Writing e-Exams in pre-university college
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Matching paper http://ta.vu/occe40
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 - Puentedura, 2012
## Study context - broader e-Exam project

### Phases

<table>
<thead>
<tr>
<th>Start &gt;</th>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
<th>Phase 4</th>
<th>Phase 5</th>
<th>&gt;Future &gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Ready</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>&gt;Future &gt;</td>
</tr>
<tr>
<td>Crawling</td>
<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>&gt;Future &gt;</td>
</tr>
</tbody>
</table>

- **Phase 1**: Paper equivalent small scale. (Basic doc exams to begin!)
- **Phase 2**: Post-paper small to medium. (Expanding the app and media landscape.)
- **Phase 3**: Medium to large scale. (Adding the power of an LMS.)
- **Phase 4**: Whitelisted and logged Internet (Network BYOD exam.)
- **Phase 5**: Open but fully logged Internet (Network mixed mode BYOD exam.)

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### This paper!

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

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**Thursday demo!**
Moodle resistant to network outages!
Pedagogical Affordances

Authentic assessments. It is a platform, not an app!
e-Exam system (offline mode used in this study)

1. Teacher creates exam, media, Moodle content, etc
2. Create master USB (load exam, configure, test)
3. USBs duplicated
4. USBs sent to exam venue
5. Pre-session: Student laptop setup & practice.
6. Exam venue:
   a. Students enter room
   b. Given USB
   c. Start laptop from USB
   d. Do exam
   e. Finalise and shutdown
   f. Return USB
   g. Leave room
7. Manual return
8. Responses retrieved from USBs.
10. Return feedback to student.

Linux Live USB.
Libre Office.
Question paper.

USBs can be recycled next exam.

Pre-exam: prepare learning materials

OR

USBs can be recycled next exam.

Post-exam: assessment
### Study context - e-Exam Project trials

<table>
<thead>
<tr>
<th>2017 University [pre-university]</th>
<th>2018 University</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Monash</strong></td>
<td><strong>Monash</strong></td>
</tr>
<tr>
<td>• Geography x 3 classes [Monash college 2016]</td>
<td>• Language Translation</td>
</tr>
<tr>
<td></td>
<td>• Business Statistics</td>
</tr>
<tr>
<td></td>
<td>• Language Translation (some NAATI)</td>
</tr>
<tr>
<td></td>
<td>• Globalisation x 4 classes [Monash college 2017]</td>
</tr>
<tr>
<td></td>
<td>• Introductory Chinese language (offline, Spreadsheet used as a form)</td>
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<tr>
<td></td>
<td>• Language Translation</td>
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<tr>
<td><strong>UQ</strong></td>
<td><strong>French language</strong></td>
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<tr>
<td>• French language translation</td>
<td></td>
</tr>
<tr>
<td><strong>CQU</strong></td>
<td><strong>IT management</strong></td>
</tr>
<tr>
<td>• Knowledge Management Principles (IT)</td>
<td></td>
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<tr>
<td>• Ethics and Social Issues (IT)</td>
<td></td>
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<tr>
<td><strong>UTAS</strong></td>
<td><strong>Environmental Chemistry</strong></td>
</tr>
<tr>
<td>• Education</td>
<td></td>
</tr>
<tr>
<td><strong>MqU</strong></td>
<td><strong>ICT in Education</strong></td>
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<tr>
<td>• ICT in Education</td>
<td></td>
</tr>
<tr>
<td><strong>UNSW</strong></td>
<td><strong>Air power (ADFA)</strong></td>
</tr>
<tr>
<td><strong>ECU</strong></td>
<td><strong>Teaching Introductory Computer Programming</strong></td>
</tr>
<tr>
<td>• Teaching Introductory Computer Programming</td>
<td><strong>OHS for trades</strong></td>
</tr>
<tr>
<td><strong>UniSA</strong></td>
<td><strong>Math for secondary teaching</strong></td>
</tr>
<tr>
<td>• Science &amp; Math for secondary teaching x2</td>
<td></td>
</tr>
</tbody>
</table>

*Items marked in purple* for this presentation (paper 41 and also 40).
*Items marked in red* - we will talk about these at our Thursday demonstration!
## Research Questions

<table>
<thead>
<tr>
<th>Area</th>
<th>Example research questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rationale of students</td>
<td>What proportion of candidates were in favour of typing their exam?</td>
</tr>
<tr>
<td></td>
<td>What rationale was provided for their choice?</td>
</tr>
<tr>
<td></td>
<td>Did the e-Exam environment support their writing?</td>
</tr>
<tr>
<td>Writing strategies</td>
<td>Were there <strong>differences in the writing preferences</strong> and strategies used by those that typed and those that handwrote?</td>
</tr>
<tr>
<td>Student performance</td>
<td>Were there <strong>differences in words produced and grades achieved</strong> by those that typed and those that handwrote?</td>
</tr>
</tbody>
</table>

