

# UQ: BYOD for e-Exam Trial outcomes



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**Get the demo and user guides**

<http://transformingexams.com>



Acknowledgement

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# Part 1: About e-Exams

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.*



So?

Essentially...

We are faced with a growing disconnect between the way high stakes testing is conducted using pen on paper exams and students' everyday experiences.

# e-Exam System

Pertinent Features	Affordances
A 'Whole computer' environment (OS, LMS, applications...) on a stick.	Vastly expanded pedagogical scope over that of a browser window.
Typed student responses via Word processor, constructed via apps (human marked) or on-board learning management system quiz (computer marked).	Caters for introduction to advanced uses. Components added/removed to suit. Electronic collection facilitates analytics, item response analysis...
No live network required during exam, even for LMS questions.	Robust. Greater control. (network could be used for admin)
Student owned equipment used as host and left untouched.	An ethical approach to scalability (no invasive software to install)
Modular, open source code base and commodity 'off the shelf' components.	Leveraging popular and sustainable projects for better efficiency. Fully 'known' (no 'blackbox'). Available!
One version works on most Intel based laptops - Apple, 'windows', Linux, that have a USB port.	One software version can serve all. Streamlines development and maintenance.



Bootable  
'live'  
USB  
drive





# Current e-Exam System v5 Demo

Four-in-one demo system (desktop shown below)...

1. Word document based exams (paper equivalent / intro use **S1 2014**)
2. Word doc + multimedia + 3<sup>rd</sup> party software tools (more trials soon...)
3. LMS (Moodle) based exams (computer marked questions - TBA)
4. Remote (serves as a restricted gateway) to networked LMS.



Word doc exams



e-Exam Starter

Student ID:

First Name(s):

Surname



On-board LMs exams

# UQ S1 2014 Trial: Paper equivalent exams

First stage: Paper 'equivalent' via on-board word processor.  
*This was used for Semester 1 2014 Trials.*

## To start an e-Exam:



1. Student boots laptop with USB
2. Students type ID, name & click 'Start Exam' button
3. Student can now start typing

Note: Automated background processes...  
The system copies Question 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!)

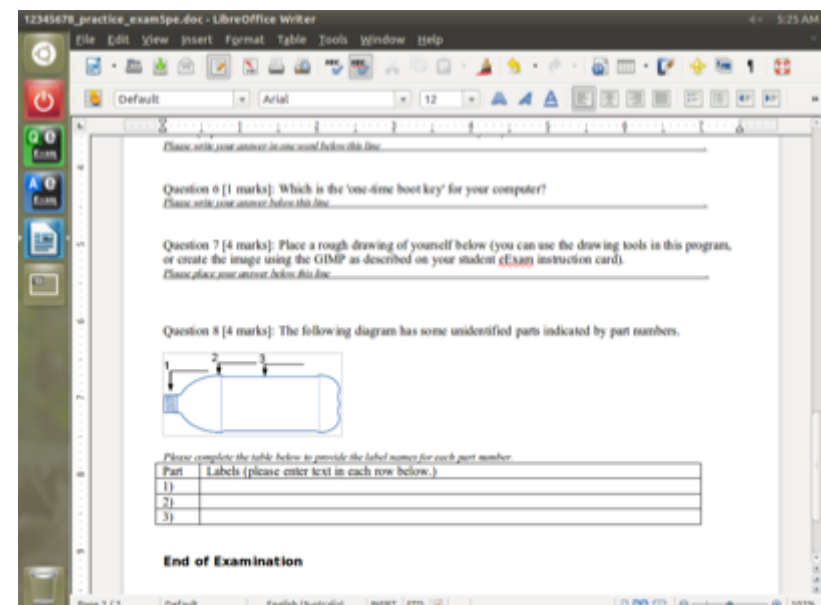
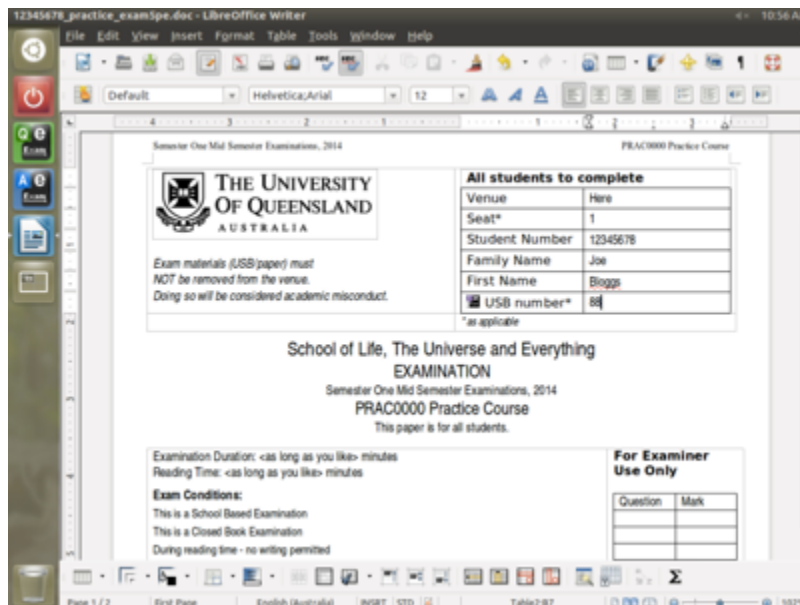
The image shows two screenshots. The top screenshot is a window titled 'e-Exam Starter' with a background image of a person in a field. It contains three text input fields: 'Student ID: 12345678', 'First Name(s): Joe', and 'Surname: Bloggs'. A 'Start Exam' button is located to the right of the Surname field. A large black arrow points from the 'Start Exam' button down to the second screenshot. The second screenshot shows a LibreOffice Writer window displaying an exam question paper. The paper is titled 'Semester One Mid Semester Examinations, 2014' and 'PRAC0000 Practice Course'. It features the University of Queensland logo and a table for 'All students to complete' with fields for Venue, Seat, Student Number, Family Name, First Name, and USB number. Below the table, it says 'School of Life, The Universe and Everything EXAMINATION'. At the bottom, there are sections for 'Examination Duration', 'Exam Conditions', and 'For Examiner Use Only' with a table for marking questions.

Question	Mark

# UQ S1 2014 Trial: Paper equivalent exams

**UQ trials, Semester 1 2014** : The aim was to explore the idea of BYOD e-exams, logistics, student impressions.

- Paper 'equivalent' exams (computer optional - students choose pen or keyboard).
- Mid term exams ~ 15% of grade.
- Question types used: essay, short answer, limited MCQs (type 'x' in a box), label a diagram/image (fill in a table; basic drawing features were available but not used by students). All manual marking – but at least it was typed text!





# UQ S1 2014 Trial: Paper equivalent exams

Responding to questions in-line in the word processor  
(note – the system keeps a read-only backup of the questions!)

