

# Effective Assessment in a Digital Age

A guide to technology-enhanced assessment and feedback



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# Effective Assessment in a Digital Age

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'Nothing that we do to, or for, our students is more important than our assessment of their work and the feedback we give them on it. The results of our assessment influence our students for the rest of their lives and careers – fine if we get it right, but unthinkable if we get it wrong.'

Race, Brown and Smith (2005), 500 Tips on Assessment



# Introduction

**Assessment lies at the heart of the learning experience: how learners are assessed shapes their understanding of the curriculum and determines their ability to progress. At the same time, assessment and feedback form a significant part of practitioners' workloads and, with increased numbers, reduced budgets and higher learner expectations, continue to be a matter of concern for many institutions.**

What contribution can technology make to ensuring that assessment and feedback processes are agile, streamlined and capable of promoting high-quality learning? **Effective Assessment in a Digital Age** draws on recent JISC reports and case studies depicting different contexts and modes of learning to explore the relationship between technology-enabled assessment and feedback practices and meaningful, well-supported learning experiences.

The Re-Engineering Assessment Practices (REAP) principles of good assessment and feedback, developed as a result of the [REAP project](#) funded by the Scottish Funding Council during 2005–2007, provide a framework for discussing how assessment and feedback can have a beneficial impact on learning. Accompanying this discussion is a sequence of case studies and practitioner voices which illustrate how technology can assist in the design of learning-focused assessment and feedback practices.

The scope of the publication is broad. It is proposed that technology, if used appropriately, can add value to any of the activities associated with assessment: from establishing a culture of good practice to the processes involved in submission, marking and return of assessed assignments; from the delivery of assessment to the generation of feedback by practitioners or peers. No separation is made between assessment for learning and assessment of learning, nor is the focus solely on computer-assisted assessment. Indeed,

a wide range of technologies is evident in the sampled practice; the case studies and practitioner voices illustrate the potential to be found in generic, widely available technologies as well as in the use of more complex e-assessment tools and technologies.

Throughout the publication, you are encouraged to reflect on how technology-enabled practice, grounded in principles of good assessment and feedback, might enhance the quality of assessment and feedback in your own institution.

## Further information

**Effective Assessment in a Digital Age** is designed for those in further and higher education who provide assessment and feedback for learners in institutional, work-based or distance learning contexts.

The publication, which draws on work funded by JISC, JISC's partners and national funding agencies, complements other publications in the same series, in particular the parallel guide, [Effective Practice in a Digital Age](#) (JISC, 2009a), and the closely related publications, [Effective Practice with e-Portfolios](#) (JISC, 2008) and [Effective Practice with e-Assessment](#) (JISC, 2007).

**Effective Assessment in a Digital Age** is available in different formats. Supplementary resources, including video clips, podcasts and detailed versions of the case studies, are available online.

[www.jisc.ac.uk/digiassess](http://www.jisc.ac.uk/digiassess)

[www.jisc.ac.uk/assessresource](http://www.jisc.ac.uk/assessresource)



## Context

**A number of influences have brought assessment and feedback to the forefront of institutional and educational agendas, resulting in an increasing imperative to enhance assessment and feedback practices through technology.**

Firstly, the relationship between learning, assessment and feedback has become more widely understood over the last decade through the work of Gibbs and Simpson, Black and Wiliam, Nicol and Macfarlane-Dick in the UK, and Boud and Sadler in Australia. Principles of effective practice arising from their work have had a wide impact.

As a result of these pedagogic advances, it is now recognised that learning programmes that provide opportunities for learners to acquire skills of self-monitoring and self-regulation (for example by assessing their own work against defined criteria) prompt deeper and more effective learning. A number of sources, including the reports and case studies highlighted in this publication, have demonstrated that technology has a significant part to play in making such approaches achievable without adding to the workload of practitioners.

Secondly, research by JISC has deepened understanding of the extent to which learners rely on technology while learning. Research undertaken between 2005 and 2009 into [learners' experiences of e-learning](#) revealed a high level of ownership of technologies such as laptops and handhelds among learners entering higher education, indicating that use of technology for research and assignment production is likely to be widespread. While not all learners can be considered competent users of technology for educational purposes, this research (involving nearly 3,500 survey respondents) suggests that institutional assessment and feedback practices need to take account of the digitally enhanced landscape in which learning now takes place.

In a parallel sampling of learners' views, the [National Student Survey](#) has consistently reported lower levels of satisfaction with assessment and feedback than with other aspects of the higher education experience. Representatives of the student body have clearly articulated the value that many learners see in harnessing technology to transform assessment and feedback practices:

*'We would like to see all universities and colleges implement a systematic policy to enhance traditional teaching methods with new technologies [and] leverage technology to provide innovative methods of assessment and feedback.'* [National Student Forum Annual Report 2009](#)

In addition, significant progress has been made since the late 1990s to develop the robust and flexible technical infrastructure that enables institutions to respond to new opportunities.



