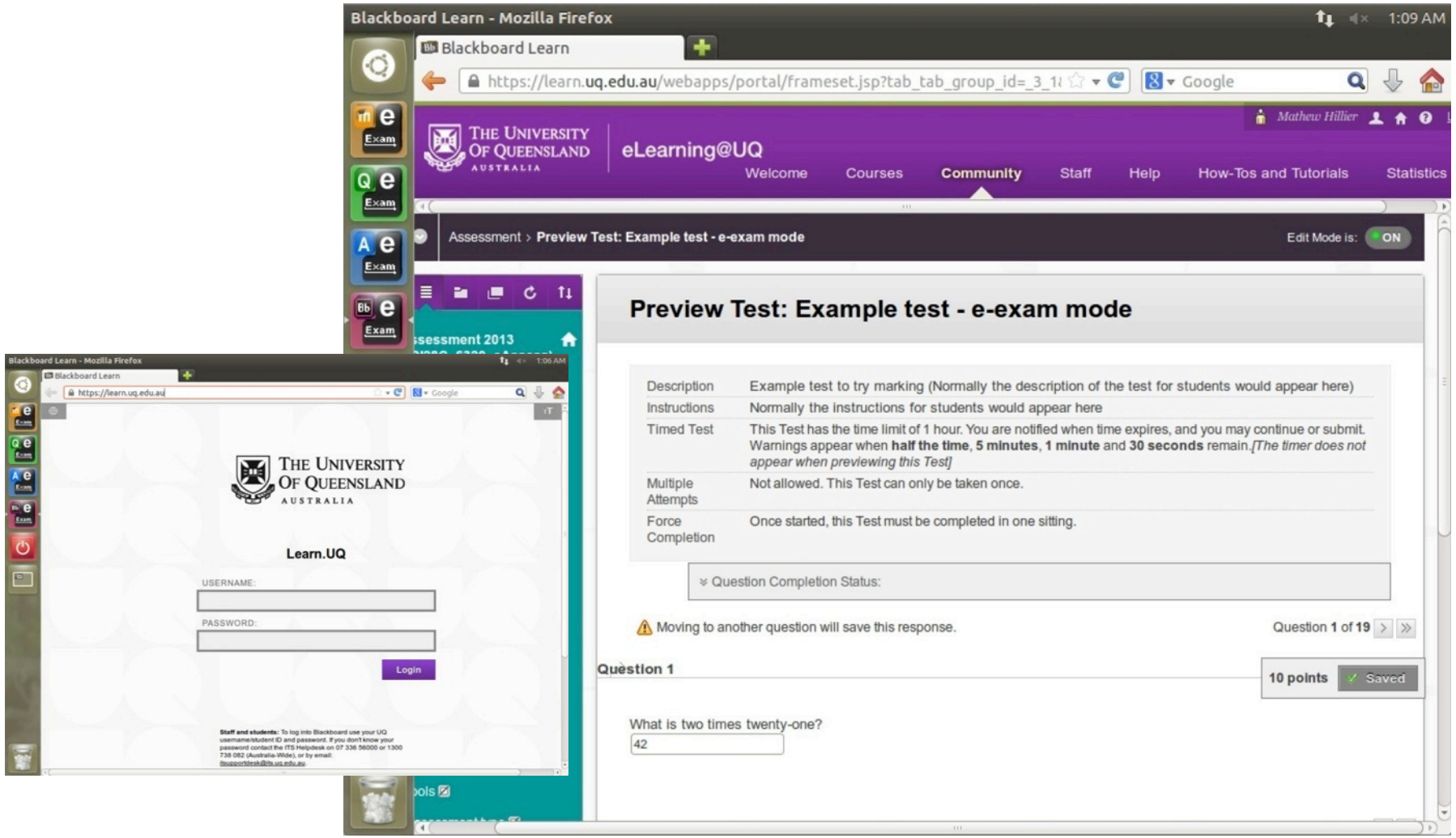




Current e-Exam v5 Demo

Computer marked question types via institutional LMS

Needs network for restricted connection – e.g. demo can *only* connect to UQ Blackboard (IP address) and no other server. New to v5.