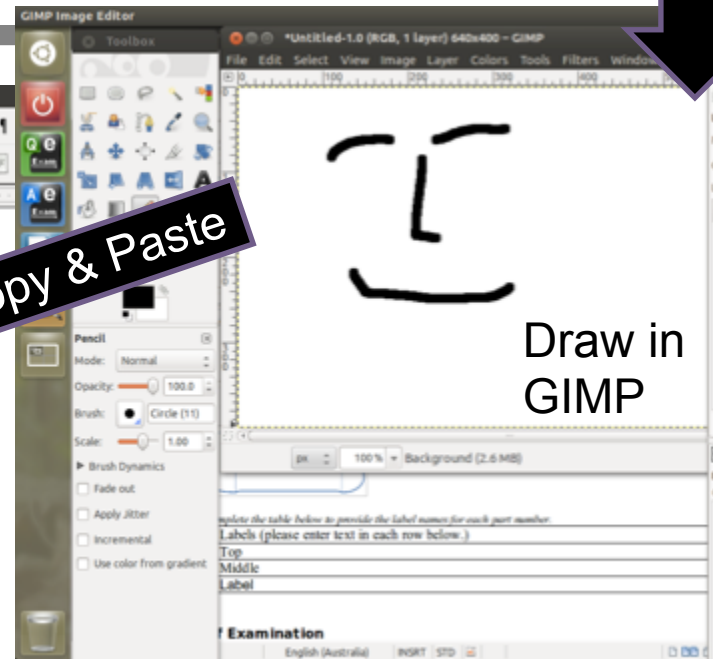
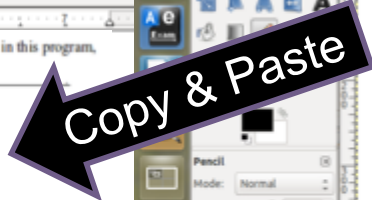
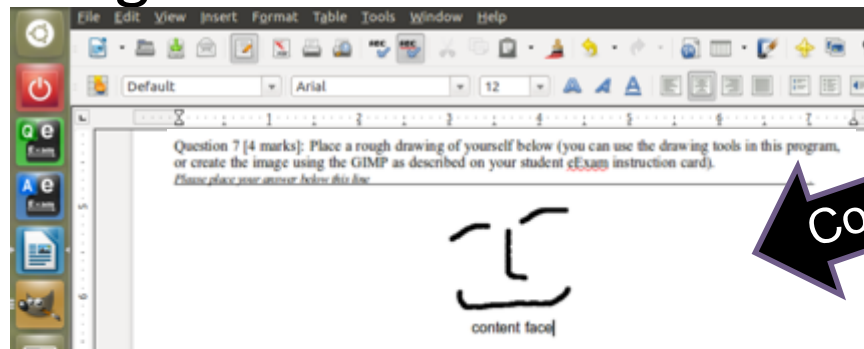
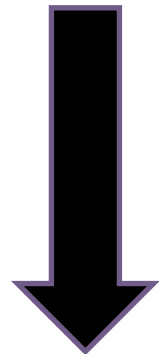
Type where indicated....

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 (or in a box)

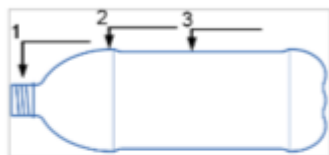
Simple drawing tools...

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

Label a diagram...



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



Fill in table rows...  
Or type 'x' for MCQs

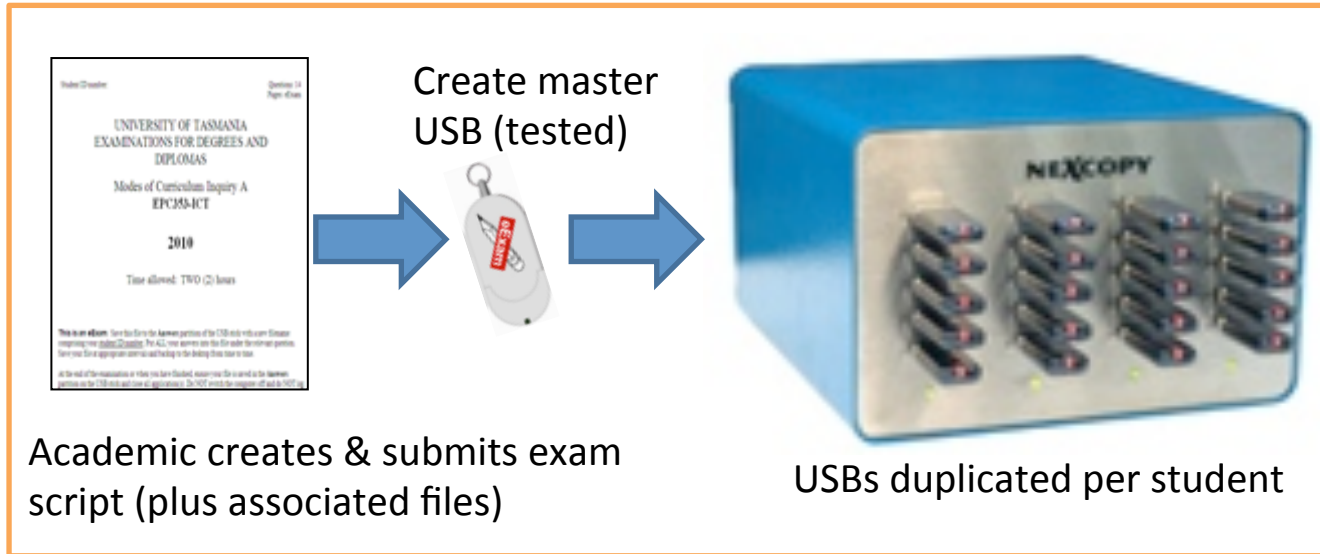
Please complete the table below to provide the label names for each part number.

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

Note: Drawing tool was available but not used.

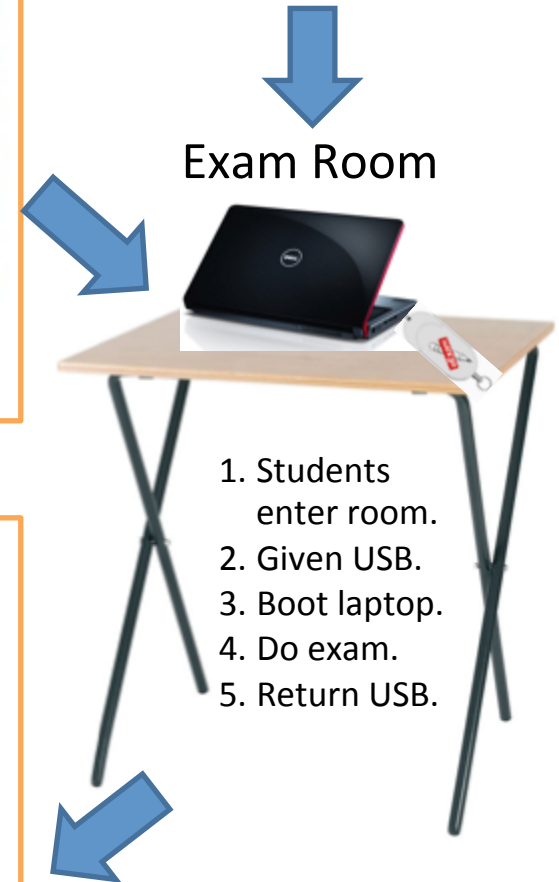
# The Current Process – how it works

## Prep



Students pre-exam:  
Practice/laptop testing/  
setup sessions.