## 'Good assessment is the right of all our students.'

Mark Russell, Deputy Director, Blended Learning Unit, University of Hertfordshire

For example, JISC-funded work has helped institutions to support large-scale summative e-assessment and embed the use of e-portfolio systems. In addition, JISC has played a key role in addressing institutional issues surrounding technology-enabled assessment: in 2006, the JISC [e-Assessment Roadmap](#) charted the drivers for, and barriers against, wider adoption of e-assessment in the UK.

However, the more recent 2009 JISC [Review of Advanced e-Assessment Techniques](#) (RAeAT) indicated that, despite potential benefits, adoption in higher education of the more complex opportunities made possible by technology is variable. Without departmental champions to support implementation, take-up of the more challenging aspects of e-assessment, especially in the context of summative assessment, has been slow.

The 2009 JISC [Report on Summative e-Assessment Quality](#) (REAQ) also confirmed the need for institutional support to implement computer-assisted assessment effectively:

*'... it seems that because e-assessment is not yet embedded in the exam structure and processes for many departments or institutions, delivery issues are a time-consuming concern for practitioners.'* Gilbert et al (2009) *Report on Summative e-Assessment Quality (REAQ)*

Nonetheless, technology in the broadest sense is filtering into assessment and feedback practice, although it is not always the most sophisticated technologies that provide the most appropriate solutions. Practitioners with a clear understanding of the principles underpinning good assessment and feedback practice are demonstrating the value of integrating a wide range of technologies into their practice, enabling learners to experience more varied and appropriate assessment and feedback strategies at all stages of their learning programmes.

JISC has explored the relationship between technology and effective assessment and feedback through a range of programmes, some ongoing and some completed:

- [e-Learning programme](#) (2003–2012) – supporting the key activity areas of [Technology-enhanced Assessment](#) and [e-Portfolios](#)
- [Institutional Approaches to Curriculum Design programme](#) (2008–2012) – reviewing how course design and validation can be enhanced by technology
- [Transforming Curriculum Delivery through Technology programme](#) (2008–2010) – investigating more flexible and creative models of delivery
- [Learning and Teaching Innovation Grants programme](#) (2008–2011) – supporting one-year projects on any aspect of technology-enhanced learning, teaching and assessment
- [e-Learning Capital programme](#) (completed 2009)
- [JISC Users and Innovation: Personalising Technologies programme](#) (completed 2009)
- [JISC Institutional Innovation programme](#) (completed 2010)



# Introducing technology-enhanced assessment and feedback

## Writing about practice

**Effective Assessment in a Digital Age** offers an accessible introduction to the application of technology to assessment and feedback. The focus is on internally designed curricula rather than on programmes of learning directed by external awarding bodies. Nonetheless, the principles underpinning effective assessment and feedback have relevance to any post-16 context in which practitioners provide assessment and feedback opportunities for their learners.

The terminology used across the post-16 sector varies widely. As a result, 'practitioner' has been adopted as a generic term for those in a teaching or teaching support role. In the case studies, alternative terms have been used as appropriate to the context.

Similarly, 'learner' is used within the body of the publication to refer to those following a course of study, but in the case studies 'student' replaces 'learner' in contexts in which this term is more widely adopted.

As the term 'e-assessment' is sometimes understood as referring only to on-screen assessment, 'technology-enhanced' or 'technology-enabled assessment' are the terms used in this publication to describe practices made possible by technology.

Technical or specialist terms are defined in the **Glossary** and links to tools and technologies featured in the case studies can be found in **Further information**. Jargon has been avoided wherever possible.

## Benefits and challenges of assessment and feedback in a technology-rich context

**Effective assessment and feedback can be defined as practice that equips learners to study and perform to their best advantage in the complex disciplinary fields of their choice, and to progress with confidence and skill as lifelong learners, without adding to the assessment burden on academic staff.**

Technology, although still under-utilised in assessment and feedback practices, offers considerable potential for the achievement of these aims. However, benefits are accompanied in some cases by challenges. Wider understanding is still needed of how applications of technology can enhance assessment practices, and when there is a business case to support such innovations.

For example, if designed appropriately, computer-assisted assessment (such as, but not exclusively involving, multiple-choice tests) offers a number of benefits that can enhance learning and reduce the workload of administrators and practitioners: online assessments can be accessed at a greater range of locations than is possible with paper examinations, enabling learners to measure their understanding at times of their own choosing; immediate expert feedback delivered online in response to answers selected by learners can rapidly correct misconceptions; and the time saved in marking can be used in more productive ways, for example in supporting learners experiencing difficulties. Outcomes of assessments can also be more easily collated and evaluated for quality assurance and curriculum review processes.