What else it could do

Computer marked question types (Moodle)

Standard [already in the demo]:

- Calculated (Wildcards and datasets, calculated MCQ)
- Matching
- Embedded Answers (Cloze Test / Gap Fill – text with multiple choice, short answers and numerical answers)
- Short Answer (sentences)
- Numerical
- True/False
- Short essay (with response template)

Custom types:

- Algebra, Multinumerical, Spreadsheet,
- Chemistry Molecular editor questions,
- Music (key signature, scales, intervals)
- Hot spots, drag and drop (labels, text, images),
- Set splitting,
- Missing words, Gapfill,
- Regular expression…

Marking: delayed, Certainty-Based Marking… manual override.

More Examples – Confidence questions

- Confidence based approaches penalise guessing. Students need to choose a response and declare their level of certainty. Available in Moodle now.

Certainty levels and consequences

Certainty level:	C=1	C=2	C=3	No Reply
Mark if correct:	1	2	3	0
Penalty if wrong (T/F Q)	0	-2	-6	0

Qu. 1:

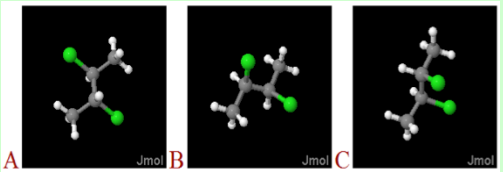
Which structure shown below represents meso 2,3-dichlorobutane, A, B or C?

[Click on the text below to open a window with the three choices]

Three structures, A, B and C

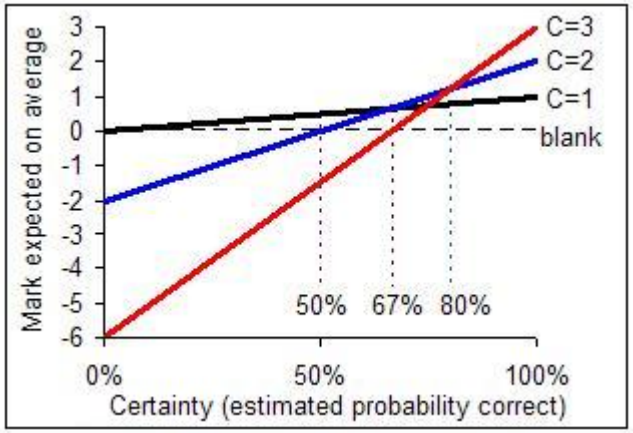
Choose one of the following:

- C
- A
- B



No Reply **Certainty:** C=1 (low) C=2 (mid) C=3 (high)

Certainty v Mark Expected



University College London

Tony Gardner-Medwin, UCL, TA Webinar 6 April 2011 http://bit.ly/TA6A2011
http://www.ucl.ac.uk/lapt/

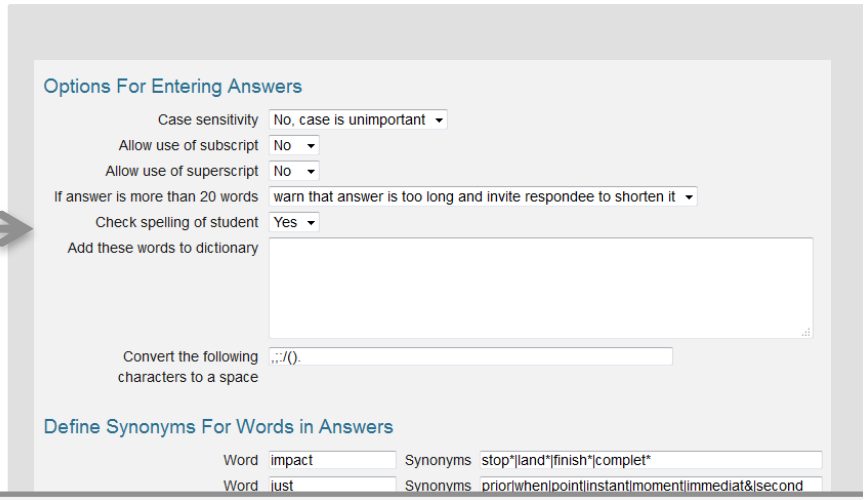
More Examples – Short text response

Students type in a short sentence response which can be marked by computer based on pattern matching.

Available in Moodle now.