## Exam Room



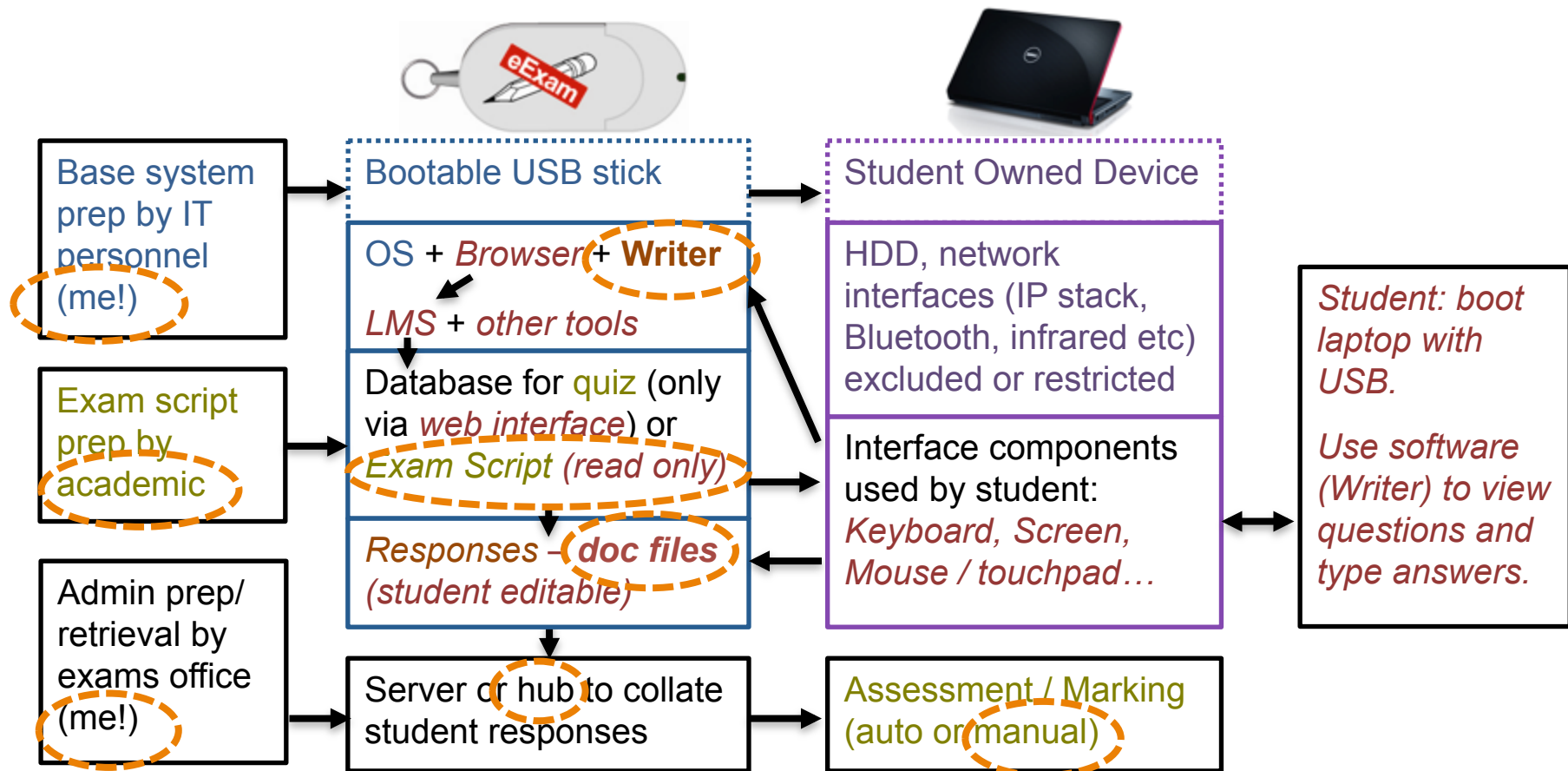
## Post Exam



(credit: Dr Fluck UTAS)

# Architecture of e-Exam System

Modular architecture so academics / institutions can choose the features and mode of operation that suit them... **For UQ trials we kept to the basic features!**



Current OLT project adds these features to v5 (not used in UQ trial):

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

# Part 2: UQ e-Exam Trial Outcomes S1 2014

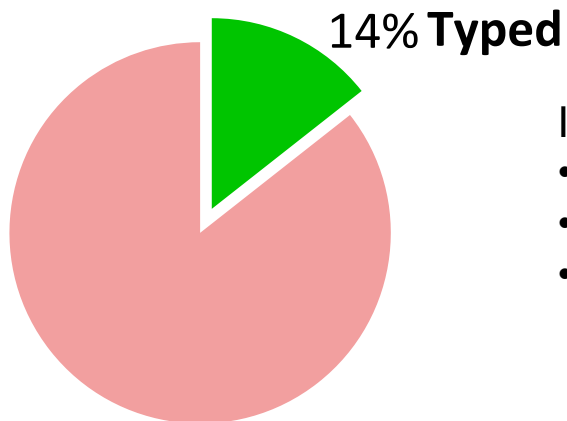
UQ Trials S1 2014 - Four courses.

Data collected from students:

- Via pre-exam short survey (*not shown here*).
  - Conducted at the pre-exam practice setup sessions.
  - Covered: technical compatibility, hardware spec lists, student preliminary impressions.
- Via post-exam extended survey (***main findings follow***)
  - Conducted at the conclusion of the exam (in the room).
  - Covered: student exam experience, reaction to exam session conditions, e-exam system impressions, exam writing strategies and production, general non-exam writing strategies.

Future analysis – production (words, language density, marks).

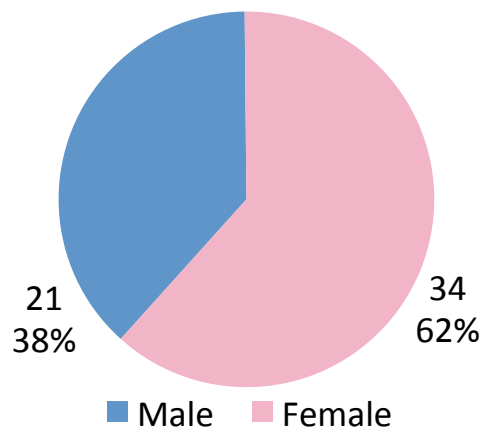
Participation	Typed	Handwrite
Veterinary technology: 90 min theory, mostly short answer	11	89
Criminology: 70 minutes. Single long essay response section (and a Multiple choice section done pen on OMR sheet)	17	67
Physiotherapy: 15 min (watch video and write) before OSCE	25	113
Animal Biology: 45 min mixed short answer and MCQ (type 'x')	5	115
<b>Total</b>	<b>58</b>	<b>345</b>



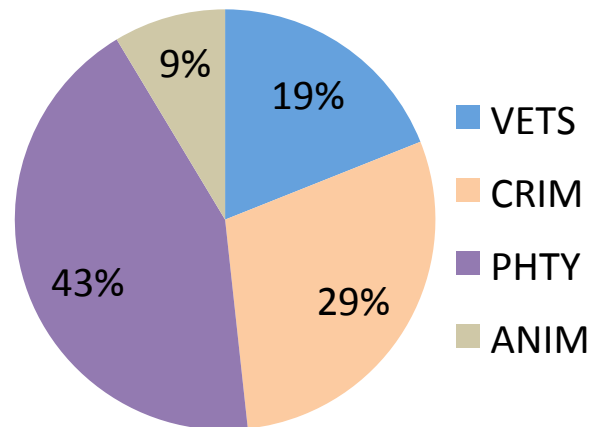
It is important to note:

- First 'toe in the water' trials.
- Participation was optional.
- Mid term exams worth an average 15% of course grade.