‘It is the learners and teachers as human actors who ultimately determine the formative effects of engaging with technologies, but technologies can shape the potential for this to happen.’

Pachler *et al* (2009), *Scoping a vision for formative assessment: a project report for JISC*

When deployed at scale, however, especially in summative assessment, computer-assisted assessment requires commitment at an institutional or departmental level to ensure an appropriate technical infrastructure and physical estate, and a sustainable approach to upskilling academic staff and learners. Quality issues in relation to test design and delivery also require close scrutiny.

Technology can add value in other respects such as improving the experience of assessment and feedback. There is considerable potential for multimedia technologies to make feedback richer and more personal and for a wider range of learner skills and attributes to be demonstrated through assignments involving, for example, e-portfolios, blogs and wikis. In addition, online tools can support peer and self-assessment in any location and at times to suit learners – the value of peer and self-assessment in developing learners’ ability to regulate their own learning is increasingly recognised.

However, technology provides only the potential for enhancing assessment and feedback. Transformative effects are more likely when there is a clear educational purpose behind the proposed innovation (for example, to increase learners’ autonomy, to enhance the quality of feedback or to improve teaching efficiency) and when the use of technology is skilfully contextualised within the academic and wider social context.

Despite the greater scope provided by technology, the principles underpinning good assessment and feedback still apply. The following section, **Designing effective assessment and feedback**, explores in more detail the value of a principles-based approach to assessment and feedback.

### What technology offers

Technology-enhanced assessment and feedback refers to practices that provide some, or all, of the following benefits:

- Greater variety and authenticity in the design of assessments
- Improved learner engagement, for example through interactive formative assessments with adaptive feedback
- Choice in the timing and location of assessments
- Capture of wider skills and attributes not easily assessed by other means, for example through simulations, e-portfolios and interactive games
- Efficient submission, marking, moderation and data storage processes
- Consistent, accurate results with opportunities to combine human and computer marking
- Immediate feedback
- Increased opportunities for learners to act on feedback, for example by reflection in e-portfolios
- Innovative approaches based around use of creative media and online peer and self-assessment
- Accurate, timely and accessible evidence on the effectiveness of curriculum design and delivery



# Designing effective assessment and feedback

## Approaches to assessment

**Decisions about assessment and feedback lie at the heart rather than at the periphery of the curriculum design process.**

Four broad perspectives on learning are proposed in Table 1 (opposite). Each perspective makes different assumptions about the nature of learning and suggests different approaches to assessment and feedback.

The **associative perspective** emphasises that learning is about acquiring competence through concept linking and bringing together component skills. Assessment might involve both small-scale testing of basic understanding and skills and more complex assignments where understanding and skills are assessed in larger contexts (for example, through projects or work-related assignments). Feedback would involve supporting learners as they build more complex understanding and skills.

The **constructivist perspective** emphasises that learners must actively construct their own understanding. Assessment would focus on the extent to which learners can structure and restructure material for different purposes without the help of others (for example, through inquiry-based tasks), and feedback would support learners in becoming more self-directed. Hence this approach requires that learners reflect, self-assess and generate feedback on their own learning.

Assessment can engage or deter, develop or overburden, but it cannot be avoided in programmes of formal learning.

The **social constructivist perspective** emphasises the role of others in constructing understanding. Dialogue and collaboration are seen as key to learning success. Assessment would involve group tasks and assignments, sometimes with individual contributions being assessed. This perspective emphasises that feedback is not just teacher-provided but must be rich and varied, deriving also from peers during collaboration and discussion.

The **situative perspective** sees learning as arising from participation in communities of practice. Learners participate in many learning communities during their studies which prepare them to become members of professional communities (learning to think and act like a lawyer or an engineer, for example). This perspective is consistent with social constructivism but also emphasises identity formation. Assessment tasks would be authentic and modelled on what happens in professional practice; feedback would involve peers, disciplinary experts and those in relevant roles and professions.

These four learning perspectives should not be seen as incompatible. Indeed, learning designs for tasks, modules and programmes will invariably draw on a mix of these perspectives and on their different assessment and feedback approaches.

However, it should be noted that effective assessment designs take into account the longer term purpose of learning: helping learners to become self-reliant, confident and able to make judgements about the quality of their own learning (Nicol, 2010). As a result, self-assessment, peer feedback and the active use of teacher feedback should be an integral part of most courses.

