Establishing high stakes computer-based testing through Blackboard: challenges & lessons learned

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VLE Exam
Secure online assessment service
VLE Exam: defining our current service

- Dedicated instance of VLE, separate from the main VLE platform
- Automated marking of tests with defined responses (MCQs). Scope also for longer answer open responses
- Students access via a locked-down desktop environment – only access to exam server permitted
- Exams delivered successfully to 200+ PGT students across 4 PC classrooms (Jan. 2015 / Jan. 2016): multiple rooms with simultaneous testing
Progression from trial to service

- QMP trials (2009-2012)
- Benchmarking & technology review (2012-2013)

Formative tests – low stakes

Technical review & dummy tests

Formative & summative exams – high stakes

Formative testing informing higher stakes exam

VLE hosted testing & exam (2013-2014)

VLE exam as a supported service (2014-15)

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VLE hosted testing & exam (2013-2014)

VLE exam as a supported service (2014-15)
QMP trials (2009 – 2012) – LOW STAKES

**PHASE 1**

**Outcome**
- Identification of QMP as software solution

**Stakeholders**
- Strategic IT Projects Group (sponsor)
- E-Learning & IT Services

**Summer 2010**
- Benchmarking Review

**Pilot QMP Local Install**
- E-learning, IT networking & desktop services
- Education & Management School

**Summer 2011**
- Configuration & performance challenges (missing data)

**Pilot QMP On Demand**
- E-learning, IT networking & desktop services

**Autumn 2012**
- Configuration & performance challenges (connection speed & submission problems)
### Benchmarking & technology review (2012-2013)

#### Sector Review
- **Strategic IT Projects Group** (sponsor)
- **E-learning / IT & Education Department**

#### VLE Pilot
- **E-learning, IT networking & desktop services**
- **Education Department**

#### VLE Mock Exam
- **Education Department**
- **IT and e-learning services**
- **Exams Office**
- **Students**

#### Phase 2

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<th>2013</th>
<th>Summer 2013</th>
<th>Autumn 2013</th>
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<td>Reappraisal of Blackboard VLE’s assessment engine</td>
<td></td>
<td>Creation of VLE Exam instance – with locked down desktop</td>
<td>Issues over exam design: question volume &amp; balance</td>
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**PHASE 3**

**VLE Exam Masters**

- Education Department;
- IT & e-learning services
- Exams Office
- Students

**VLE Mock Exam Masters & UG**

- Education Department;
- IT & e-learning services
- Exams Office
- Students

**VLE exam Masters & UG**

- Education Department;
- IT & e-learning services
- Exams Office
- Students

**Outcome**

- Spring 2014: Review of question-set: Ratio of MCQ & open questions; randomisation & sequencing
- Autumn 2014: Successful delivery of exam (160 students)
- Spring 2015: Successful delivery of exam (160 students)
Defining Failure

Hard Failure
*(crash and burn)*

- Network failure
- Loss of student data
- Multiple workstation failure.
- Timetabling/room allocation errors
- Room capacity / Students sent to wrong rooms

Soft Failure
*(only just worked)*

- Variability in connection speeds / server responsiveness (latency)
- Invigilators unfamiliar with E-Exam protocol

Technical Support
Perceptions and Risk Management

- **E-Exam**: Must be intuitive, flawless and pedagogically fit for purpose (valid, reliable, secure)

- Electronic provision can magnify existing weaknesses in institutional processes

Fear of unknown → Higher anxiety levels

- **Exam Protocols**
  - new
  - established

- **Exam Technology**
  - familiar
  - unfamiliar

**HIGH RISK**
## Addressing failure: Enhancement agenda for the VLE exam service

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<th>Focus</th>
<th>Stakeholders</th>
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<td>Technical challenges</td>
<td>Configuration of test environment: security; tuning; performance; network management</td>
<td>IT desktop &amp; network VLE administrator VLE Manager</td>
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<td>Exam design</td>
<td>Design &amp; composition of question-set; Management of question blocks (randomisation)</td>
<td>VLE Manager Academic exam coordinator &amp; question authors</td>
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<td>User support (key stakeholders)</td>
<td>Orientation to exam environment and exam protocols</td>
<td>Academic exam coordinator (departmental team) Exams Office (invigilators) Students</td>
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Technical challenges

- Configuring the exam environment
  - Both *shared* and *dedicated* systems considered as options
  - Decision to opt for *dedicated* exam platform
    - Easier to configure, monitor and manage
      - Configuration specific for exams
      - All traffic is exam traffic
    - Shared platform more difficult to manage

- Managing the locked-down desktop
  - Boots straight into browser and VLE EXAM URL
Security

▪ **Server**
  – Restricted access (IP restrictions / module availability)
  – Exam available for duration of exam only
  – Separate user accounts (exam number / student ID)

▪ **Client**
  – Zero client can be used anywhere
  – Specifically designed for VLE EXAM
  – Only app is browser, no other apps available
  – Browser restricted to accessing VLE EXAM server URL
How we improved VLE exam system performance

▪ **Upgrading**
  - Pre Apr14 releases vs Post Apr14
    Apr14 much better experience, randomisation cured

▪ **Restarts**
  - System restarted prior to examination sessions to reduce issues from any possible memory leaks

▪ **Priming the caches (exercising question items)**
  - Prior to each exam caches are primed by running through exam on each app server
Exam design

- Attention to proportion of short answer (essay) questions to MCQs
- Use of blocks (question type / difficulty)
- Randomisation by question type (higher value questions served up first to all)
User support: academics and students

▪ Academic support:
  - training on test / question pool design
  - provision of test student accounts
  - quality checking of exam (sense and flow)

▪ Student support:
  - alignment of formative to summative test experience (question difficulty / timed conditions)
  - video tutorial of exam environment controls & guidance slides...
ONLY when you have finished:

1.  Go to the last question
2.  Click Save and Submit
3.  Click OK

Do not click SAVE AND SUBMIT if you have not finished the exam. You will NOT be able to re-enter the exam.

To navigate the questions in the exam you can use the blue bar above where the questions are displayed.
Invigilator support:
- briefed on exam environment
- ELDT in attendance throughout exam
- ELDT now oversee logging in procedure
- ELDT assist with workstation failures, moving students to spare PC
- ELDT verify when exam finished / submissions received, making VLE exam site unavailable
But we still face ongoing challenges....

- **People and processes:**
  - room allocation and bookings (Timetabling)
  - invigilator confidence and expertise

- **Estate:**
  - room capacity and sustainability / extensibility of service (challenges of common assessment period)

- **Resourcing and scalability:**
  - reliant on dedicated Digital Workspace, IT network & ELDT support
Discussion points

1. How does our experience of establishing a VLE exam service compare with yours (with UGs / PGs, in a greenfield / mature institutional context)?

2. What recommendations on VLE exam service management and stakeholder support would you make based on your experience?

3. What developments do you foresee in computer-based testing in the next 5 years? What are the implications for central support services? And for Blackboard in terms of the design of the assessment engine (user interface)?
Thank you!

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