Example question

Example settings

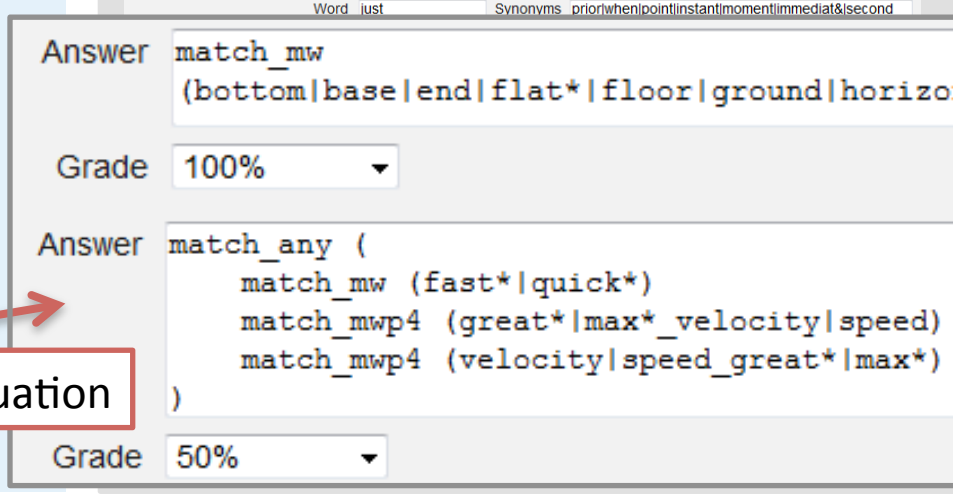


A boy climbs slowly to the top of a slide and then slides down it. At which point will his kinetic energy be a maximum?
Note: Your answer should ignore the effects of friction.

*You should give your answer as a **short** phrase or sentence.*

Kinetic energy will be at maximum when at the bottom of the slide.

evaluation



Examples – embedded applets

Moodle Quiz – Easy in Moodle, not so in BB!

1
Marks: --/1

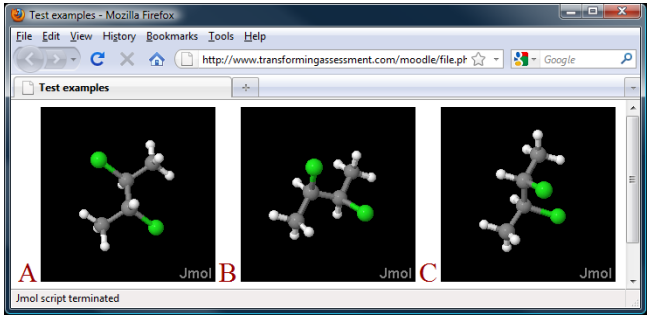
Which structure shown below represents meso 2,3-dichlorobutane, A, B or C?

[Click on the text below to open a window with the three choices]

Three structures, A, B and C

Answer:

Submit



2
Marks: --/1

Use the Jmol applet to view the crystal structure of the presented molecule. Use the Jmol applet display to match the following statements.

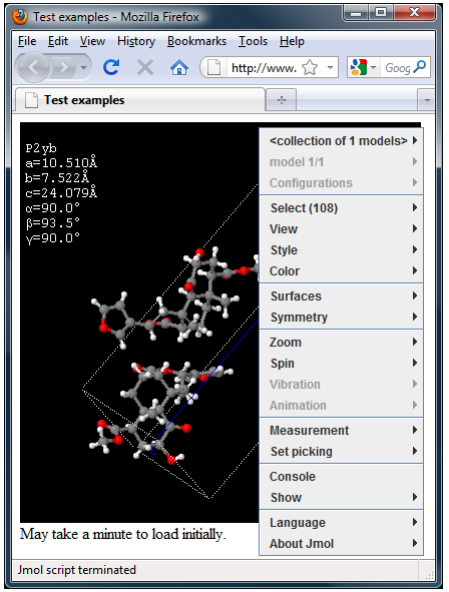
There are 7 stereogenic centres in the molecule — Choose...

There is evidence for an intramolecular hyrdogen bond — Choose...

There is evidence for an intermolecular hyrdogen bond — Choose...

Choose...
True
False

Submit



Students interact with tools to obtain data to construct an answer.

