Bridging the digital divide with an off-line e-learning and e-assessment platform

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(Monash University)

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Global Digital Divide

Quick stats
Global Digital Divide

Households with Internet at home

Developed Nations: 81%
Developing Nations: 38%

Connection quality?!

International Telecommunications Union
Global Digital Divide

Households with Internet at home catching up but still a way to go.

Percentage Point Difference

Developed Nations

Developing Nations

International Telecommunications Union
Global Digital Divide

2015 Internet users per 100 people

Source: World Development Indicators
Australia – by income

33% of the poorest 20% of households are offline. Only 2% of the richest 20% are offline.

ABS 8146.0 - Household Use of Information Technology, Australia, 2014-15
21% of outer regional and remote households are offline. 12% of major city households are offline.
Australia wide 14% of households don’t have Internet access at home.

ABS 8146.0 - Household Use of Information Technology, Australia, 2014-15
Ideas

BRIDGE THE GAP

Leveraging Open Tools
# Current Solutions – offline or online?

There are trade-offs for any distance e-learning solution.

<table>
<thead>
<tr>
<th>Online (net)</th>
<th>Offline</th>
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<tbody>
<tr>
<td>• Long way to travel.</td>
<td>• No longer applicable. (CD ROM)</td>
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<tr>
<td>• Efficient system management.</td>
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<tr>
<td>• Equipment: need to supply equipment or facilities for BYOD</td>
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<tr>
<td>• <strong>Help at hand</strong> and spaces can be supervised, live request.</td>
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<tr>
<td>• <strong>Needs reliable network</strong> at site.</td>
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| Hybrid system? |
|----------------|------------------------------------------------|
| • No travel. | | |
| • Efficient system management. | | |
| • Students supply equipment. | | |
| • **Help via live chat.** | | |
| • Large media files problematic. | | |
| • Network connectivity can be lacking and costly at home. | | |

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There are trade-offs for any distance e-learning solution.
Hybrid solution - leveraging existing work

Transforming Exams Across Australia
Australian Government Office for Learning and Teaching
National Grant ID15-4747: AU$500K over 3 Years + 100K Monash

>> Authentic assessment in exams using secured BYOD <<

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
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<tbody>
<tr>
<td>Dr Mathew Hillier; Leader OLT national project. Seed leader</td>
<td>Monash University</td>
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<tr>
<td>Dr Andrew Fluck; Originator of USB e-exam concept. Seed partner.</td>
<td>University of Tasmania</td>
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<tr>
<td>Dr Michael Cowling, Mr Kenneth Howah Seed trial site.</td>
<td>Central Queensland University</td>
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<td>Dr Kim Blackmore</td>
<td>Australian National University</td>
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<td>Assoc. Prof. Paul Newhouse</td>
<td>Edith Cowan University</td>
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<td>Dr Matthew Bower, Prof. Dominic Verity</td>
<td>Macquarie University</td>
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<td>Dr Ruth Geer, Mr Bruce White</td>
<td>University of South Australia</td>
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<tr>
<td>Mr Dominic McGrath</td>
<td>University of Queensland</td>
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TransformingExams.com
<table>
<thead>
<tr>
<th>Component</th>
<th>Status</th>
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<tbody>
<tr>
<td>Ubuntu</td>
<td>Mature open source</td>
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<tr>
<td>Moodle</td>
<td>Mature open source</td>
</tr>
<tr>
<td>AMP stack</td>
<td>Mature open source</td>
</tr>
<tr>
<td>USB sync scripts</td>
<td>Custom - TBA</td>
</tr>
<tr>
<td>USB system configuration scripts</td>
<td>Custom - Bash</td>
</tr>
<tr>
<td>USB admin scripts</td>
<td>Custom - Bash</td>
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<tr>
<td>USB sticks</td>
<td>Commodity h’ware</td>
</tr>
<tr>
<td>USB Hubs</td>
<td>Commodity h’ware</td>
</tr>
<tr>
<td>Home base server</td>
<td>Custom - TBA</td>
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</table>
USB Preloaded with interactive tools

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

'Windows' software via WINE. E.g. CAD / 3D modeling, Celestia.

Moodle LMS with media.
Preloading with interactive tools

Linked documents –
Assignment document with links to launch local apps and resources: graphics, Scratch programming tools, presentation slides, PDFs. All on-board the USB stick.

No downloads!

Scratch SDK

Assignment doc

Video

PDF
Moodle and OpenSim Working Together

Undertaking an assessment activity in the VW initiates data transfers to the LMS.

