EASiHE JISC Final Report

Project name/acronym:	EASiHE: e-Assessment in Higher Education
Project website/blog address:	http://easihe.ecs.soton.ac.uk/
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Acknowledgements

The EASiHE project was funded by the JISC ‘Institutional Innovation’ programme.

Executive Summary

The EASiHE project provides an open source solution for formative assessment by integrating services currently available within the JISC eFramework.

This has involved taking existing tools such as open source repositories, open source assessment tools (including peer assessment), along with accessibility tools and combining them in ways that lecturers required, in order to develop effective formative e-assessment questions and tests. The questions and tests can be developed using appropriate standards such as QTIv2.1 so that they can be moved around the assessment system independent of any particular vendor solution. These e-assessments are available on mobile as well as desk-based devices.

Several key questions have been addressed by the EASiHE project:

1. What are the barriers to uptake of e-assessment and what strategies/drivers are required to overcome them?
2. How much support is required to produce effective e-assessments?
3. Can we engage students to write questions themselves with good feedback and provide web 2.0 social tools for students to write evaluate and offer opinions on questions?
4. For formative assessments what type of repository is need to ensure that questions and test are shared effectively?
5. How can we ensure that accessibility issues are included in the design and development, of tools and assessments?

The methodology has involved two strands, one technical and the other institutional. The technical strand followed a relatively conventional 'analyse, design, prototype, evaluate' methodology across two iterations, involving the end user from the start as we have used and developed over a number of JISC projects (mPLAT, Peer Pigeon, Faroes), namely through co-design, agile development, and co-deployment. The 'institutional' strand layers the technical strand with selected elements underpinning institutional transformation as identified in the JISC 'Innovating e-Learning' online conference, in particular engagement with senior management, using champions, involving students, exploiting formative assessment as a change agent, and providing a shared space. We have grounded these into practical demonstrators from five schools in the University (plus Bournemouth and Poole College) each showing different aspects of the work.

The main deliverables include: the provision of an open source e-assessment repository; services for the contribution and migration of assessment questions, tests, and peer assessments; services for the delivery of tests and peer assessments; documentation supporting the pedagogical design of e-assessments at higher levels of Bloom's taxonomy; and dissemination material for the wider sector dealing with institutional change using the processes of co-design and co-deployment.

Deliverables include: source code for the software produced; a project Web site giving free access to and downloads for the project deliverables; reports and materials; and the project blog and wiki. See www.easihe.ecs.soton.ac.uk for all deliverables.

The University of Southampton has invested very significantly in the JISC-funded EdSpace and EdShare projects, and extending this repository into e-assessment, particularly formative assessment, achieves a major component of the institutional strategy Professionally, the project investigators are reporting compelling and authoritative outcomes at appropriate conferences and in relevant journals, leading to enhanced standing and esteem within their communities. Staff participants can hence provide better quality, more varied, more interesting, and more innovative e-assessments, and students can therefore expect a better experience, both in terms of their learning outcomes and in terms of their positive engagement with the social, Web 2.0, and mobile features of the EASiHE system.

1. Background

The educational landscape is changing as government initiatives and student requirements call for more openness and accountability. Institutions are concerned with "consistency and fairness of their assessment" (QAA press release, 23 June 2008). Students are the new digital natives, now increasingly paying for and therefore expecting and demanding a better quality of service. Staff are commonly digital immigrants, feeling the tensions of teaching and assessing more students and larger classes in higher education and dealing with ever increasing complexity in the assessment process. Yet the time given for such activities is much the same as when class sizes were smaller and processes simpler.

In addition, we should recognise the requirements and expectations placed on the education process by accrediting bodies, in particular the desirability of formative assessment. For instance, engineering bodies view problem sheets as best practice.

Like many institutions, the University of Southampton (UoS) has for some time identified e-assessment as part of the solution to the changing landscape. For students, the hope is to have an assessment environment that they are more familiar with, which provides them with quicker feedback on their work, and which instils confidence that the system is robust. For staff, the hope is for an assessment system where the marking burden for large groups is greatly reduced, assessment is consistent, and analyses of the quality of the assessment are automatically produced.