3
Marks: --/1

Use the Jmol applet to view the molecular structure of the presented molecule. Use the Jmol applet display to match the following statements.

The most electron rich region of this molecule is — Choose...

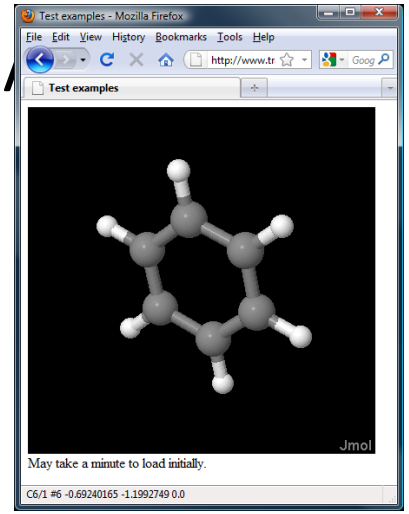
The most electron poor region of this molecule is — Choose...

The lowest energy molecular orbital for the molecule is — Choose...

The highest energy molecular orbital for the molecule is — Choose...

Choose...
situated on the six carbons
situated on the six carbons and the hydrogens
the edges of the molecule, in the plane
in the midle of the molecule, above and below the plane

Submit

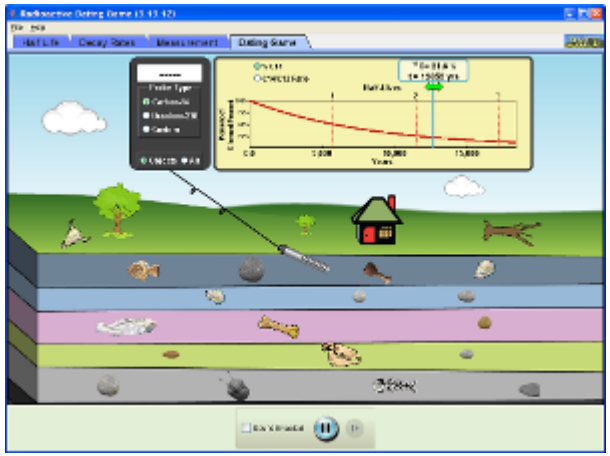


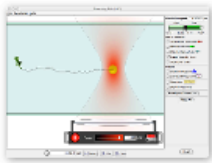
Save without submitting | Submit page | Submit all and finish

http://www.transformingassessment.com/moodle/file.php/27/jmol/jmol01.html

Advanced Examples – Virtual Labs / Sims

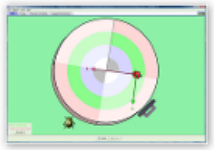
Conduct experiments via locally run simulations[1] or internet connected hardware[2]