* Note this study should be read in conjunction with our other paper!
Participation

128 pre-tertiary students.
Two units (subjects):
Geography and Globalisation
Sample: 65% female and 35% male.
52% of students chose to type.
But males were more likely to type than females.
Chi-square test \( (x^2(1) = 5.299, \ p = 0.021) \)

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

Geography & Globalisation
Students could choose to type or handwrite.
1) Two weeks prior: practice session and pre-survey.
2) Exam day: In-class, graded, supervised assessment task.
Materials provided on paper & as a word processor document. Included photos, diagrams, charts and data tables.
- **Geo 2016**: the assessment task was a single case study with an extended essay response. (*example next slide*)
- **Glo 2017**: two short answer sections and a mini-case essay response
3) Students then completed a post-exam survey before leaving the room.
Example Assessment task (Geo)

Instructions: You will have the entire double lesson to write an essay in which you explain the ways in which underdeveloped countries are impacted by deforestation. Your responses should refer to your own study knowledge and address the suggested length for this task is 350-400 words.

Materials Allowed:
- Pen/pencil and paper
- Printed dictionaries with no added text

Materials Not Allowed:
- Electronic dictionaries
- Wristwatch
- Notebooks/books/articles

All mobile phones must be switched off and placed in a bag. A mobile phone in their possession (even if switched off) will be severely penalized. Please ensure you receive an automatic zero for this assignment.

Marking:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Marks Possible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retrieval</td>
<td>6</td>
</tr>
<tr>
<td>Comprehension</td>
<td>12</td>
</tr>
<tr>
<td>Analysis</td>
<td>12</td>
</tr>
<tr>
<td>Knowledge Utilization</td>
<td>8</td>
</tr>
</tbody>
</table>

Mark: 16
Letter Grade: B
Findings: Writing preferences
Post-exam survey responses (n=64)

- I type faster than I handwrite
- I type accurately
- When I make errors, I am able to quickly correct them when typing
- I often rely on spell check to detect errors
- I work more efficiently when I type on a familiar keyboard
- My hand-writing is normally neat and legible
- I go back to re-read and revise my writing quite a lot
- I prepare most of my assignments /reports using a computer

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

Responses were in alignment with their choice to type or hand-write. (n=64) Fisher’s exact test.

**Sig** When ... using a ‘computer’, ‘same’ or ‘pen and paper’.

> .001 I write more words in an exam when...

> .001 I write faster in an exam when...

> .001 I think more carefully before I start writing in an exam when...

n/s I pause to think most in an exam when...

> .001 I write in a style that feels more normal in an exam when...

0.003 I try not to make changes unless they are really important when...

> .001 I change, move or correct words or phrases most when...

> .001 I think the overall structure/argument of my response is better when...

> .001 I make more effective use of the time available in an exam when...

> .001 I go back and read over my response most in an exam when...

n/s I feel more stressed in an exam when...

n/s I am more likely to run out of time in an exam when...

> .001 Overall I feel I perform better in an exam when...

Caveat: Not random samples - descriptive of these groups only.
Findings: Post-exam survey responses

Typists: using a computer for the assessment (Geography only n=24)

- I would like to use a computer for similar assessments in the future
- I was able to easily think and compose my answer using a computer
- I was able to easily refer to reference materials and resources
- I was able to easily edit and make changes
- I was able to quickly complete the assessment
- I was able to produce a better final version of this assessment

Handwriting in the assessment (both units n=53)

- I experienced discomfort (sore/tired/cramp) in my writing hand
- I think my handwriting was neat and legible

Caveat: Not random samples - descriptive of these groups only.
Findings: Performance - words and marks!

No statistically significant (MW-U) difference in number of words produced by typists and hand-writers. Assessment tasks were different - only compare within units.
Correlation (Spearman’s) is certainly not causation in terms of word count - quality still matters!

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

Alignment of preferred writing strategies and chosen text production mode (purposeful, optimising humans!)

The choice to type or handwrite is multifaceted.

Strong influences:

- Able to type more quickly than handwrite, typing accuracy, editing capability.

Short duration tasks (70 min) -
Handwriters: only a few sore hands.

Typists said: the computer allowed them to produce better responses on the assessment task. Scatter chart shows a slightly better ‘earn’ rate too!

A period of transition needed for hand-writers to ensure they are able to adapt successfully (leave nobody behind).
Thank you
For further information contact: Mathew.Hillier@monash.edu
TransformingExams.com
eExamSymposium.eventbrite.com.au
24 Nov, Melbourne, Australia.

Our presentations at OCCE 2018:
1. Writing e-Exams in Pre-university College. Full text http://ta.vu/occe41
2. Tuesday FPS 4.1 (15:00 - 16:30) Student experiences with a bring your own laptop e-Exam system in pre-university college. Full text http://ta.vu/occe40
3. Thursday FPS 8.1 (10:30 - 12:00) Robust networked e-Exams with Moodle ~ demo! Get abstract http://ta.vu/occe42