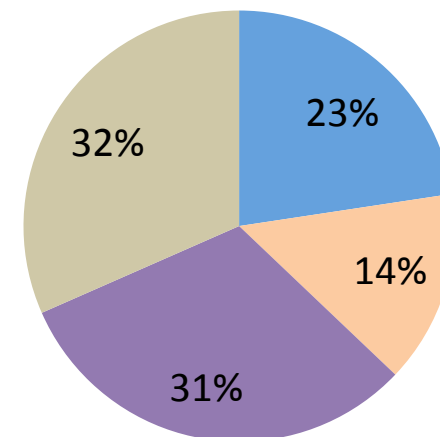
**Gender (Typers)**



**Typers by cohort**

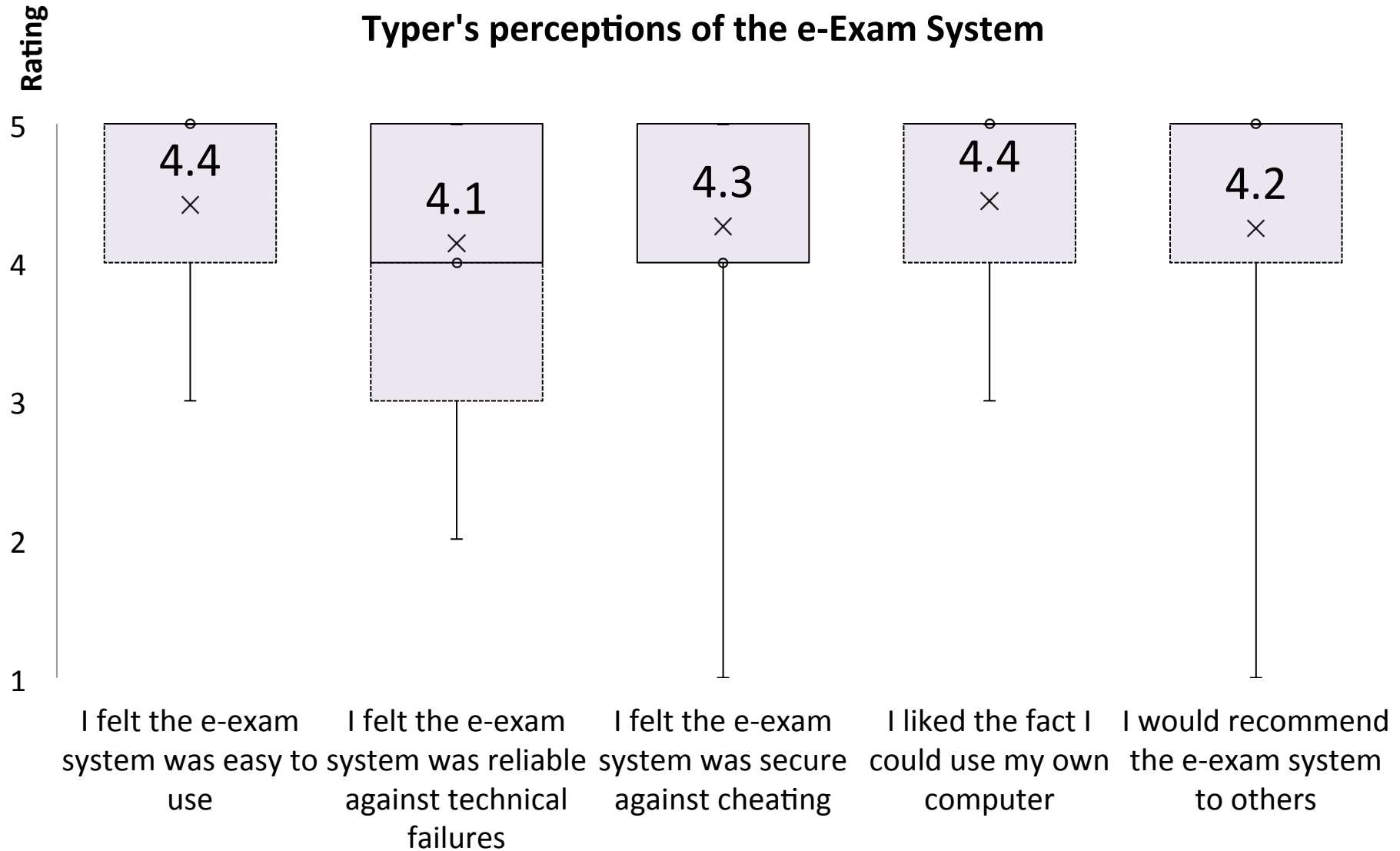


**Handwriters by cohort**



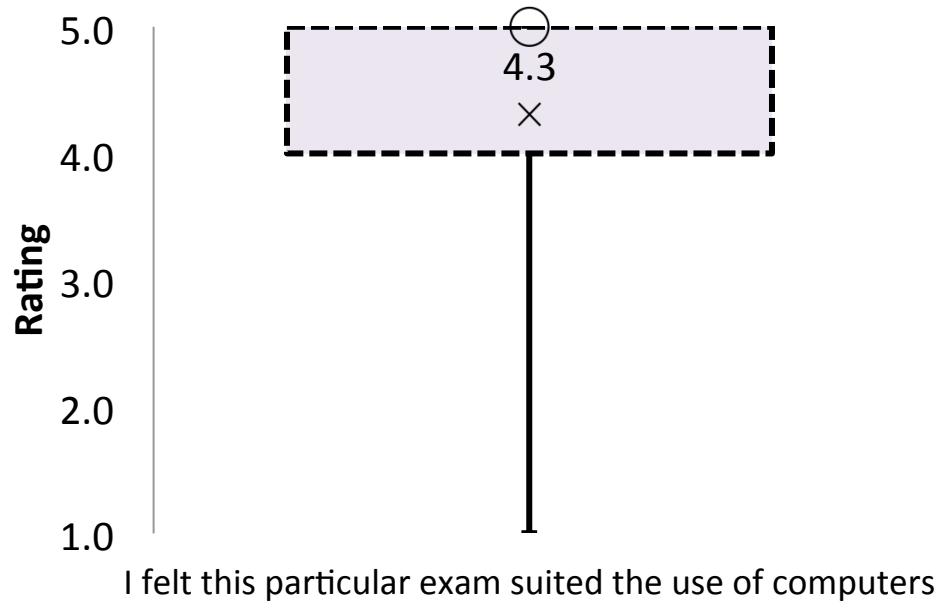


# Reported by those that used the system (via post-exam survey)



Likert scale/rating: 1 = strongly disagree to 5 = strongly agree [N = 58]

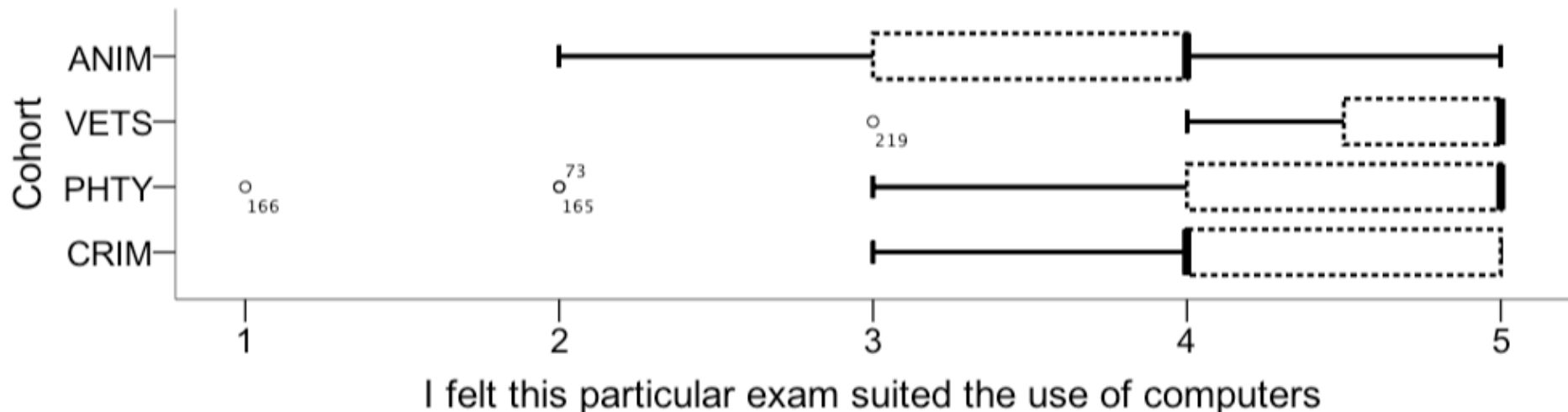
# Did typers think the exam suited the use of computers?



Those that typed the exam. All four cohorts combined (VETS, CRIM, PHTY & ANIM).  
Likert Scale: 5 = Strongly Agree, 1 = Strongly Disagree  
Boxplot whiskers are min and max.  
An X denotes the mean 4.31 (value shown) and a small **circle** indicates the median. N = 58.

Largely that was a 'yes'.

Those that typed the exam by cohort:

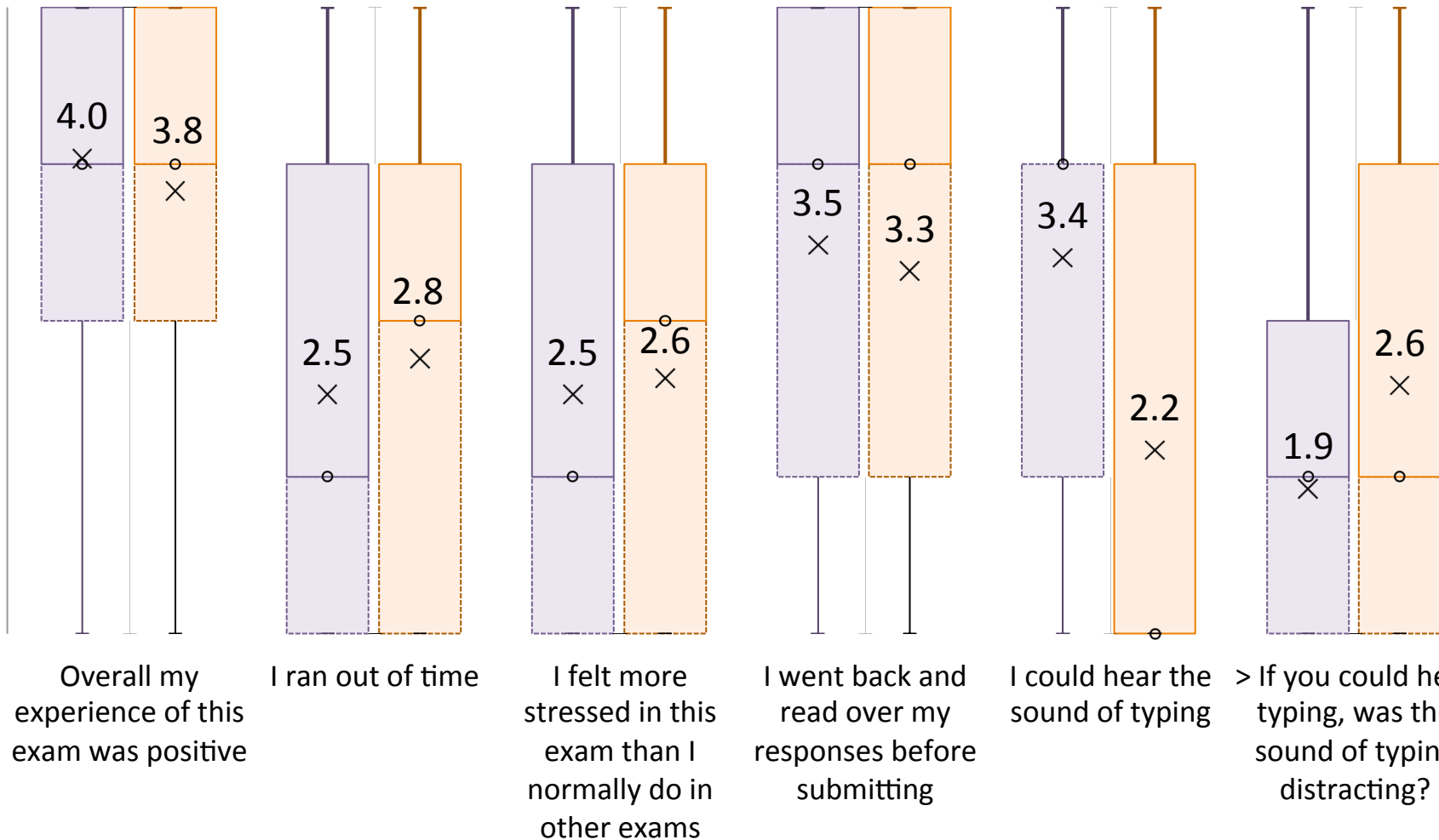


# Student reaction to exam conditions

## Typers (left) and Hand writers (right)

Rating

5  
4  
3  
2  
1

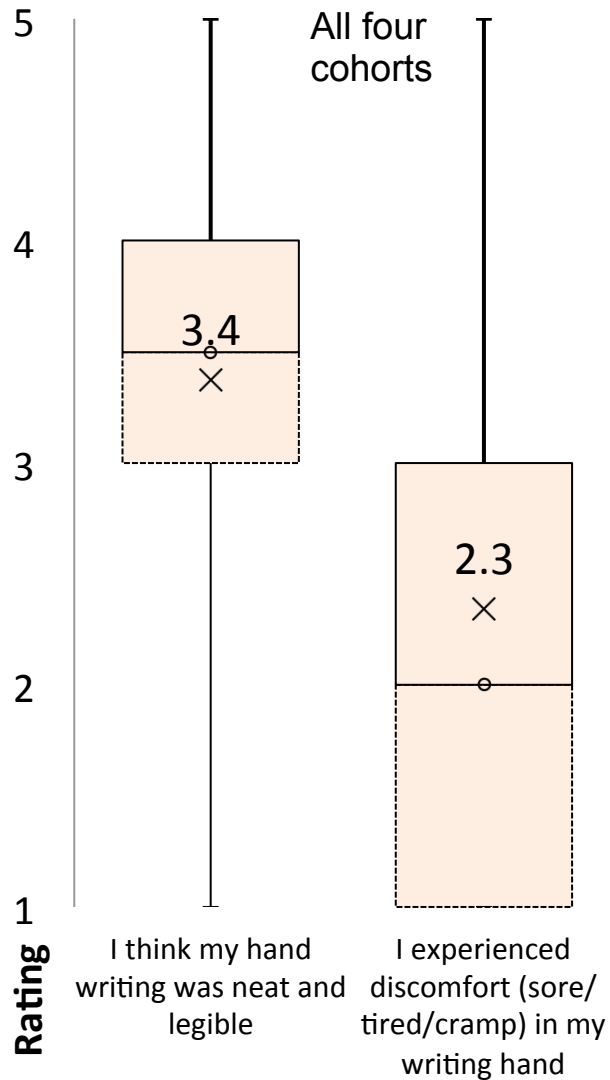


Likert scale: 5 = strongly agree, 1 = strongly disagree. Mean shown as x with figure and median shown as a circle o.

**T-test** to compare means (cross X and figures shown above) of typers and hand writers.

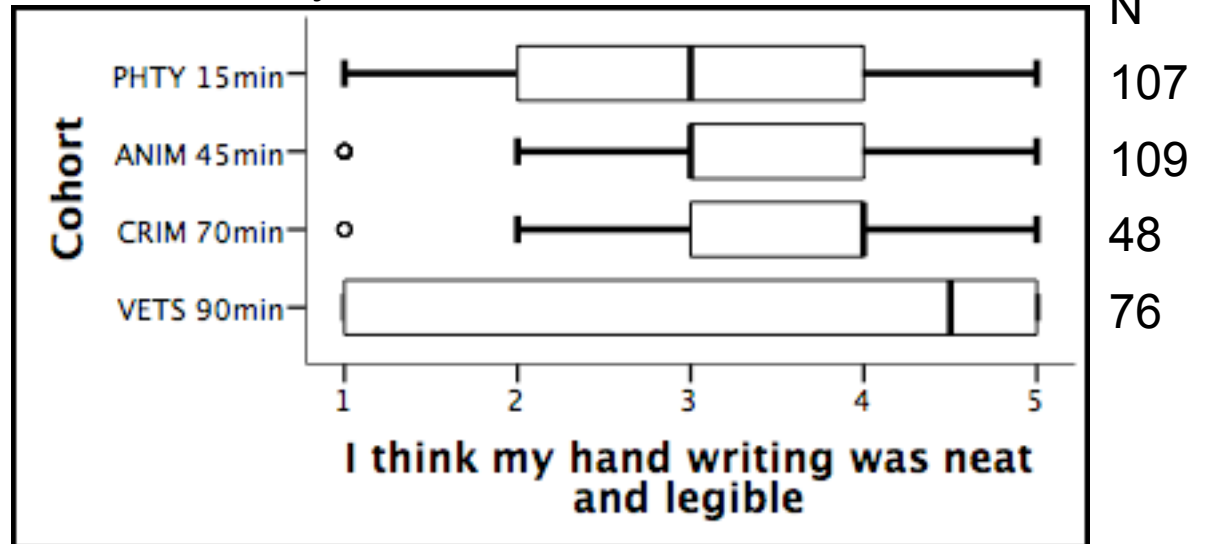
p .166 .288 .582 .438 .000 .001

# Hand writing in the exam



*Are some students over estimating the neatness of their hand writing?!*

## Breakdown by cohort



Discomfort from using a pen increased with exam duration (below).



Sig at >.01!

\* Note 20% response rate by VETS for this item. All others near 100%

## **Most issues encountered were relatively minor**

The bottom line is that all students were able to complete their exam in time.

**Scrolling** - relates to the ease/fluidity of moving up and down pages/screens.

For example, two finger touchpad scrolling in the e-exam system was in the opposite direction to OSX but the same as in MS Windows. The size of the scroll bars may have also been an issue when targeting the cursor. (may also relate to the next item)

**Touchpad/mouse - the sensitivity/behaviour** of the software drivers and hardware. The interaction of the touchpad on their laptop and the software may not have been smooth. This may have resulted in erratic cursor movement or overly sensitive movements. No students chose to bring a mouse - all used the touchpad on their laptop.

