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Academics hosting trials
- Monash college: Nathaniel Lyons (Globalisation + Geography)
- Monash Uni: Dr Shani Tobias (Translation), Dr Charanjit Kaur (Bus Stats).
- 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.
Problems with current exams

Paper based exam features...

- Limited pedagogical scope... MCQ/TF, short/essay response, static diagrams.
- Tendency to examine end product (final response) rather than process.
- Harder to examine deep/higher order skills - tends to lower order
- Hand-written pen-on-paper is much less common as a problem solving and information presentation tool.
- But, computerised MCQ and a text box isn’t making pedagogical progress!
- Not reflective of the modern world of work.

Is this limiting our ability to accredit graduates as being able to operate in the world of today, immersed in technology, information and complexity? Other problems you know of?
Why keep exams?

Discuss!
Why keep exams?

High stakes, supervised testing is still needed because:

- Qualification identify verification (be sure it is the student’s work - rise of contract cheating)
- A test of the student’s ‘metal’ under pressure.
- Accreditation requirements.
- Social/political stakeholder expectations.
- Time and workload efficiencies?
- Other reasons ...?
e-Exam Types
### Types - Phased implementation strategy

<table>
<thead>
<tr>
<th>Start</th>
<th>&gt;</th>
<th>&gt;</th>
<th>&gt;</th>
<th>&gt;</th>
<th>&gt;</th>
<th>&gt; Future</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Get Ready</strong></td>
<td><strong>Phase 1</strong></td>
<td><strong>Phase 2</strong></td>
<td><strong>Phase 3</strong></td>
<td><strong>Phase 4</strong></td>
<td><strong>Phase 5</strong></td>
<td></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>
<td></td>
</tr>
<tr>
<td>Basic doc exams to begin.</td>
<td>Expanding the landscape with apps and media.</td>
<td>Adding the power of an LMS (Moodle).</td>
<td>Network BYOD exam.</td>
<td>Network mixed mode BYOD exam.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Crawling** **Walking** **Running** **Jumping** **Flying!**

http://ta.vu/e-exam-roadmap
e-Exam types now in use

The e-Exam platform features in use now:

1: Paper-equivalent doc or spreadsheet ‘form’ based exam
2: Post-paper word doc centric exam (multimedia, programming, spreadsheets as math tools)
3: Moodle based exam (client/server with ‘offline’) 

Features under development ~ 2018-2019+

4: White-listed online exam with logging (half done!)
5: Open online exam with logging
e-Exam Trials: Towards ‘post-paper’ (phase 1 to 2)

Start simple and build up!

Scratch SDK

Start! Exam doc

Video

PDF

Sims

Spreadsheets as ‘forms’ or as calculation and analysis.

Specialist applications

PDF

Sims
**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
Paper equivalent using word documents

Suitable format adjustments were made to cater for both paper and screen.
e-Exam trial feedback - Macquarie U

“I would recommend the e-Exam system to others”.

ICT in Education, 80 min 40% Final exam
Word document: 10 x MCQ and 1 x Essay

(MQU. Post. S1, 2017)
e-Exam trial feedback - case studies

“I would recommend the e-Exam system to others” ~ Sem 1, 2017.

UTAS Education (multi media)

UQ French translation (doc)
Intro to Chinese (first year): 2017 Semester 2. 22 students at pre-exam practice. 16 typed the exam. 7 females and 9 males.

Caveat: sample was small and not random - descriptive of these groups only.
Spread sheet as a Form

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rewrite:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>English:</td>
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</tr>
</tbody>
</table>

Language tools available according to LOTE selection

(2) 你好
Rewrite: 你好
English: hao

(3) 我他见
Rewrite in

Respond in designated cells (other cells are locked).
Candidates can access wxMaxima, SciLab, GeoGebra, GNU Octave (like MatLab), R (statistics package) alongside the standard LibreOffice suite (word processor, spread sheet etc), media, plus programming tools such as Python, Scratch etc. Responses via documents or Moodle LMS.
e-Exam trial feedback - ECU case studies

“I would recommend the e-Exam system to others”.

Teaching Python Programming exam:

Word document + Python IDLE

ECU: CSE & DTE Post-survey 2017 S2
e-Exam trial feedback - UQ

“I would recommend the e-Exam system to others”.
French language. 120 min 30%.
Word document: article translation
Case studies - hand out (double sided!)