## 'The way in which students are assessed fundamentally affects their learning.'

Quality Assurance Agency for Higher Education (2006) Code of practice for the assurance of academic quality and standards in higher education, Section 6: Assessment of students

Perspective on learning	Assumption	Assessment	Feedback
<b>Associative</b>	<p><b>Learning as acquiring competence</b></p> <p>Learners acquire knowledge by building associations between different concepts.</p> <p>Learners gain skills by building progressively complex actions from component skills.</p>	<p>Concepts and competencies frequently assessed at micro level and in combination through macro-level tasks.</p>	<ul style="list-style-type: none"> <li>■ Expert feedback focusing on weaknesses in skills and conceptual understanding</li> <li>■ Interactive environments for knowledge and skills acquisition</li> </ul>
<b>Constructivist</b>	<p><b>Learning as achieving understanding</b></p> <p>Learners actively construct ideas by building and testing hypotheses.</p>	<p>Assessment by means of experimentation, discovery and inquiry-based tasks.</p>	<ul style="list-style-type: none"> <li>■ Self-generated feedback arising from reflection and self-assessment</li> <li>■ Interactive discovery environments with opportunities for self-testing</li> </ul>
<b>Social constructivist</b>	<p><b>Learning as achieving understanding</b></p> <p>Learners actively construct new ideas through collaborative activities and dialogue.</p>	<p>Collaborative and cooperative tasks involving shared expression of ideas.</p> <p>Participation by learners in the design of assessment tasks.</p>	<ul style="list-style-type: none"> <li>■ Peer feedback arising from collaborative activities and dialogue</li> <li>■ Interactive environments that support sharing and peer feedback</li> </ul>
<b>Situative</b>	<p><b>Learning as social practice</b></p> <p>Learners develop their identities through participation in specific communities of practice.</p>	<p>Holistic assessment in authentic or simulated professional contexts.</p> <p>Participation in social practices of inquiry and assessment.</p>	<ul style="list-style-type: none"> <li>■ Socially produced feedback from multiple sources</li> <li>■ Feedback derived from authentic real-life tasks</li> <li>■ Interactive environments that simulate professional practice</li> </ul>

Table 1: Perspectives on learning and approaches to assessment and feedback

# Formative assessment and feedback

**Since the 1990s, educational researchers have increasingly argued that assessment should be used to support learning rather than just test and certify achievement.**

Hence terms such as 'formative assessment' and 'assessment for learning' have become widely used, and often contrasted with 'summative assessment' and 'assessment of learning'. Formative assessment refers to activities that enable learners and practitioners to monitor learning, and to use the information generated to align subsequent learning and teaching activities.

In 2006, [Nicol and Macfarlane-Dick](#) re-interpreted the research on formative assessment and feedback within a model of 'self-regulated learning'. Their work identified seven principles that, if implemented, would encourage learners to regulate their own learning – for example by monitoring, evaluating, generating feedback on, and making judgements about, their work.

## **The seven principles of good feedback:**

1. Clarify what good performance is
2. Facilitate reflection and self-assessment in learning
3. Deliver high-quality feedback information that helps learners self-correct
4. Encourage teacher–learner and peer dialogue
5. Encourage positive motivational beliefs and self-esteem
6. Provide opportunities to act on feedback
7. Use feedback from learners to improve teaching



From another perspective, [Gibbs and Simpson](#) (2004) proposed that learning would be more effective if assessment design 'engaged' learners by encouraging them to spend 'time on task' in and out of class, and to distribute their effort evenly across their programme of study.

Designers of assessment have a key part to play in putting these principles into practice. To become effective in regulating their own learning, learners need to be engaged in and motivated by tasks. But it is also important that the design of tasks enables learners to take ownership of their learning. While engagement requires that learners understand the goals and criteria for the assessment, spend time on task and receive feedback from academic staff, empowerment requires that they have opportunities for self-assessment, peer dialogue and peer feedback, and that they use feedback to improve subsequent tasks. Balancing engagement and empowerment is a key design challenge.

<sup>1</sup> Sadler, D.R. (2010), Beyond feedback: Developing student capability in complex appraisal, *Assessment and Evaluation in Higher Education*, 35(5), 535–550

<sup>2</sup> Nicol, D. (2010b) From monologue to dialogue: Improving written feedback in mass higher education, *Assessment and Evaluation in Higher Education*, 35(5), 501–517

'Formative assessment includes both feedback and self-monitoring. The goal of many instructional systems is to facilitate the transition from feedback to self-monitoring.'

Royce Sadler, Professor of Higher Education, Griffith University, Australia

### Making the most of feedback

Feedback is often seen as the sole responsibility of the practitioner. While practitioner feedback is essential, this approach can have drawbacks: some learners can become dependent on practitioner feedback, which can undermine the development of lifelong learning skills.