**Boot up/start up** - relates to the initial boot process.

For example, forgetting the 'one time boot' key, or forgetting the key press combination or on Apple laptops - holding down the power key rather than pressing and releasing it while holding down the ALT key to bring up the boot menu.

**None were road blocks** in that all can be addressed through a combination of:

- \* use USB wired mice,
- \* more pre-exam practice by students to familiarise themselves with the software and processes,
- \* ensuring help/testing/set-up assistance is available to catch hardware incompatibilities before they get to the exam room (recommend mock exams too)

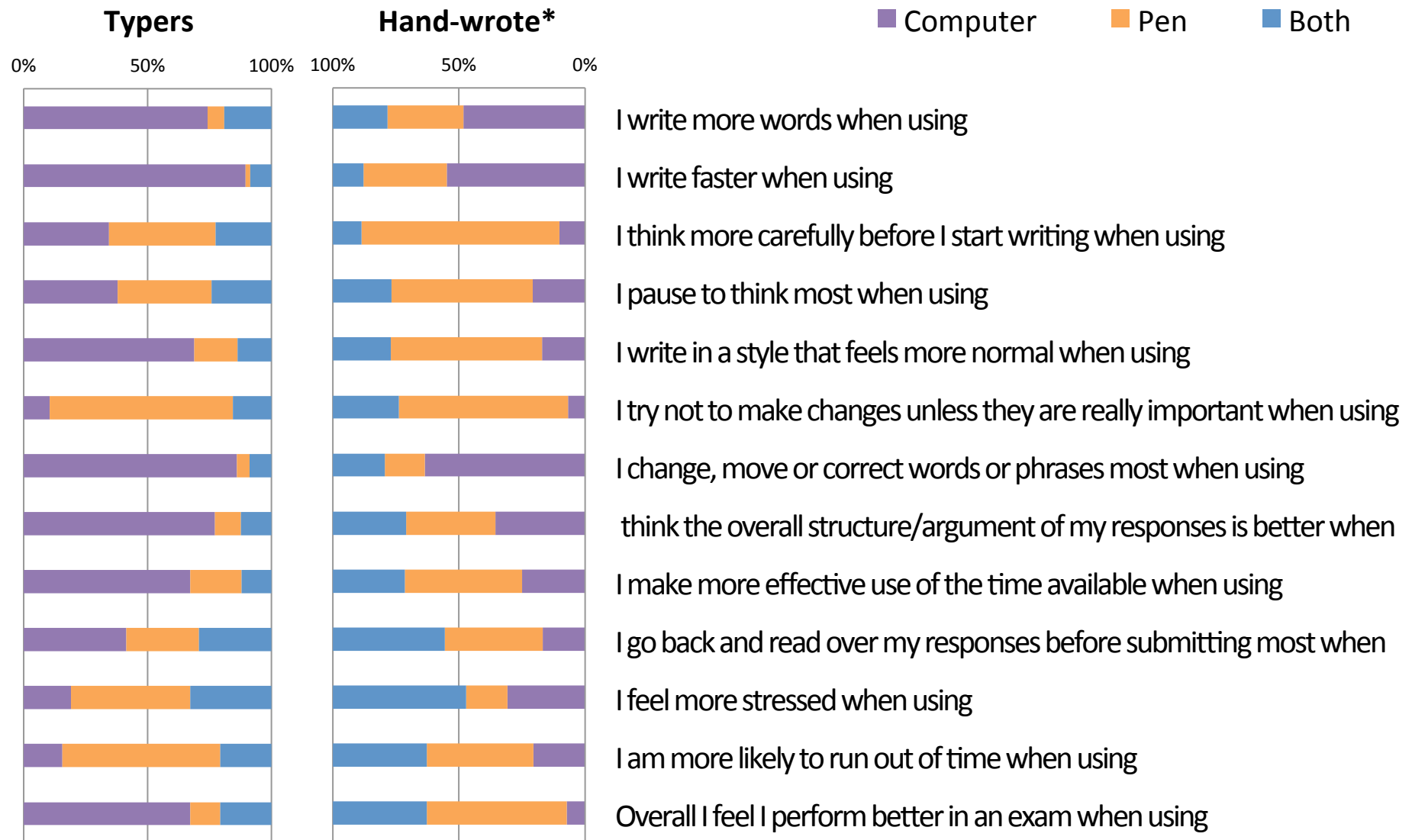


# Trial Technical Issues

**Issue log:** 10 people of the 58 who typed reported 'technical issues' via the post-exam survey. Notes below supplemented by observation.

Issue	N	Notes, Additional Observations, Suggested Solutions
Boot up/ start up	2	In reality most participants needed assistance/forgot boot key. <i>Familiarity: need to practice!</i>
Entering my details	0	All good.
Using the software	0	Some did not know how to 'exit' gracefully (i.e. File save, file exit, shutdown). <i>Need to practice! Investigate an 'I'm finished' script/button.</i>
Battery	0	Most plugged in. <i>Power needs to be available.</i>
Saving files	0	All good. (noticed one student used 'save as' when save was 'greyed out')
Software crashed/ computer froze	1*	2 mins into a 15 min exam. Continued on paper and given 2 mins extra time. Old 2009 white Macbook. <i>Better pre-exam testing should catch. Persistent logging to be implemented. Currently has 'recovery' autosave, a 'full' autosave to be investigated too.</i> *Recorded via observation.
Touchpad/ mouse	7	Sensitivity reported by participants. <i>Some adjustments were made. USB mice highly recommended! Investigate drivers.</i>
Scrolling	<b>13</b>	Two finger scrolling opposite to OSX. Small scroll bars. Sensitivity. <i>Familiarity: need to practice. Larger scroll bars. Investigate a user selectable option for touchpad/scroll behavior (and re-mapping of keyboard shortcuts)</i>

## Student consideration of general exam conditions when using computer versus pen (responses by those who typed on the left & those that hand-wrote\* on the right)