UTAS - Post-paper word document based eexam
Monash - ‘robust’ online e-exam in Moodle

Your help ....
Any suggestions to improve these cases?
Anything we left out that you would like to know?
e-Exam trial - Robust Moodle (Monash case):

Monash – Chinese language – two units (1st year and 3rd Year)

Early days for Moodle mode!

Robust Moodle worked to rescue network outages (double layered backup!)

Select 3rd party software carefully (can be limited).

“I would recommend the e-Exam system to others”
Sem 1, 2018.
e-Exam Process - Trials at Monash...

1) Two weeks prior: practice session + pre-survey.
2) Exam day: In-class, graded, supervised assessment task + post survey.
### Pre and post response trends (preliminary)

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written instructions were easy to follow</td>
<td></td>
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</tr>
<tr>
<td>It was easy to start my computer using the e-Exam USB stick</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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</tbody>
</table>

Caveat: Not random samples - descriptive of these groups only.
Some 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 responses.

d) Students need transition opportunity: roughly 30% preferred paper!

What else do you want to ask about findings?
Logistics – UTAS e-Exams

The Exam room –
What is on the desks!
A student’s exam desk

- eExam Candidate instructions
- Plastic ziplock bag
- USB stick contains the eExam
What do Supervisors get?

Security image. To match student computer desktop before starting.

Backup Question papers (or from PDF)
Staff professional development (UTAS)

**Invigilators/Supervisors**
Hand out & collect USBs, not papers
Note USB numbers with ID checks
*Modified announcements to candidates*
BYOD computers start up as candidates sit down (staggered)
Start-up check – desktop picture from BACK of room
Revert to paper if necessary

**Information Technology Officers**
(basic IT skills sufficient)
Assist with laying power (UTAS: < 50% of candidates used it!)
Don’t touch keyboards when verifying files
How to reboot/resume from the eExam USB
IT support staff to be advised/follow exam room protocol

**ALL**
University eExam reference web-site
eExam procedure manual
(Academic professional development for authentic e-exams!)

*Additional documentation is available from:*
http://www.transformingexams.com/guides.html
e-Exam process: robust online Moodle (Phase 3)

**Pre-exam:** prepare learning materials
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. a. Students enter room
   b. Given USB (s.o.s WiFi dongle)
   c. Start laptop from USB & connect to Moodle with key
   d. Do exam in Moodle
   e. Finalise and shutdown
   f. Return USB & dongle
   g. Leave room

**Post-exam:** assessment
10. Results submission, analytics & reporting

**7B In case of network outage:** Get backup responses from USBs.
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.
Hands-on:

Try an e-Exam USB stick. Follow the ‘quick start’ guide to:

• Boot to USB...
  • **PINK USBs ONLY:** you join EduRoam using (yourusername@youruni.edu.au)
  • **GREEN** and **Black/RED:** will auto join WiFi.
• Logon to our demo Moodle
  user1, user2... user50
  Passw0rd!
Start up

Select LOTE (if applicable)

Connect to WiFi Eduroam network
Starting the exam at the same time - password

Log into Moodle server

Password given out in class at the exam start time.
Third party software included.

Moodle questions in Safe Exam Browser

This is an offline dictionary tool ‘Dim Sum’
A range of form based question types were used in these e-exams.
Questions

Listening test 1

Audio data files cached at the start of the exam. Students used headsets to listen.
Questions

1. Download file

2. Software application used to interrogate and construct a response.

3. Respond via form
Questions

Constructed response
(file upload)

1. Open software
2. Use software application to construct a response.
3. Respond by file upload
Multi layered backup - Network Outage

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

b) If there is a network outage, then student response data is saved to the USB drive in an encrypted file.
Multi layered backup - Network Outage at Submission

- If at submission time there is a network outage, then student response data is saved to the USB drive.
  - Ideally the student should try again or call an exam supervisor for help.
- If the connection cannot be reinstated then after the exam the response file is retrieved from the USB and uploaded to Moodle.
Successful Submission

Confirmed submission to server triggers USB self clean up ready for next exam.

Immediate feedback (optional setting)
Thank you
For further information contact: Mathew.Hillier@monash.edu
TransformingExams.com
eExamSymposium.eventbrite.com.au
Sat 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.

Please complete our feedback survey!