Walkthrough:
BYOD e-Exams with Robust Moodle online

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Transforming Exams
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Adoption roadmap: towards authentic e-assessment

Start > > > > > Future

Get Ready
- Institutional approvals, research ethics, hardware and infrastructure

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.

Crawling
- Basic doc exams to begin!

Walking
- Expanding the app and media landscape.

Running
- Adding the power of an LMS.

Jumping
- Network BYOD exam.

Flying!
- Open but fully logged Internet
- Network mixed mode BYOD exam.

http://ta.vu/e-exam-roadmap

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

We are here! Moodle resistant to network outages.
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, math tools)
3: Moodle based exam (client/server - robust, ‘offline’)

Features under development ~ 2019+
4: White-listed online exam with logging (half done!)
5: Open online exam with logging, key logging, screen recording, cam capture... (half done!)
BYOD 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:**
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:**
10. Results submission, analytics & reporting
11. e-Feedback via network

**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.

**Exam content resides on a server.**

**7B In case of network outage: Get backup responses from USBs.**
8 Responses finalised to server (USB resets *)

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

* USB auto reset works with Moodle quiz only submission.
Academics / Teachers (Preparation)

Online exam:
1) Create Quiz in Moodle
2) Apply four settings* for added security and reliability.
3) Configure and deploy e-Exam USBs.

* Moodle requires modified plugins and configuration. This must be paired with Safe Exam Browser e-Exam OS edition!

Pass given to students in exam room only
Can only use SEB
Protect network outage
Unique SEB key.
Try it: Start laptop from e-Exam USB

E.g. To boot to USB (on Apple)*
1. Power is off
2. Insert USB
3. Power ON & hold DOWN alt/option.
   Keep holding then..
4. Choose the yellow EFI icon.
5. System will auto join EduRoam WiFi (or type username and pass)
6. SEB will open at the demo Moodle Logon page:
   
   **user1, user2... user70**
   
   **Password!**

* Windows laptops also work – e.g. At step 3: Dell = F12. Windows 10 may require shift restart. We provide a ‘Quick start’ sheet to students... (see transformingexams.com)
Start up – upon reaching the e-Exam OS desktop

Select LOTE (if applicable)

Connect to WiFi network (or system can automatically connect)
Log onto Moodle and start the exam

Log into LMS server. Network access was whitelisted.

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

Questions in Safe Exam Browser

This is an offline dictionary tool ‘Dim Sum’. Copy-paste was possible.
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
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.
If at submission time there is a network outage, then student response data is saved to the USB drive in an encrypted file.

- 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)
If not submitted - post-exam upload to LMS

This quiz uses fault-tolerant mode. Adminstrators can upload exported responses. This quiz has been configured so that students may only attempt it using the Safe Exam Browser. You must use an approved version of Safe Exam Browser to attempt this quiz.

From the Quiz page, Admins/teachers can upload encrypted response file(s) from USB (can be done in bulk too using a large hub + our Admin tool).

After upload: USB clean-up using Admin tool to ready for next use.
In-class BYO Laptop robust Moodle use (Monash example)

Tables + chairs in standard ‘collaborative’ layout classroom.
Power sockets in tables + WiFi (Ethernet can be used too, but want not in this case).
Ensure students sit 90degree to avoid overseeing other screens.
Possibility: add cardboard ‘screens/dividers’.
Possibility: use random order for questions, random order for distractors.
Technical References

With thanks to these contributors!

Martin Coleman – Lead e-Exam system software developer.
Safe Exam Browser (Daniel Schneider and SEB team at ETH Zurich).
SEB Moodle plugin for keys (by Tim Hunt at Open University, UK).
Moodle Quiz fault-tolerant plugin (by Tim Hunt at Open University, UK).
Moodle Auto enroll plugin (by Mark Ward).

Note: These components cannot be used ‘as-is’. We have extended them to enable SEB to operate within the Live Linux USB implementation, modified the key exchange mechanism, added transparent auto save to local storage in the event of network outage and extended the caching of quiz components.

*Our work is not done - more to do! :-)*

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