Sadler (2010)<sup>1</sup> maintains that learners must develop their own skills of evaluation and judgement, noting that practitioners acquire such skills by making many judgements each year on learners' assignments and by providing explanations for those judgements in the form of feedback. Peer assessment is an active learning approach that requires learners to engage in acts of evaluation with reference to criteria and standards; peer assessment also exposes learners to the approaches other learners take when tackling assignments and, importantly, develops their ability to make evaluative judgements on their own work. Thus through regular opportunities for peer assessment and feedback, learners will acquire a similar level of evaluative skill as their tutors.

However, if learners are to become self-regulating, they must also acquire the skills and disposition to self-assess. Learners already monitor and evaluate their work as they produce it, generating internal feedback with regard to its alignment with defined criteria and standards. Nicol (2010)<sup>2</sup> argues that giving feedback to yourself should become an explicit rather than an implicit part of assignment production. For example, learners might identify the strengths and weaknesses in their assignments, or provide a justification for the approaches they have taken.

In addition, practitioner feedback can be designed to prompt learners into self-regulation, for example, by developing learners' understanding of the assessment criteria before they commence an assignment, by making feedback more of a dialogue than a one-way process and by ensuring that learners can act on the feedback they receive. Good results may also be obtained when learners apply assessment criteria to examples of completed work before producing their own assignments.

### David Nicol Professor of Higher Education, University of Strathclyde

**We tend to think of feedback as something a teacher provides, but if students are to become independent lifelong learners, they have to become better at judging their own work.**

Students learn not by listening to transmitted information, but by actively constructing their own understanding of that information and deriving meaning from it. If I, as a teacher, deliver feedback to you, what do you have to do with that feedback? First of all, you have to decode my feedback, then you have to internalise it and then use that information to make a judgement

about your own work. All these activities are acts of self-evaluation, so why are we spending so much time trying to improve the quality of teacher feedback? We should certainly spend equal time designing environments that help improve learners' ability to make their own evaluative judgements about the quality and impact of their work.

If you really want to improve learning, get students to give one another feedback. Giving feedback is cognitively more demanding than receiving feedback. That way, you can accelerate learning. 🎯

## Voices on assessment and feedback

# Principles of effective formative assessment and feedback

**An influential body of work, the [Re-Engineering Assessment Practices](#) (REAP) project, led by the University of Strathclyde, funded by the Scottish Funding Council and supported by JISC, drew on the work of Nicol and Macfarlane-Dick. The REAP project explored how technology might improve learning outcomes in different disciplines without adding to the time or effort expended by practitioners.**

An example of a REAP re-design was a first-year basic psychology course at the University of Strathclyde. In groups, learners undertook a sequence of online essay-writing tasks of increasing difficulty, posting their developing work on the discussion board of the university's Virtual Learning Environment (VLE). Learning was supported through online peer interaction and feedback which was monitored, but not moderated, by academic staff. The outcomes showed substantial learning and efficiency gains: the number of scheduled lectures was halved, yet students developed deeper conceptual understanding, resulting in a 6% gain in the mean examination mark.<sup>3</sup>

The REAP project gave rise to a wider set of 12 principles (given opposite) which, while focusing on formative assessment, affirm links with summative assessment. The 12 principles bring into focus the importance of learning communities in enhancing engagement and achievement, and of learner contributions to decision making about

assessment policy and practice. In addition, choice is seen as improving the experience of assessment: assessment designs that offer choice in the approach, format and timing of assessment are fairer for learners disadvantaged by traditional methodologies, but may also provide more appropriate assessment strategies that benefit all learners. Equally, the option of feedback by digital audio or video can make feedback a more personal and instructive experience for many learners.

It should be noted that the 12 REAP principles overlap and are building blocks for each other. Hence all 12 principles need not be applied to every assessment design. The principles may also need to be adapted to different disciplinary contexts: self-assessment in history, for example, is different from self-assessment applied in mathematics. What is important is that course designers select (or even formulate) principles to guide the design of assessments in their own contexts.

Principles, such as those proposed through REAP, help ensure that the educational purposes of assessment and feedback are clear and that they are grounded in what is known about good practice. Principles also make it possible to identify where the application of technology may add educational value. In line with the thinking in this section, the case studies in this publication have been benchmarked against the 12 REAP principles.

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<sup>3</sup> See JISC (2007) [Effective Practice with e-Assessment, p.38](#)

<sup>4</sup> As given in Nicol (2009) [Transforming Assessment and Feedback: Enhancing integration and empowerment in the first year](#), p.5, Scottish Quality Assurance Agency (QAA) for Higher Education

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**1 Help to clarify what good performance is (goals, criteria, standards)**

To what extent do learners on your course have opportunities to engage actively with goals, criteria and standards before, during and after an assessment task?