In addition, an e-assessment system should make easier the process of conducting summative assessment or of providing formative assessment. The higher initial set-up costs for e-assessment should be recognised, however, since a conventional assessment is usually quicker to construct. The gain and the advantage of e-assessment consists in reduced re-use costs, enhanced by the use of templated questions, item pools, and interoperability standards.

For many years, the University of Southampton (UoS) has provided virtual learning environments (VLEs) and proprietary tools for e-assessment. These have had modest take-up from staff, however, who still favour conventional written examinations. In part, this is because of a misapprehension that e-assessment cannot be used in the assessment of the higher order learning outcomes or competencies which characterise Higher Education. Another reason for low take-up is the resistance within any large institution to change; after all, written examination along with viva voce have been the main methods of assessment for several hundred years within HE, and the process is very well understood within a university.

UoS has recognised that there are both technical and cultural issues to be solved if e-assessment is to make a significant impact upon learning and teaching at the University. An excellent technical specification alone is unlikely to facilitate the cultural change necessary throughout the institution. It is imperative that a co-design and co-deployment process be used when specifying and implementing an assessment system to ensure community involvement and uptake.

2. Aims and Objectives

The EASiHE project provides an open source solution for formative assessment by integrating services currently available within the JISC eFramework.

This has involved taking existing tools such as open source repositories, open source assessment tools (including peer assessment), along with accessibility tools and combining them in ways that lecturers required, in order to develop effective formative e-assessment questions and tests. The questions and tests can be developed using appropriate standards such as QTIv2.1 so that they can be moved around the assessment system independent of any particular vendor solution. These e-assessments are available on mobile as well as desk-based devices.

Several key questions have been addressed by the EASiHE project:

1. What are the barriers to uptake of e-assessment and what strategies/drivers are required to overcome them?
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4. For formative assessments what type of repository is need to ensure that questions and test are shared effectively?
5. How can we ensure that accessibility issues are included in the design and development, of tools and assessments?

3. Methodology

The methodology involves two strands, one technical and the other institutional.

The technical strand followed a relatively conventional 'analyse, design, prototype, evaluate' methodology across two iterations, involving the end user from the start as we have used and developed over a number of JISC projects (mPLAT, Peer Pigeon, Faroes), namely through co-design, agile development, and co-deployment.

The 'institutional' strand layers the technical strand with selected elements underpinning institutional transformation as identified in the JISC 'Innovating e-Learning' online conference, in particular engagement with senior management, using champions, involving students, exploiting formative assessment as a change agent, and providing a shared space.

We needed to ground these into practical demonstrators, each showing different aspects of the work, and chose to work with the following Schools within UoS:

- School of Civil Engineering and Transport. Demonstrations at lower levels of Bloom's taxonomy for e-assessment with undergraduates and the use of Web 2.0.
- School of Modern Languages. Demonstrations at the middle levels of Bloom's taxonomy for e-assessment with undergraduates and the use of accessibility tools.
- School of Medicine. Demonstrations at the middle and upper levels of Bloom's taxonomy for e-assessment with students writing the questions.
- School of Electronics and Computer Science. Demonstrations at middle and upper levels of Bloom's taxonomy with technology support for undergraduate peer assessment.
- School of Health Professionals. Demonstrations at all levels of Bloom's taxonomy for e-assessment, including a serious game as a demonstrator of higher order e-assessment in particular.

In addition to working with the schools we needed to inform colleagues of good practice and lessons learnt, and did this through a series of seminars and workshops. We also developed training material for staff.

Critical success factors in these demonstrations were that, at the least, staff and students could provide questions and set tests for formative e-assessment.

An independent member of University staff in a different Faculty is evaluating the project outputs.

4. Implementation

The EASiHE project provides an open source solution for formative assessment by integrating services currently available within the JISC eFramework.

