e-Exams: UQ Trial Outcomes S1 2014

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Get the demo and user guides
http://transformingexams.com

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necessarily reflect the views of the Australian Government Office for
Learning and Teaching or participating institutions.
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.
Why e-Exams?

Rationale


Concerns, drivers, solutions for e-Exams (a 'wicked' problem!) – a clear need to take a whole of system approach – not just software!

bit.ly/eexam-map
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

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

1. Word document based exams (paper equivalent / into use **S1 2014**)
2. Word doc + multimedia + 3rd party software tools (coming **S2 2014**)
3. LMS (Moodle) based exams (computer marked questions - TBA)
4. Remote (serves as a restricted gateway) to networked LMS.
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!)
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!
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...

Fill in table rows...

Or type ‘x’ for MCQs

Note: Drawing tool was available but not used.
The Current Process – how it works

Prep

Create master USB (tested)

Academic creates & submits exam script (plus associated files)

USBs duplicated per student

Post Exam

Collated responses sent to academic.

Responses retrieved from USBs.

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

1. Students enter room.
2. Given USB.
4. Do exam.
5. Return USB.

(credit: Dr Fluck UTAS)
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]
The next phase: Post-paper exams with multimedia

UQ S2 2014 TBA: Post-paper exams via word processor (used at UTAS)
Include links to on-board media, PDFs and other software tools.
The next phase: can include software tools

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


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

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

*Trials TBA!*
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.*
Proposal for offline Virtual OSCE, practicals etc. Technology is already working 'online'.

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.

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

Online (Second Life) examples see http://www.transformingassessment.com/secondlife.php
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!
UQ Trials S1 2014 Data collected:

- **Via pre-exam short survey (not shown here).**
  - Conducted at the pre-exam practice setup sessions.
  - Covered: technical compatibility, hardware spec lists, preliminary impressions.

- **Via post-exam extended survey (main findings follow)**
  - Conducted at the conclusion of the exam (in the room).
  - Covered: exam experience, reaction to exam session conditions, e-exam system impressions, exam writing strategies and production, general non-exam writing strategies.
I felt the exam system was easy to use
I felt the exam system was reliable against technical failures
I felt the exam system was secure against cheating
I liked the fact I could use my own computer
I would recommend the exam system to others

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)

<table>
<thead>
<tr>
<th>Rating</th>
<th>Overall my experience of this exam was positive</th>
<th>I ran out of time</th>
<th>I felt more stressed in this exam than I normally do in other exams</th>
<th>I went back and read over my responses before submitting</th>
<th>I could hear the sound of typing</th>
<th>&gt; If you could hear typing, was the sound of typing distracting?</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>4.0</td>
<td>2.5</td>
<td>2.5</td>
<td>3.5</td>
<td>3.4</td>
<td>2.2</td>
</tr>
<tr>
<td>4</td>
<td>3.8</td>
<td>2.8</td>
<td>2.6</td>
<td>3.3</td>
<td>3.4</td>
<td>2.6</td>
</tr>
<tr>
<td>3</td>
<td>2.5</td>
<td>2.5</td>
<td>2.6</td>
<td>3.3</td>
<td>3.4</td>
<td>1.9</td>
</tr>
<tr>
<td>2</td>
<td>2.5</td>
<td>2.5</td>
<td>2.6</td>
<td>3.3</td>
<td>3.4</td>
<td>2.6</td>
</tr>
<tr>
<td>1</td>
<td>1.9</td>
<td>2.5</td>
<td>2.6</td>
<td>3.3</td>
<td>3.4</td>
<td>2.6</td>
</tr>
</tbody>
</table>

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

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

p 0.166  0.288  0.582  0.438  0.000  0.001
Are some students overestimating the neatness of their hand writing?!
Student response to general exam conditions when using computer versus pen (responses by those who typed on the left & those that hand-wrote* on the right)

Typers

Hand-wrote*

<table>
<thead>
<tr>
<th>Computer</th>
<th>Pen</th>
<th>Both</th>
</tr>
</thead>
</table>

I write more words when using
I write faster when using
I think more carefully before I start writing when using
I pause to think most when using
I write in a style that feels more normal when using
I try not to make changes unless they are really important when using
I change, move or correct words or phrases most when using
think the overall structure/argument of my responses is better when
I make more effective use of the time available when using
I go back and read over my responses before submitting most when
I feel more stressed when using
I am more likely to run out of time when using
Overall I feel I perform better in an exam when using

* 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)**

<table>
<thead>
<tr>
<th>Writing habit</th>
<th>Typers</th>
<th>Z-test</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>I think carefully before I start writing when using my computer</td>
<td>75%</td>
<td>40%</td>
<td>4.78</td>
</tr>
<tr>
<td>I think carefully before I start writing when using pen and paper</td>
<td>81%</td>
<td>87%</td>
<td>-1.13</td>
</tr>
<tr>
<td>I take notes in lectures using my computer</td>
<td>67%</td>
<td>52%</td>
<td>2.09</td>
</tr>
<tr>
<td>I take notes in lectures using pen &amp; paper</td>
<td>54%</td>
<td>68%</td>
<td>-2.06</td>
</tr>
<tr>
<td>I make quick, rough notes before writing essays/reports properly using my computer</td>
<td>75%</td>
<td>49%</td>
<td>3.48</td>
</tr>
<tr>
<td>I make quick, rough notes before writing essays/reports properly using pen and paper</td>
<td>64%</td>
<td>75%</td>
<td>-1.82</td>
</tr>
<tr>
<td>I make a detailed plan before writing essays/reports properly using my computer</td>
<td>72%</td>
<td>50%</td>
<td>3.03</td>
</tr>
<tr>
<td>I make a detailed plan before writing essays/reports properly using pen and paper</td>
<td>57%</td>
<td>61%</td>
<td>-0.62</td>
</tr>
<tr>
<td>I just start writing (there is no plan!) when using my computer</td>
<td>48%</td>
<td>57%</td>
<td>-1.23</td>
</tr>
<tr>
<td>I just start writing (there is no plan!) when using pen and paper</td>
<td>28%</td>
<td>30%</td>
<td>-0.30</td>
</tr>
<tr>
<td>I make lots of notes using pen &amp; paper</td>
<td>63%</td>
<td>70%</td>
<td>-1.05</td>
</tr>
<tr>
<td>I tend to go back and re-read and revise my writing quite a lot</td>
<td>77%</td>
<td>83%</td>
<td>-0.90</td>
</tr>
<tr>
<td>I prepare most of my assignments using a computer</td>
<td>98%</td>
<td>89%</td>
<td>2.09</td>
</tr>
</tbody>
</table>
More information....
Demo set-up Guide,
Student Practice and User Guide
http://transformingexams.com/guides.html

Demo videos start-up, use and recovery examples.
'Wintel' (Dell) http://bit.ly/eexam-demo-vid-d
http://transformingexams.com

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