e-Exams Briefing

Authentic e-Assessment

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Acknowledgements

Project Partners
• Monash University: Dr Mathew Hillier (PI), Prof. Marilyn Baird, Dr Scott Grant
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Academics hosting trials
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• UQ: Dr Amy Hubbell (French language).
• CQU: Dr Rahat Hossain (KM in IT).
• UTAS: Dr Wendy Balassa (Education)
• ECU: Dr Jeremy Pagram (Programming/Python)
• UNSW/ADFA: Andrew Gilbert (Air Power).

Project staff
Martin Coleman (lead software developer)
Vilma Simbag (project manager/admin)
Former staff: Lubos Rendek (software dev).
Students (summer/winter projects and casual RAs): Chao Wang, Kim Martinow, Sayumi Umeda, Annie (Yunyi Yang), Yi Zheng.
A key motivation - The gap

Real world of work

Exams

We are faced with a growing disconnect between the way *high stakes testing* is conducted using pen on paper exams and students’ everyday experiences of study, work and life.
What we are doing about it...

Redefinition
Tech allows for the creation of new tasks, previously inconceivable

Modification
Tech allows for significant task redesign

Augmentation
Tech acts as a direct tool substitute, with functional improvement

Substitution
Tech acts as a direct tool substitute, with no functional change

SAMR Theory - Puente, 2012
Authentic - Writing Tools

Authentic

Not
Authentic - Engineering Problem Solving

Authentic

Not
Three dimensions - Assessment

- Authenticity
  - Relevant and rigorous
  - Valid and identity verified
- Integrity
  - Doable and cost effective
- Scalability

Pick two? ....
We need to strive for all three.
Triad - Requirements

**Authenticity:**
Enabling a broad pedagogical landscape for the assessment of 21\textsuperscript{st} Century capabilities. Go beyond a ‘quiz’ paradigm. Use ‘tools of the trade’ (word processor, spreadsheet, database, math, stats, graphics, multimedia, software dev, simulations, CAD, discipline tools). Flexible for open/closed book (restricted online, or isolated offline, e-resources). Data open for analytics.

**Scalability:**
Mix multiple computer marked question types as well as constructed and process problems. Large scale equipment provision \(\approx\) BYOD. Reliable \(\neq\) networks!? = optional.

**Integrity:**
Three dimensions - Which e-Assessment Approach?

Available now?

Quick

Good

Authentic 21C Assessment, scalable, robust, secure?

Cheap

Administratively efficient, low cost?

Pick two? ....

Authentic e-assessment is not readily available off-the-shelf. Investment and time required.
## Online, Offline, On Campus or Distance
### Trade-offs to be made in seeking an e-exam solution.

<table>
<thead>
<tr>
<th>Online (net)</th>
<th></th>
<th>Offline</th>
<th></th>
<th>On Campus (controlled spaces)</th>
<th></th>
<th>Distance (at home)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Space issues for institutions.</td>
<td></td>
<td>• Space issues for institutions.</td>
<td></td>
<td></td>
<td></td>
<td>• No space issue for institutions.</td>
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</tr>
<tr>
<td>• Improved exam management efficiency.</td>
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<td>• Improved exam management efficiency.</td>
<td></td>
<td></td>
<td></td>
<td>• More efficient exam management.</td>
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</tr>
<tr>
<td>• Equipment: need computer labs to cater for 2000 at once or BYO laptops.</td>
<td></td>
<td>• Equipment: need computer labs to cater for 2000 at once or BYO.</td>
<td></td>
<td></td>
<td></td>
<td>• Equipment: Students supply equipment.</td>
<td></td>
</tr>
<tr>
<td>• Most secure: live IT monitoring/control, spaces are supervised.</td>
<td></td>
<td>• More secure: IT control possible, spaces are supervised.</td>
<td></td>
<td></td>
<td></td>
<td>• Less secure: IT monitoring, but wider spaces are unsupervised.</td>
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<tr>
<td>• Needs reliable network (single point of failure).</td>
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<td>• Network reliability not an issue.</td>
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<td></td>
<td>• Needs reliable network.</td>
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</tbody>
</table>
# e-Exam project roadmap

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


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

We are here. LMS exams resistant to network outages!
Pedagogical Affordances

Authentic assessments. It is a platform, not an app!
**e-Exam trials**

<table>
<thead>
<tr>
<th>Exams</th>
<th>Typists</th>
<th>Pen</th>
<th>Weight</th>
<th>Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sum</td>
<td>1750</td>
<td>1309</td>
<td>~</td>
<td>4145</td>
</tr>
<tr>
<td>Mean</td>
<td>40</td>
<td>37</td>
<td>32%</td>
<td>106</td>
</tr>
<tr>
<td>Smallest</td>
<td>1</td>
<td>~</td>
<td>5%</td>
<td>15</td>
</tr>
<tr>
<td>Largest</td>
<td>166</td>
<td>~</td>
<td>50%</td>
<td>180</td>
</tr>
</tbody>
</table>

Typists: *I would recommend the e-Exam system to others.*  
70% recommend it!

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**Recent e-Exams 2017 and 2018**

- **Monash**
  - Business Statistics
  - Chinese online media (‘Robust’ online).
  - Geography x 3 classes [Monash college 2016]
  - Globalisation x 4 classes [Monash college 2017]
  - Language Translation (some NAATI)
  - Introductory Chinese language (offline, Spreadsheet used as a form)
  - Introduction to Chinese (‘Robust’ online).