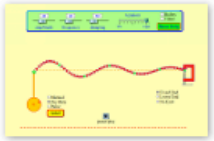


Stretching DNA

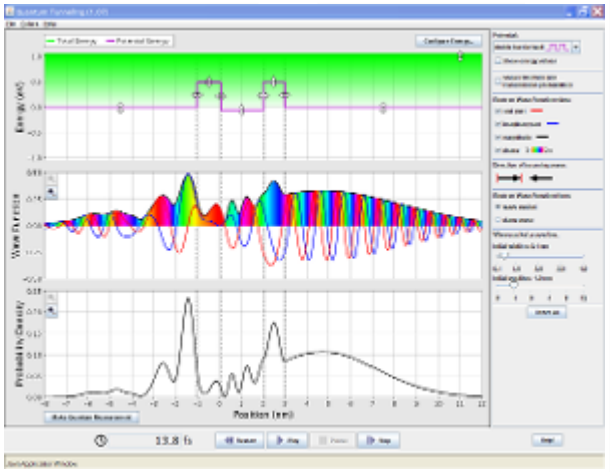
The Ramp

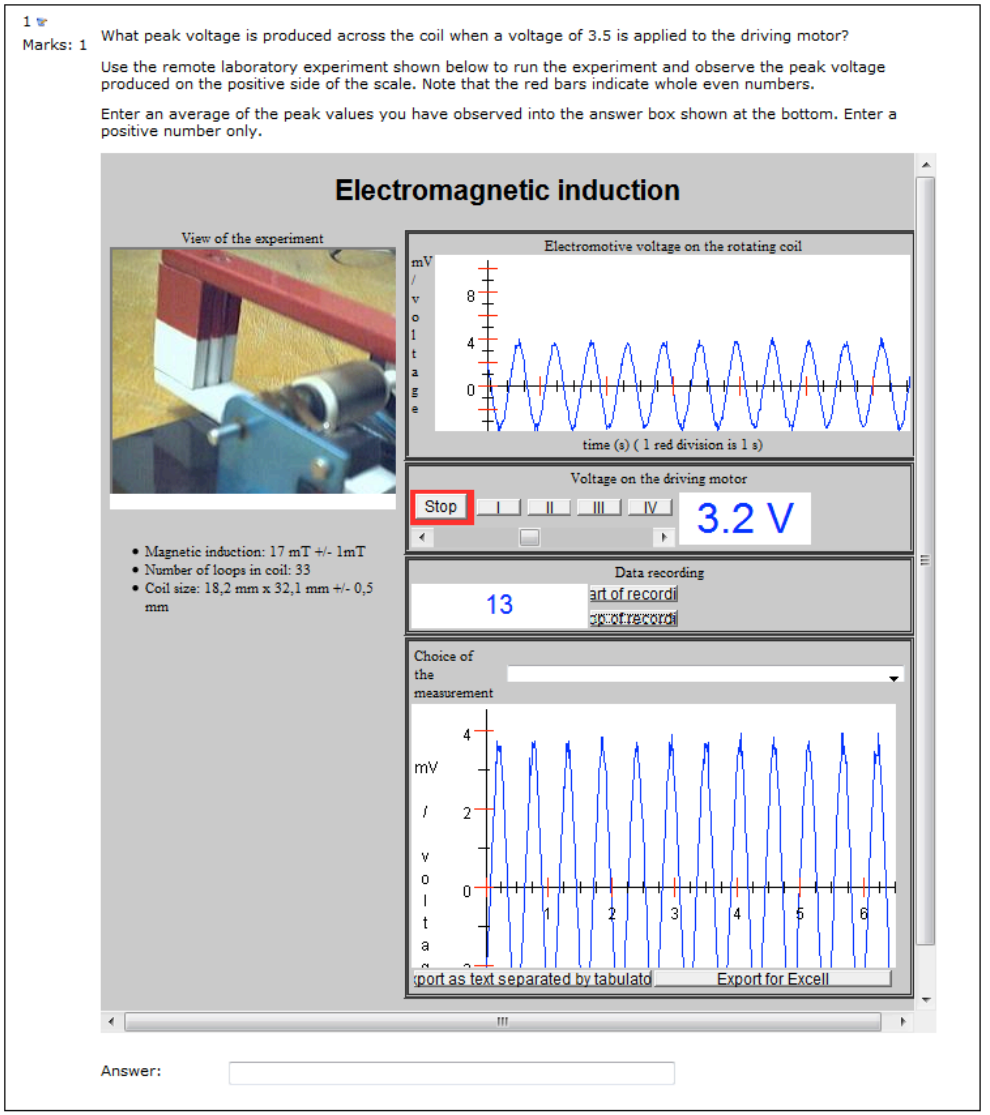


Torque



Wave on a String