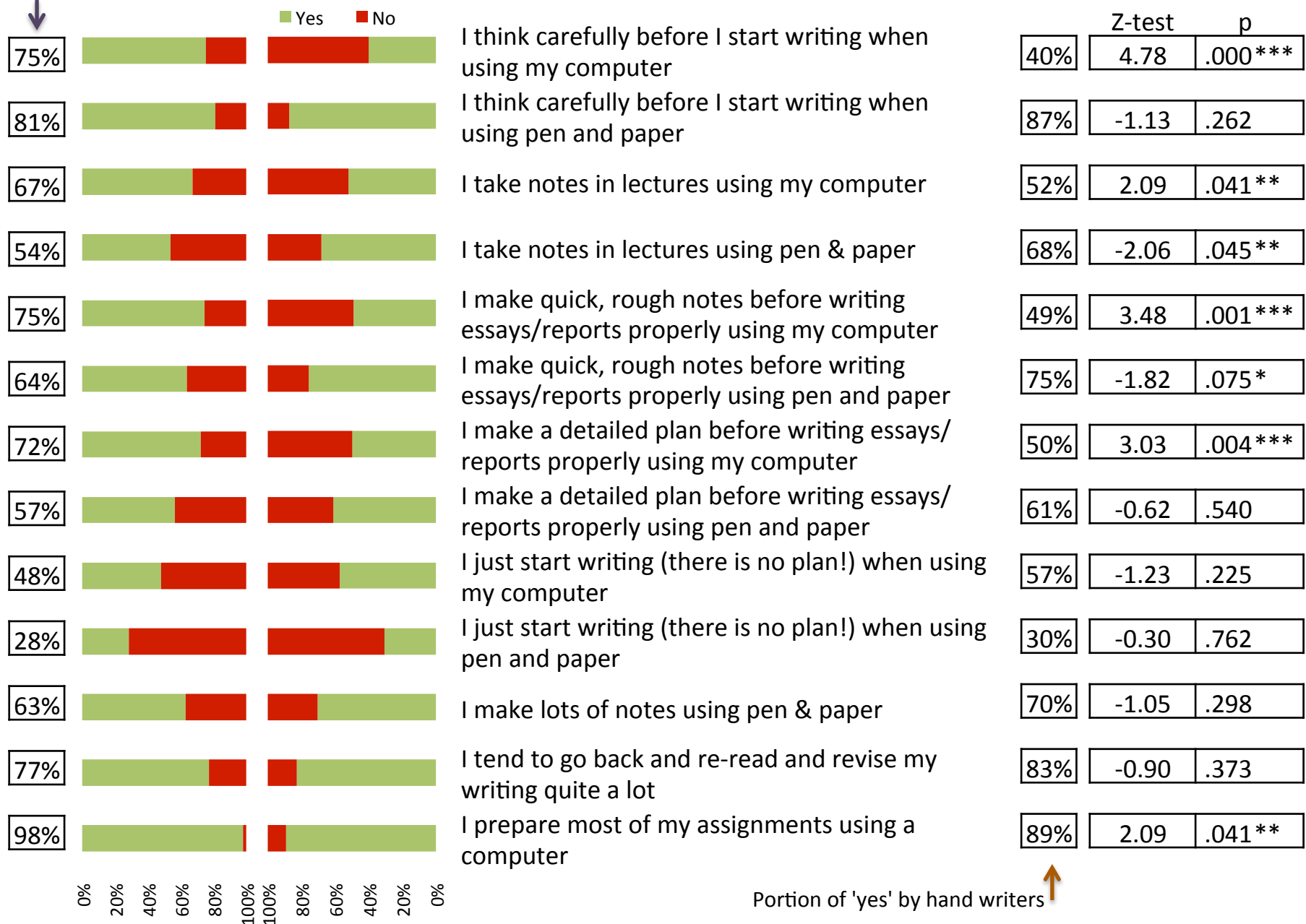


\* Note - Many of those that hand-wrote their exam had no prior experience of using a computer for an exam so the results presented here are largely speculative on their part. However, it is reasonable to assume that they drew on their general use of computers.

# Writing strategies under non-exam conditions – general writing habits

## Responses by Typers (left) and Hand writers (right)

Portion of 'yes' by typers



Portion of 'yes' by hand writers

# Part 3: Next phase. Post-paper exams with multimedia

**UQ 2015?** TBA: Post-paper exams via word processor (used at UTAS)

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

The image shows a computer screen with a word processor window and a video player window. The word processor window displays exam questions:

- Please describe the picture shown below.  
Please write your answer below this line.
- Click on [this link](#) or open the file from your [Materials](#) folder.  
Please write your answer below this line.
- Place a drawing of yourself below (you can use the GIMP as described on your student cEEx page).  
Please put your answer below this line.
- View the video file by clicking on [this link](#) in your [Materials](#) folder.  
a) Could you see the video playing on your screen?

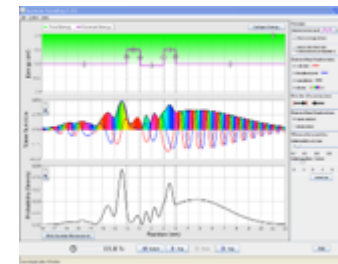
The video player window shows a simulation titled "GENOMICS DIGITAL LAB". The simulation interface includes a "PLANT PROPERTIES" panel with the following data:

PLANT PROPERTIES	Light	Gases	Liquid
CHLOROPLAST	Light Reaction @ 0.47	CO <sub>2</sub> 1.00	H <sub>2</sub> O 1.00
	Glucose 0.00	O <sub>2</sub> 0.00	
	SUGARS 0.00		

The simulation also features a "WHERE THE CHLOROPLAST THE LIGHT REACTION OCCURS" section with a "Score" of 1.00. The video player shows a progress bar at 0:27 / 1:18 and standard playback controls.

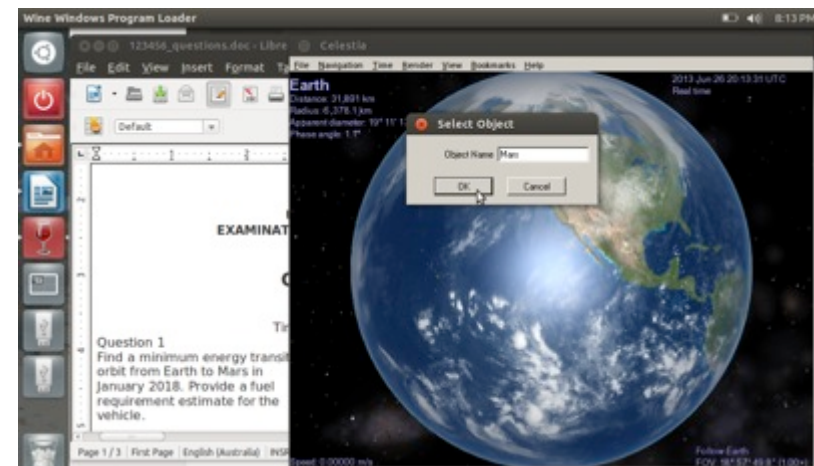
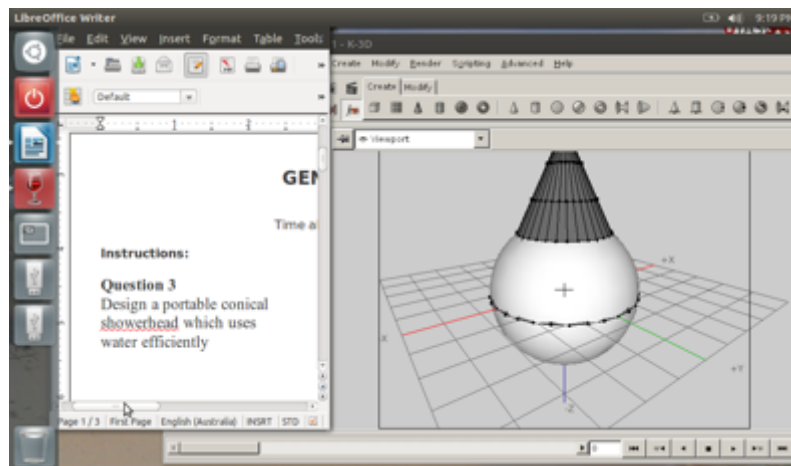
# The next phase: can include software tools

Simulations, tools, virtual experiments, serious games...  
Business, history, language/communication, science labs...



More examples <http://www.transformingassessment.com/moodle/course/view.php?id=38>

Including 'Windows' software; CAD / 3D modeling, Celestia via WINE



Ref: Dr Fluck, UTAS



# The Future: LMS on e-Exam v5 (Demo)

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

*Trials TBA!*

The screenshot shows the 'e-Exam' interface in a browser. The top navigation bar includes 'Home', 'My courses', 'e-Exam', 'e-Exam Demo', and 'Start e-Exam Demo'. A 'QUIZ NAVIGATION' panel on the left shows the user 'John Smith' and a grid of question numbers 1 through 14. The main content area displays three questions:

- Information:** All questions in this demonstration exam, except for number 7 which an essay question, are computer marked. This demonstration displays all questions on one page, permits multiple attempts and provides feedback on correct and incorrect responses after the completion of the exam. These settings can be changed as needed.
- Question 1:** Moodle is the most popular LMS in the world today. Select one:  True,  False.
- Question 2:** What do you call a question format in which students must uniquely associate a set of prompts with a set of options? Answer:

The screenshot shows a close-up of two questions in the e-Exam interface:

- Audio Question:** Listen to the audio and choose the appropriate response - what did you hear? An audio player shows 0:25. Select one:  a. The sound of an elephant,  b. The audio didnt work for me,  c. The sound of a bird.
- Video Question:** Can you play the video and hear the sound? A video player shows a 3D scene with a large yellow sphere and other objects. Select one:  a. I get nothing,  b. I can play the video and hear the sound,  c. I can play it, but can not hear any sound.

# The Future: LMS Question Types

## 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 - human marked]

### 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.*

# The Future: Advanced Example - Virtual 3D Spaces

Proposal for offline Virtual OSCE, practicals etc. Technology is already working 'online'.

*Data flows as if the student was doing the activity in the LMS*



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



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



Student undertakes assessment in the virtual world

1 Click on the link for Question 1 on the external web page. Use the emission and absorption spectroscopy tool below to determine the element corresponding to the colour orange-red in the gas discharge tube.

Marks: 1

Choose one answer.