Technically, the project has exploited the JISC-funded 'EdSpace' repository and the Web 2.0 'Faroes' project, incorporated the IMS Question and Test interoperability standard by integrating the 'QTIEngine' assessment delivery engine (and has been informed by the outputs from the 'AsDel', 'MathAssess', 'Minibix', 'Aqurate', and 'R2Q2' projects), has ensured the system is informed by the JISC-funded 'LexDis' project for accessibility, and includes relevant lessons from the JISC-funded 'mPLAT' and 'Remora' projects for mobile learning and assessment.

The project sought to provide an approach to assessment, and to formative assessment in particular, which develops the current principles of Web 2.0. The EASiHE repository (which was build on EdShare and OneShare) holds assessment items, questions, answers, tests, and feedback, including linked resources and other relevant materials such as student evaluations and opinions. The EASiHE repository also incorporated the social elements available from the Faroes project working on top of the EdSpace repository (as well as peer review contributed by the Peer Pigeon project). The

repository supports the use of mobile devices following the lessons learned from the JISC-funded mPlat and Remora projects.

Accessibility is an increasingly significant institutional issue, and the EASiHE project incorporates the guidance and guidelines from the LexDis project to embed good practice in the development of the assessments (tests and questions).

5. Outputs and Results

The main deliverables include: the provision of an open source e-assessment repository; services for the contribution and migration of assessment questions, tests, and peer assessments; services for the delivery of tests and peer assessments; documentation supporting the pedagogical design of e-assessments at higher levels of Bloom's taxonomy; and dissemination material for the wider sector dealing with institutional change using the processes of co-design and co-deployment.

All source code for the software produced or enhanced is available online (see the links below). This includes:

- Enhanced PeerPigeon for peer assessment
- The Eqiat authoring tool for the web
- The mobile authoring tool
- QTIEngine

Other deliverables include a project Web site giving free access to and downloads for the project deliverables, reports and materials, as well as the project blog and wiki. See www.easihe.ecs.soton.ac.uk. The Website also includes:

- Conference and journal papers dealing with issues relevant to and arising out of the project.
- Material produced as a result of the workshops on how to write effective (and pedagogically well designed) questions and how to write questions to assess the higher order learning outcomes.
- The blog, covering the institutional experience of transformation.
- The demonstrator and walk through for the various schools
- Lessons learnt.

In summary, our four outputs, as presented at the JISC Innovation Exchange (January 2010), are available from the following locations:

- Software:
    - Enhanced Peer Pigeon. http://www.peerpigeon.ecs.soton.ac.uk/
    - Eqiat. http://wiki.qtitools.org/wiki/Eqiat
    - Mobile authoring tool. https://forge.ecs.soton.ac.uk/plugins/scmsvn/viewcvs.php/MobileAuthoringTool/?root=easihemobile
    - QTIEngine. http://wiki.qtitools.org/wiki/QTIEngine
    - Extended QTIEngine REST API. https://forge.ecs.soton.ac.uk/docman/index.php?group_id=1184&selected_doc_group_id=1716&language_id=1
    - QTIBox. A plugin for Edshare which allows QTI content to be previewed from the repository view. http://wiki.qtitools.org/wiki/QTIBox
    - Android Mobile Phone QTI Playr. https://forge.ecs.soton.ac.uk/docman/index.php?group_id=1184&selected_doc_group_id=1716&language_id=1.
    - An example installation of an eAssessment repository using Edshare and QTIBox from Bournmouth and Poole College. http://lslvm-pz1.ecs.soton.ac.uk/
    - Validate. http://wiki.qtitools.org/wiki/Validate
    - VLE Connectors: for Moodle/QTIEngine (QTI tools) ; and Perception to Blackboard / Moodle.