**2 Encourage 'time and effort' on challenging learning tasks**

To what extent do your assessment tasks encourage regular study in and out of class and deep rather than surface learning?

**3 Deliver high-quality feedback information that helps learners to self-correct**

What kind of teacher feedback do you provide, and in what ways does it help learners to self-assess and self-correct?

**4 Provide opportunities to act on feedback (to close any gap between current and desired performance)**

To what extent is feedback attended to and acted upon by learners on your course and, if so, in what ways?

**5 Ensure that summative assessment has a positive impact on learning**

To what extent are your summative and formative assessments aligned and supportive of the development of valued qualities, skills and understanding?

**6 Encourage interaction and dialogue around learning (peer-peer and teacher-learner)**

What opportunities are there for feedback dialogue (peer-peer and/or tutor-learner) around assessment tasks on your course?

**7 Facilitate the development of self-assessment and reflection in learning**

To what extent are there formal opportunities for reflection, self-assessment or peer assessment in your course?

**8 Give choice in the topic, method, criteria, weighting or timing of assessments**

To what extent do learners have choices in the topics, methods, criteria, weighting and/or timing of learning and assessment tasks on your course?

**9 Involve learners in decision making about assessment policy and practice**

To what extent are learners on your course kept informed or engaged in consultations regarding assessment policy decisions?

**10 Support the development of learning groups and learning communities**

To what extent do your assessment and feedback processes help to encourage social bonding and the development of learning communities?

**11 Encourage positive motivational beliefs and self-esteem**

To what extent do your assessment and feedback processes enhance your learners' motivation to learn and be successful?

**12 Provide information to teachers that can be used to help shape their teaching**

To what extent do your assessment and feedback processes inform and shape your teaching?

The 12 REAP principles of formative assessment and feedback<sup>4</sup>

'Don't ask what the technology can do for you, rather what the pedagogy needs.'

Gilly Salmon, Professor of e-Learning and Learning Technologies, University of Leicester



## Adding in technology: designing assessment in a digital age

**Understanding more about the close relationship between assessment, feedback and effective learning is the first step towards assessment practices that empower rather than inhibit learning. Technology offers a new perspective through which this relationship can be explored.**

This report proposes that technology should enhance assessment and feedback practices rather than replace highly valued strategies such as face-to-face tutorials. However, the greater scope offered by technology can add value to a wide range of assessment-related activities.

The technology may be designed for the purpose (such as on-screen assessment delivery systems or originality-checking software) or adopted from a pool of widely available generic software (such as Web 2.0 technologies) and familiar hardware (such as digital cameras or handheld devices). The range of available options is broad, and becoming broader.

Claims of potential value, however, need to be verified by research-based evidence. For technology to enhance assessment and feedback, it must add value to current practices, for example by making the experience of assessment more authentic or appropriate, by enabling learners to more effectively monitor and correct their own learning, by increasing the validity and efficiency of assessments or by improving the quality and timeliness of feedback.

Recent JISC projects and reports, combined with the case studies in this publication, indicate that particular benefits might be experienced in the following areas:

- **Dialogue and communication:** Online interaction via forums, blogs, email and voice boards can enrich feedback and help to clarify learning goals and standards. Distance and time constraints can be overcome.
- **Immediacy and contingency:** Interactive online tests and tools in the hand (such as voting devices and internet-connected mobile phones) can facilitate learner-led, on-demand formative assessment. Rapid feedback can then correct misconceptions and guide further study.
- **Authenticity:** Online simulations and video technologies can increase the discriminatory power of assessment and support risk-free rehearsal of real-world skills in professional and vocational education.
- **Speed and ease of processing:** Assessment delivery and management systems can provide instant feedback to learners and practitioners, yielding robust information for curriculum review and quality assurance processes. Interoperability standards can facilitate transfer of data between institutional systems.
- **Self-evaluative, self-regulated learning:** Activities such as peer assessment, collection of evidence and reflection on achievements in e-portfolios and blogs can generate ownership of learning and promote higher-order thinking skills, in turn improving performance in summative assessment.
- **Additionality:** Technology can make possible the assessment of skills and processes that were previously difficult to measure, including the dynamic processes involved in learning. Technology can also add a personal quality to feedback, even in large-group contexts, and, through efficiencies gained from asynchronous communication and automated marking, can enable practitioners to make more productive use of their time.