- a. sodium
- b. copper
- c. neon
- d. barium

Module Item Added Controller

This course is listed for learning activities in Second Life. This page is provided to allow students to check whether the Second Life interface is correctly installed, and for instructors to configure the interface.

SLOODLE Controller for Chemistry

Status: Enabled

Module Item Configuration

You can choose to configure some SLOODLE objects with a subclass instead of using the generic web-based authentication. It is best to use, as it involves the use of a single form prepared for all objects, but it makes it quicker and easier to set up non-configured objects from your inventory.

Select which object you would like to create a configuration record for from the list below. If multiple versions are available, then they are shown in the brackets - only use the older versions if the main version does not work.

- Choice
- LogInZone
- Registration
- Password Reset
- Picture Glass
- Presenter
- ProneCup
- Quiz Chair
- Quiz Item On
- Registration/Environment Booth
- SLOODLE Set
- Second Life Tracker
- Smooth ARV HQ
- Smooth Award System
- Waiting Machine
- WebInterface

Showing graded and ungraded attempts for each user. The one attempt for each user that is graded is highlighted. The grading method for this quiz is **highest grade**.

Username	Attempted on	Completed on	Time taken	Score	MCQ	MC	MCQ	MC
Geoffrey Charesworth	2 May 2010, 10:00 PM	9 November 2010, 10:00 PM	128 days 3 hours	2.0	0.0	0.0	0.0	0.0
Geoffrey Charesworth	20 June 2010, 02:00 PM	9 November 2010, 10:00 PM	128 days 8 hours	0	0.0	0.0	0.0	0.0
Geoffrey Charesworth	4 July 2010, 10:48 PM	9 November 2010, 10:00 PM	122 days 7 hours	0	0.0	0.0	0.0	0.0
Geoffrey Charesworth	4 July 2010, 10:22 PM	9 November 2010, 10:00 PM	122 days 7 hours	0	0.0	0.0	0.0	0.0
Geoffrey Charesworth	4 July 2010, 04:14 PM	9 November 2010, 10:00 PM	122 days 5 hours	0	0.0	0.0	0.0	0.0
Geoffrey Charesworth	4 July 2010, 02:41 PM	9 November 2010, 10:00 PM	128 days 7 hours	0.0	0.0	0.0	0.0	-0.0
Geoffrey Charesworth	4 July 2010, 09:04 PM	9 November 2010, 10:00 PM	128 days 1	0	0.0	0.0	0.0	0.0
Geoffrey Charesworth	4 July 2010, 10:28 AM	9 November 2010, 10:00 PM	128 days 11 hours	0	0.0	0.0	0.0	0.0
Geoffrey Charesworth	4 July 2010, 10:00 AM	9 November 2010, 10:00 PM	128 days 8 hours	0	0.0	0.0	0.0	0.0
Geoffrey Charesworth	4 July 2010, 10:00 AM	9 November 2010, 10:00 PM	128 days 8 hours	0	0.0	0.0	0.0	0.0
Geoffrey Charesworth	4 July 2010, 07:12 PM	9 November 2010, 10:00 PM	128 days 3 hours	0.0	0.0	0.0	0.0	0.0
Geoffrey Charesworth	4 July 2010, 10:28 AM	9 November 2010, 10:00 PM	128 days 4 hours	0.0	0.0	0.0	0.0	0.0
Geoffrey Charesworth	2 June 2010, 10:47 PM	9 November 2010, 10:00 PM	128 days 4 hours	0.0	0.0	0.0	0.0	0.0
Geoffrey Charesworth	10 June 2010, 09:20 PM	9 November 2010, 10:00 PM	142 days 4 hours	0	0.0	0.0	0.0	0.0
Geoffrey Charesworth	7 May 2010, 10:48 PM	7 May 2010, 10:48 PM	31 secs	0	0.0	0.0	0.0	0.0
Geoffrey Charesworth	20 June 2010, 02:00 PM	20 June 2010, 02:00 PM	20 secs	0	0.0	0.0	0.0	0.0
Overall average				0.0	0.0	0.0	0.0	0.0



Chemistry

Physics

STANDARDIZED PREPARATION EXAMINATION QUESTIONS

Geoffrey Charesworth's "SLOODLE 1.1 Quiz Chair"

Click on the link for Question 2 on the external web page. Use the emission and absorption spectroscopy tool below to determine the element corresponding to the colour orange-red in the gas discharge tube.

1. reduces the centripetal force.  
2. keeps the centripetal force the same  
3. increases the centripetal force

SLOODLE 1.1 Quiz Chair Resolving  
Configuration received  
Starting quiz for Geoffrey Charesworth  
Fetching quiz data  
Ready to attempt Sloodle example for physics  
Moving the (yellow) fixed node closer to the load increases the tension in the left hand track

# Remote connection to networked LMS

## Computer marked question types via institutional LMS

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

Trials TBA – *dependant upon reliable/robust network connections!*

The image displays two screenshots of the Blackboard Learn interface. The top screenshot shows the 'Preview Test: Example test - e-exam mode' page. The page header includes 'THE UNIVERSITY OF QUEENSLAND AUSTRALIA' and 'eLearning@UQ'. The main content area contains a table with the following details:

Description	Example test to try marking (Normally the description of the test for students would appear here)
Instructions	Normally the instructions for students would appear here
Timed Test	This Test has the time limit of 1 hour. You are notified when time expires, and you may continue or submit. Warnings appear when <b>half the time, 5 minutes, 1 minute and 30 seconds</b> remain <i>[The timer does not appear when previewing this Test]</i>
Multiple Attempts	Not allowed. This Test can only be taken once.
Force Completion	Once started, this Test must be completed in one sitting.

Below the table, there is a 'Question Completion Status:' section and a warning: 'Moving to another question will save this response.' The current question is 'Question 1' with a value of '10 points' and a 'Saved' status. The question text is 'What is two times twenty-one?' and the input field contains the answer '42'.

The bottom screenshot shows the 'Learn.UQ' login page. It features the University of Queensland logo and the text 'Learn.UQ'. There are input fields for 'USERNAME:' and 'PASSWORD:', and a 'Login' button. A footer note states: 'Staff and students: To log into Blackboard use your UQ username/Student ID and password. If you don't know your password contact the ITS Helpdesk on 07 539 5600 or 1300 739 002 (Australia Only), or by email: [Blackboard@its.uq.edu.au](mailto:Blackboard@its.uq.edu.au)'



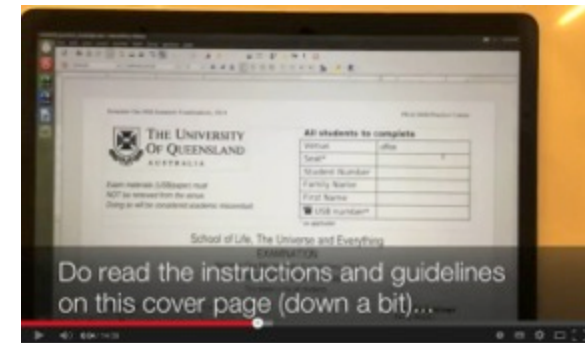
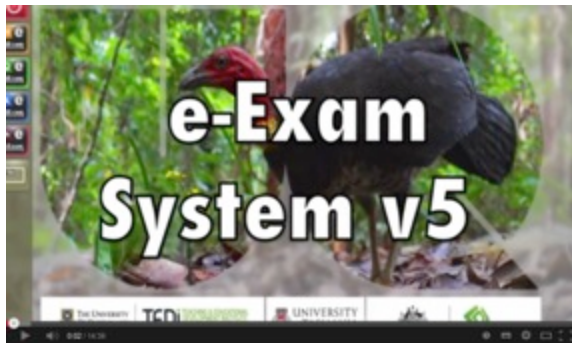
# e-Exam Project Resources

More information....

Demo set-up Guide,

Student Practice and User Guide

<http://transformingexams.com>



Demo videos start-up, use and recovery examples.

Apple <http://bit.ly/eexam-demo-vid-a>

'Wintel' (Dell) <http://bit.ly/eexam-demo-vid-d>

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

# Session Feedback & Expression of Interest

[bit.ly/EN-feedback](http://bit.ly/EN-feedback)

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