- Reports and documentation:
  - The EASiHE Blog.
  - The EASiHE Wiki.
  - EASiHE Talks. For overviews of EASiHE please see the slides from the seminar on EASiHE given at the University of Warwick in February 2010 ; and the talk given to the University of Southampton HE Research Group in January 2010. Also see the original presentation on EASIHE from the JISC Programme Meeting October 2008
  - A technical paper "IMS QTI Engine on Android to Support Offline Mobile Learning".
  - Papers. A variety of technical papers published by members of the EASiHE team.
- Workshop output:
  - Writing effective e-assessments:Hints and tips from practitioners booklet - how to write effective (and pedagogically well designed) questions and how to write questions to assess the higher order learning outcomes. http://easihe.ecs.soton.ac.uk/EASiHE_booklet_draft_0.9.pdf
  - Online information from the EASiHE workshops. http://easihe.ecs.soton.ac.uk/EventsEasiheWiki.htm. This includes:
    - 'EASiHE Assembly: Workshop on Higher Learning Skills and Good Feedback'.
    - EASiHE Workshop with Feasst outcomes: Effective feedback and mobile technology.
    - EASiHE Workshop on a Participatory Methodology for the Development of Design Patterns and Application to Formative e-Assessment.
- Case studies, both summaries and in detail with links to questions:
  - Case study summaries.
  - Case study details. (beta version)
  - A technical paper "A Formative eAssessment Co-Design Case Study".

6. Outcomes

The University of Southampton has invested very significantly in the JISC-funded EdSpace project, and extending this repository into e-assessment, particularly formative assessment, achieves a major component of the institutional strategy. In addition the institution benefits from the provision of fully-featured mathematical expressions and other components in e-assessments, robust means of quality assurance of e-assessment questions and tests through verification, and the demonstration that open source solutions can positively complement ‘high stakes’ proprietary e-assessment systems.

Professionally, the project investigators are reporting compelling and authoritative outcomes at appropriate conferences and in relevant journals, leading to enhanced standing and esteem within their communities.

Staff participants can hence provide better quality, more varied, more interesting, and more innovative e-assessments, and students can therefore expect a better experience, both in terms of their learning outcomes and in terms of their positive engagement with the social, Web 2.0, and mobile features of the EASiHE system.

We also note that a full independent evaluation of the EASiHE project is currently being conducted.

7. Conclusions

The EASiHE project has taken a disparate set of open source tools and demonstrated that these can provide lecturers with a complete suite to author, curate, use, and reuse formative questions and tests. In addition these tools produce questionnaires and tests that conform to the QTI Standard and hence can be played or re-authored in any QTIv2.1 compliant tool.

The EASiHE project has produced several demonstrators around the University from the Schools of Humanities, Civil Engineering and the Environment, Electronics and Computing, Health Professionals, and Medicine. These demonstrate not only that effective questions can be written with the tools provided, but also address issues such as accessibility, the use of Web 2.0, students writing their own questions, and e-assessment for higher learning outcomes.

Although we had enthusiastic and domain expert staff in each of the schools, it still required a significant input from the e-assessment staff to write effective questions.

The EASiHE project is also affecting the strategies for learning and teaching at the institutional level within the University, particularly in the area of assessment and feedback. We have produced several guidelines, presentations, and workshops, informing staff and senior managers of strategies and good practice in assessment.

8. Implications

EASiHE has made available the tools it has developed or modified as open source software. Other professionals can take these, enhance them and reuse them for their own purposes free of charge. All we ask is that they make these enhancements open in the same ways as the current set of tools are open.

The materials developed in the project on good practices and processes are also freely available and can be used by professionals in the fields to enhance their own study and guidance materials.

EASiHE has demonstrated that using standards such as QTIv2 helps avoid vendor lock-in and allows easier migrations as system are upgraded or changed.

All the tools were developed for the users in the project with the result that while some, such as the QTI library, have been enhanced, most do not. This was because the tools were designed to fit the user requirements. These can always be expanded in the future to cover the complete QTI specification and some of its more advanced features.

9. Recommendations

Good e-assessment is hard to find and many examples are often confined to the lower levels of Bloom's taxonomy. Even then they are often poorly written. Surprisingly the biggest hurdle to effective formative e-assessment is the lack of knowledge by staff on writing good e-assessments. This is in part because many of us have been trained to write good traditional assignments. Bridging this gap is one of the most important recommendations from this project.

References

EASiHE software, reports, case studies, guides, workshops: www.easihe.ecs.soton.ac.uk