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

Videos: Transforming Assessment Youtube Channel
MOLEAP Workflow – Remote Student

**Institution:** prepare learning materials

1. Teacher creates course, media, Moodle content, etc

2. Create master USB (load course, configure and test)

3. USBs duplicated

4. USBs sent to students

**Linux Live USB. Libre Office, Moodle etc**

5. Computer started from USB.

6. study:
   a. Boot laptop.
   b. Do lessons.
   c. Sync/submit.
   d. Shutdown.
   e. Repeat.

7A. Return USB by post
  OR
7B. Use Internet sync

8. Files synced to server

9. Collated work sent to teacher.

10A. Post Feedback to student

10B. e-Feedback via sync

USBs can be recycled next semester.

7A.2. Work retrieved from USBs.

**Institution:** assessment

9. Collated work sent to teacher.

10A. Post Feedback to student

10B. e-Feedback via sync
Student uses a laptop booted from USB to undertake their work offline. They use learning resources, do LMS activities, use software tools and type/create responses that are saved to the USB stick. When a network is available the sync offers to update content and responses can be submitted. Manual submission also possible by export or by returning the USB.

Sync USBs when online:
Update content/submit responses or Export.
Home base server at institution.

Marking (auto or manual) by teacher.

Interface components:
Keyboard, screen, pointing device, mic and speakers.

Database / backup.

Student responses

Materials: LMS materials, docs, multimedia, PDFs, small apps.

System: OS, AMP stack, Office Suite, graphics, media tools, Moodle, sync.

MOLEAP USB

Base system disk image file.
Burn to create MOLEAP USB stick.

Teacher prepares a semester of materials.
USB per student created.
USB sent to student.

Student's Computer

Computer controlled by USB:
Access to HDD, network (IP, Bluetooth, IR etc) can be restricted or open as needed.
Admin tools

e-Exam Configuration Wizard

Configuration Name

- Enable Network
- Enable Sound
- Enable Speakers
- Enable Bluetooth
- Enable Infra-Red
- Enable Virtual Terminal Switching
- Show Student Names
- Hide Hardware Specifications
- Wipe Hardware Specifications
- Enable User Terminal
- Run in Virtual Machine
- Enable Super Debug
- Remote Desktop Support
- Install Chromium Browser
- Clear Student Data
- Install Microsoft Proprietary Web Fonts
- Enable LibreOffice Spellcheck
- Enable User Monitoring
- Enable Additional Languages

Select exam type

Select wallpaper

Save Configuration File

Exit
Prototype using commodity components.

Using an old laptop it can handle 98 USBs at once.

Helper scripts to

• Initial ‘burn’ OS to each USB
• Place lesson materials.
• Retrieve lesson responses.
• Set-up for the next lesson.

User friendly admin interface under development.
System Walk Through (v6)

Refer to ‘quick start guide’ (e-Exam)
Walk Through: Starting from USB

1. Start with the computer turned OFF. Then insert USB stick

2. Hold down ALT then power on.

- Apple
  - Press and release power
  - Hold down
  - Keep holding ALT until you see...

- Other/Windows*
  - Power on while tapping ‘boot key’ (e.g. F12 or... )
  - Tap tap tap...
  - Press and release power
  - Keep tapping until you see...(or similar)

* Note Win 8/10: may need to use SHIFT>Restart to access a USB boot option.
Walk Through: Starting from USB

Apple
3. Select a yellow icon.
EFI boot or ‘Windows’
Could be either one! So just try.
If you get
Try the other one!

Other/Windows*
3. Select USB device.
It might be labeled something else and probably won’t be first.
Win 8/10 users will need to select ‘use a device’, then choose the USB.
Walk Through: System start

4A. Some system messages may appear, if so just wait.

```plaintext
tta_id[292]: HDIO_GET_IDENTITY failed for '/dev/sdb': Invalid argument
```

4B. System starts.

5. Arrive at system desktop.
Walk Through: Identify

6. Student now types in their student ID number and name* (can be disabled). Click Start. (what happens next dependent upon chosen mode)
Walk Through: Document mode

7. Exam file opens ready to enter details and responses.

Note: original file copied and student number prefixed to file name.
8. Read questions and type responses into areas indicated.
Walk Through: Document - post-paper

8.1 in ‘post-paper’ assessment: Make resources available (PDFs, Videos, images) and use specialist software tools to construct responses. Launched via links in the

[there is a 2 min ‘auto recovery’ save]
on-board LMS Mode

Start laptop with USB. Launches a web browser to login to an on-board Moodle. Moodle account created-on-the-fly. Network connections NOT needed.
on-board LMS Mode

Non-quiz related modules and menus have been removed. Large multimedia is possible due on-board storage.
10. Shut down the system.
Cite this resource

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Get the full paper http://moleap.org

More information OLT e-Exams project http://transformingexams.com

Demo videos and downloads

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