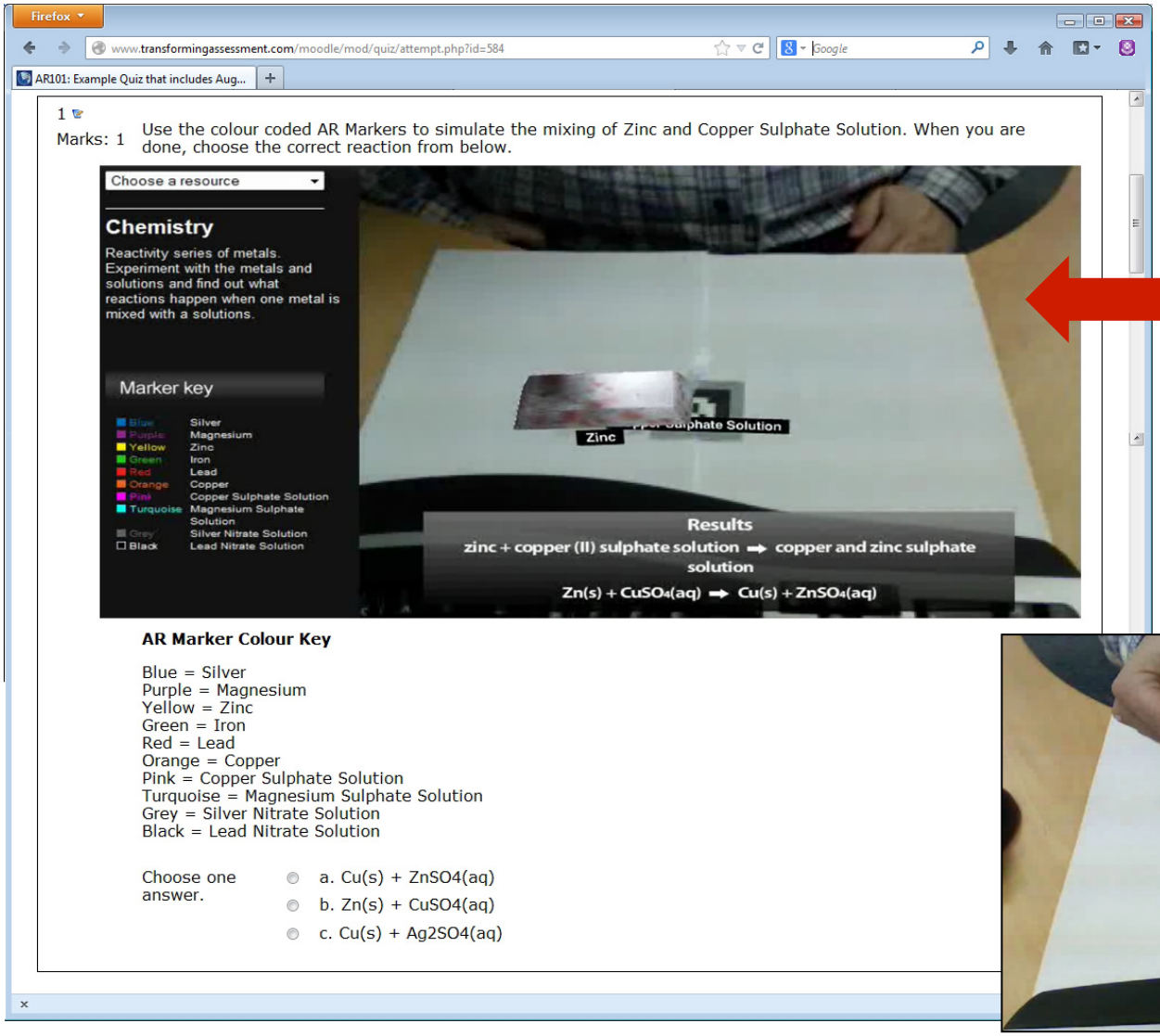




(1) http://phet.colorado.edu/

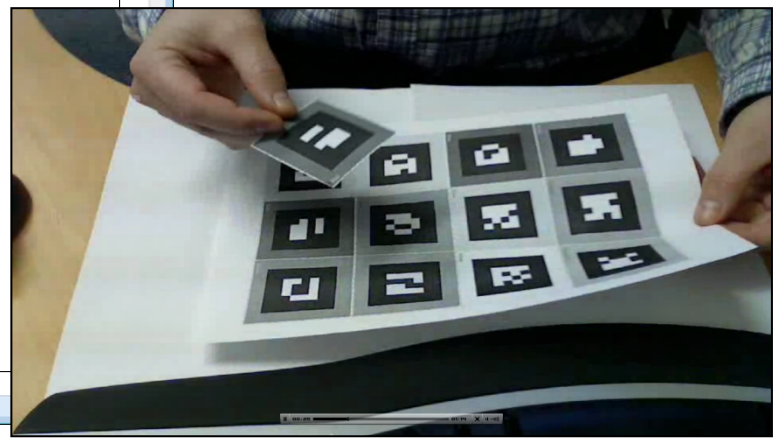
(2) http://www.transformingassessment.com/moodle/course/view.php?id=72