# The manager's perspective

**For institutional managers, the application of technology to assessment and feedback practices is likely to involve the following aims:**

- **Harnessing the potential in technology as part of a strategic vision for high-quality assessment**
- **Ensuring the validity, reliability and integrity of on-screen summative assessment**
- **Supporting and embedding changes in practice**

Recent JISC research offers some insights into progress made towards the achievement of these aims.

## **Harnessing the potential of technology**

Despite advances in assessment-related tools and systems, the 2009 [Review of Advanced e-Assessment Techniques](#) (RAeAT) indicates that a strategic approach to the use of technology in assessment is far from commonplace in higher education. Yet an institutional vision for technology in assessment and feedback practice is essential if technologies – both bespoke tools and systems and wider applications – are to become fully embedded, and used in educationally effective ways.



Case studies linked to the RAeAT report nonetheless indicate that computer-assisted assessment, if used appropriately, offers both efficiency gains and pedagogic benefits: on-screen testing, for example, provides a paperless system, improves the consistency of marking, offers flexibility over the timing of assessments and produces rapid feedback.

To widen understanding of the range of e-assessment techniques used in higher education, over 90 [advanced e-assessment projects](#) and initiatives have been recorded as part of the report. A strategic overview of assessment and feedback practices within individual institutions can help identify where a sound business or educational case can be made for implementing such developments.

## **High-quality on-screen summative assessment**

When on-screen testing is applied to a summative high-stakes context, the reliability and validity of test design, the security of systems and effectiveness of administrative procedures come under close scrutiny. The 2009 JISC [Report on Summative e-Assessment Quality](#) (REAQ) provides a comprehensive overview of quality issues in relation to on-screen testing, including:

- What constitutes high-quality on-screen assessment
- The combination of human, physical and technical resources needed to support delivery
- Changes to systems and procedures
- The need to address psychometrics (validity, reliability), pedagogy (mapping to intended learning outcomes) and practical issues (security, accessibility)

‘Long ago, people thought through all the issues to do with paper-based summative assessments. We have good practice procedures for these types of tests. Now all that thinking needs to be done again for e-assessments.’

Helen Ashton, Head of e-Assessment, SCHOLAR programme, Heriot-Watt University

One example of the issues the report covers is the shift in the timing of workload between paper-based and on-screen testing. While marking and collation of data occur almost instantly in an online assessment system, activities in advance of an assessment – test development, technical trials, provision of appropriately resourced test environments, and training of staff – require careful planning.

However, once established, on-screen testing creates a bank of reusable resources and provides reliable information on the effectiveness of learning and teaching. Time saved by more efficient management of assessment can also be used to support individual learners or improve curriculum design in subsequent years.

<sup>5</sup> See [Effecting Sustainable Change in Assessment Practice and Experience](#) (ESCAPE)

### To support and embed changes in practice, curriculum managers should:

- Raise awareness of the link between assessment and feedback practices and effective learning
- Promote discussion of sustainable and transferable ideas – not all technology-supported practices place demands on resources<sup>5</sup>
- Forge links between strategic drivers for change and grassroots innovations
- Provide evidence of the benefits of technology-enabled practice
- Make full use of data from computer-assisted assessment for quality assurance and curriculum review

## James Johnstone Senior Lecturer in Sports Studies, University of Hertfordshire

**In 2009, when I became a module leader on the BSc Sports Studies programme, student achievement on the module was assessed by four written assignments and a final examination. The workload was heavy – both for students and staff. Unsurprisingly, student engagement was low.**

Redesigning the module’s assessment structure became a priority. We now divide students into groups of four or five and set them the task of producing a wiki (within time constraints and in the format of a scientific report) on the university’s Managed Learning Environment.

At the first stage of assessment, a group mark is awarded for the introduction which also credits the quality of the student’s interactions with other group members, a component that carries low weighting but prevents underperforming students from sheltering

behind their peers. The introduction is returned with feedback, revised and resubmitted.

Responding to feedback is an important skill in the sports industry, so the next stage of marking reflects the extent to which the introductions have developed beyond the first draft stage. The remaining sections of the report are then submitted and anonymous peer assessment brings about a final differentiated grade for each student.

It’s the first year of the new structure, but it’s been a win-win experience for all of us. The whole process is paperless: the reports are written, submitted, marked, moderated and returned with feedback online. Students are more engaged and supportive of one another, and I have to wonder why we ever thought marking 250 individual papers was an appropriate way to assess this module.

## Voices on assessment and feedback



# The practitioner's perspective

For practitioners, technology offers some notable benefits such as:

- Opportunities to design richer, more interactive assessment and feedback
- Increased efficiency and reduced workload
- Wider variety of techniques to engage and support the diverse needs of learners

JISC research has explored the potential in technology to provide both effectiveness and efficiency gains in the design and delivery of assessment and feedback.