- **UQ**
  - French language translation

- **CQU**
  - Knowledge Management Principles (IT)
  - Ethics and Social Issues (IT)
  - IT management

- **UTAS**
  - ICT in Education (post-paper exams)
  - Environmental Chemistry

- **MqU**
  - ICT in Education

- **UnSW**
  - Air power (ADFA)

- **ECU**
  - Teaching Introductory Computer Programming
  - OHS for trades

- **UniSA**
  - Science & Math for secondary teaching
## Research Questions for Network Phase

<table>
<thead>
<tr>
<th>Area</th>
<th>Example research questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intention and attitude</td>
<td>Were candidates in favour of the e-Exam system? Would they recommend it to others or use it again? Did they have any concerns about undertaking an e-exam? If they typed their exam, was their attitude changed or any concerns lessened following the event?</td>
</tr>
<tr>
<td>Ease of use</td>
<td>Were the students able to use the system with relative ease? Did they have any issues related to the e-exam processes?</td>
</tr>
<tr>
<td>Technical reliability</td>
<td>Did any technical issues or interruptions arise? If so, did such issues interfere with the exam or result in lost work?</td>
</tr>
<tr>
<td></td>
<td>Were students concerned about network outages? Would the system allay any fears? Would the system itself work when the network fails?</td>
</tr>
</tbody>
</table>
e-Exam process: robust online Moodle (Phase 3)

Pre-exam:
1. Teacher creates exam: Moodle quiz, media, selects apps.
2. Configure, load and test: Moodle quiz + Gateway USB
3. Deploy quiz to Moodle. Gateway USBs duplicated.

Pre-session:
4. Student laptop setup & practice.
5. Network setup and USBs to venue.

Exam venue:
6. Students enter room
   a. Given USB (s.o.s. WIFI dongle)
   b. Start laptop from USB & connect to Moodle with key
   c. Do exam in Moodle
   d. Finalise and shutdown
   e. Return USB & dongle
   f. Leave room

Post-exam: assessment
7. Responses autosave to server (each 1 min)
8. Responses finalised to server (USB resets *)

Exam content resides on a server.

Network Moodle.

Linux Live USB
SEB + e-tools:
Libre Office, apps, SDK, sims, PDFs, large media.
Local cache of Moodle content. Response backup to USB in case of network outage.

Recycle USB & dongle for next exam. Gateway USBs can be reused as-is (from step 5) or updated (step 2).

* USB auto reset still under development.
Latest - an example

41 tertiary students.
Two units (subjects):
Intro to Chinese (first year - 14 elected to type).
Chinese online media (third year - all 27 typed).

<table>
<thead>
<tr>
<th>Gender</th>
<th>Intro Chinese language</th>
<th>Online Chinese Media</th>
<th>Gender totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>10</td>
<td>22</td>
<td>32</td>
</tr>
<tr>
<td>Male</td>
<td>4</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Unit totals</td>
<td>14</td>
<td>27</td>
<td>41</td>
</tr>
</tbody>
</table>

Caveat: Not random samples - descriptive of these groups only.
e-Exam Process

1) Two weeks prior: practice session + pre-survey.
2) Exam day: In-class, graded, supervised assessment task + post survey.
Third party software included.

This is an offline dictionary tool ‘Dim Sum’

Moodle questions in Safe Exam Browser
Multi-layer backup - Network Outage Protection

Whilst there is a network connection student data is saved to the server each minute.

If there is a network outage, then student response data is saved to the USB drive in an encrypted file.
### Pre and post response trends (preliminary)

<table>
<thead>
<tr>
<th>Written instructions were easy to follow</th>
<th>Strongly Disagree 1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>It was easy to start my computer using the e-Exam USB stick</td>
<td></td>
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<tr>
<td>I can use the e-Exam system just as well as my own laptop system</td>
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<tr>
<td>It was easy to use the office suite (word processor/spread sheet)</td>
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<tr>
<td>It was easy to use software applications beyond the word processor</td>
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<tr>
<td>It was easy to save my response files into the correct place</td>
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<tr>
<td>It was easy to answer multiple-choice questions in the e-Exam system</td>
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<tr>
<td>Overall, I feel the e-Exam System is easy to use</td>
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<tr>
<td>I feel the e-Exam System is reliable against technical failures</td>
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<tr>
<td>I feel the e-Exam System is secure against cheating</td>
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<tr>
<td>I now feel relaxed about using the e-Exam system for my exam</td>
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<tr>
<td>I would recommend the e-Exam System to others</td>
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<tr>
<td>My laptop is reliable for use in a computerised exam</td>
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<tr>
<td>My typing skills are fast enough for a computerised exam</td>
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<tr>
<td>Computerised exams make me more stressed than handwritten exams</td>
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<tr>
<td>I would like to use a computer for exams in the future</td>
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<tr>
<td>I am concerned about network outages impacting my exam</td>
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<tr>
<td>I am reassured the e-Exam System was robust against network outages</td>
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<tr>
<td>The included software was useful [e.g DimSum]</td>
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<tr>
<td>Moodle worked well as an exam environment</td>
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</table>

Caveat: Not random samples - descriptive of these groups only.
Key Findings

a) The e-Exam system was rated well by the typists: 4+ out of 5.

b) Robust network features worked (at least one obvious wifi outage). Responses were auto saved to USB, retrieved following exam and re-joined the e-workflow in Moodle.

c) Time saved in marking essay responses: 20% to 30% over that of paper.

d) Students need transition opportunity: roughly 30% preferred paper!
Thank you
For further information contact:
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TransformingExams.com
eExamSymposium.eventbrite.com.au
24 Nov, Melbourne, Australia.

Two international speakers

1) Head of e-Learning Service at Alpen-Adria University, Klagenfurt, Austria, a university with 40% uptake of e-exams.

2) Senior specialist in e-exams at the national Matriculation Examinations Board of Finland speaking about the roll out of their national e-exams project.