Examples – Augmented Reality Experiment



Web cam

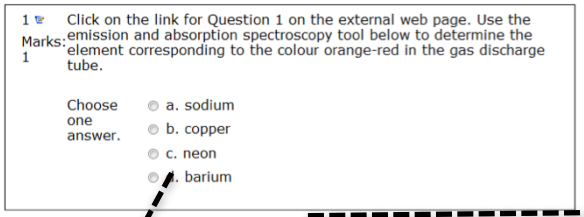
AR markers



AR software embedded in question

http://www.transformingassessment.com/moodle/course/view.php?id=70

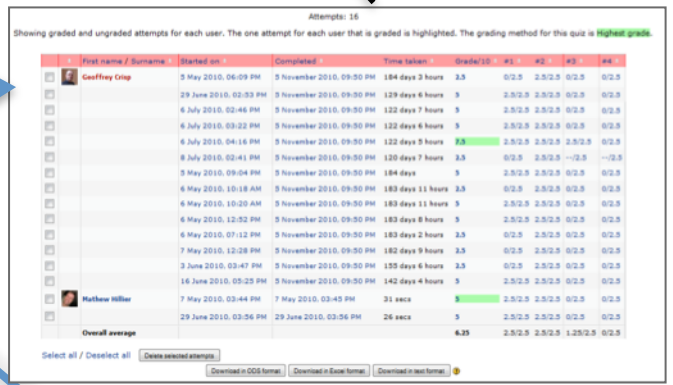
Advanced Examples – Virtual 3D Spaces



As if the student was doing the activity in the LMS

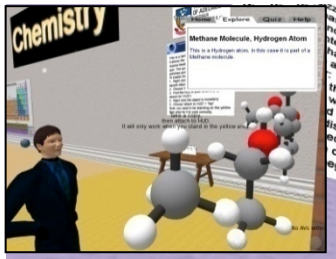
moodle

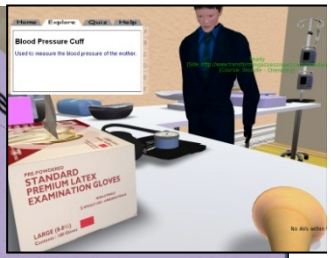
Set up Quiz in the LMS. Results are stored in the in grade book.



SLOODLE
Simulation Linked Object Oriented Dynamic Learning Environment

A set of scripts for Moodle and VW that acts as a bridge .





OpenSimulator

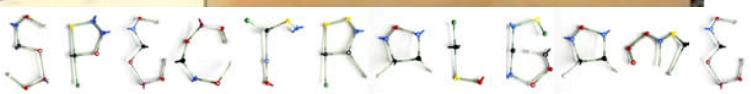
(e.g. Sim-on-a-stick)

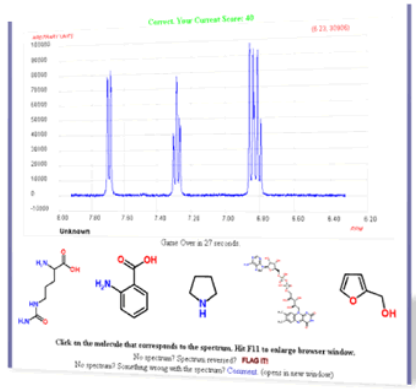
Student undertakes assessment in the virtual world

Online (Second Life) examples see http://www.transformingassessment.com/secondlife.php

Advanced Examples – Serious Games

- Serious games, simulations, role plays. Business, science, history, language/communication.





http://www.transformingassessment.com/moodle/course/view.php?id=38

Research program outputs

- The e-Exam system is situated within a wider research program to develop:
  - A working prototype of an exams platform and documentation allowing others to reproduce it.
  - A set of example questions that can be used in e-exams.
  - A research-informed set of good practice guidelines on e-exam processes and procedures.
  - A guide on preparing students for e-exams.

Further Information

Acknowledgements

OLT Project leader / Presenter: Dr Mathew Hillier*, Teaching and Educational Development Institute, University of Queensland

OLT Project Collaborator: Dr Andrew Fluck, University of Tasmania

OLT Project system developer: Marisa Emerson, University of Queensland

Contact: Email m.hillier[at]uq.edu.au

Project website and demo download

http://**transformingexams.com**

References, if any, are available upon request.

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e-Exam Demo Video

http://bit.ly/eexam-demo-vid-a