## Enhancing formative assessment

The 2009 JISC report [Scoping a vision for formative e-assessment](#) (FEASST) used the expertise of experienced e-assessment practitioners to identify a set of requirements for the design of future tools and technologies.

The project proposes the concept of 'moments of contingency' as a pivotal factor in making assessment formative. These are critical points in the teaching and learning process where the flow of instruction cannot be predetermined. Technology does not create these moments but can enable spontaneous change to occur through affordances which can be exploited in the assessment design – for example, harnessing the portability of mobile phones to capture images of a learning experience that can be used later to prompt reflection on what has been learnt.

Increased interactivity is another key benefit that technology offers in formative assessment. Examples described in **Effective Assessment in a Digital Age** range from simple VLE-based quizzes to complex designs that allow learners to interact with a question in stages and receive instant feedback aligned with their current level of understanding. The motivational quality of such assessments is now well [documented](#).

## Increasing efficiency and reducing workload

Evidence from the 2009 JISC [Review of Advanced e-Assessment Techniques](#) (RAeAT) report suggests that computer-assisted assessment can have strong pedagogic benefits, while alleviating the burden on academic staff. Automatic marking by a computer-based assessment system, for example, makes it feasible to assess learners' progress more frequently; misconceptions can be more rapidly addressed, plagiarism checks applied and marking consistency improved.

The report also highlights an additional gain – the 'e' factor, ie aspects that would be impossible to reproduce in paper-based versions, such as animated diagrams and rich media, which add authenticity to the experience of assessment.



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<sup>6</sup> Davies. P. (2000) Computerised Peer-Assessment, *Innovations in Education and Training International (IETI)*, 37,4, pp. 346–355

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## ‘Technology doesn’t solve everything but it enables me to do something about it.’

Mark Russell, Deputy Director, Blended Learning Unit, University of Hertfordshire

In addition, technology-enabled assessment practices allow practitioners to interact with learners in ways that would otherwise be impossible due to pressures of time and numbers. Technologies such as voting systems, online discussion forums, wikis and blogs allow practitioners to monitor levels of understanding and thus make better use of face-to-face contact time. Delivery of feedback through digital audio and video, or screen-capture software, may also save time and improve learners’ engagement with feedback.

### Wider variety of techniques

Technology extends the options available to designers of assessment and feedback, making it possible to vary the approach taken within a module or programme of learning. The use of different formats and media, combined with elements of peer and self-assessment, can both encourage learners to spend time on tasks and prompt original thought.

### To support and engage learners, practitioners should:

- Engage the interest of learners through a variety of assessment strategies
- Meet the diverse needs of learners through alternative assignment formats, for example multimedia-enhanced presentations, audio and video podcasts
- Increase learners’ capacity to self-assess through assessing each other’s work – online tools such as WebPA have made peer assessment a more feasible option
- Exploit technologies such as e-portfolios to evidence skills of reflection and self-assessment
- Design assignments in ways that encourage original thought and [minimise opportunities for cheating](#)

## “ Phil Davies Senior Lecturer in Computing and Mathematical Sciences, University of Glamorgan

“ For some time, I have been using the CAP (computerised assessment by peers) system<sup>6</sup> developed at the University of Glamorgan. Recently, I extended the system to introduce peer and self-assessment into an assignment based on digital story-telling.

Story-telling is one of the oldest methods of transmitting knowledge but still proves a challenging assignment. Students have to know their topic well to tell the story in a powerful and accurate way; to bring to life a particular viewpoint on the topic requires real engagement.

Computing students studying a module on e-learning produce a five-minute presentation (with full academic referencing) on web accessibility standards and colour

blindness. The presentation must be given from the viewpoint of a colour-blind person, inform about the disability, but also show the impact colour blindness has on that person’s life. In the process, students also demonstrate their multimedia skills.

After submission, presentations are available for peer review in a shared folder on the network. After looking over their peers’ work, students submit a self-assessment using the CAPODS (computerised assessment by peers of digital stories) system. Only then do they use the system to assess and give feedback to their peers – after completing their own self-assessment, they are much more thoughtful about the feedback they give to others. ”

## Voices on assessment and feedback

# The learner's perspective

**Technology can make a significant difference to learners' experience of assessment and feedback.**

**Recent JISC research suggests gains in:**

- **Access, choice and diversity**
- **Quality and effectiveness of feedback**
- **Development of graduate attributes and employability skills**

## **Access, choice and diversity**

The [Learner Experiences of e-Learning](#) theme of the JISC e-Learning programme provides a valuable insight into the needs and preferences of learners in a digital age.

Findings presented in the [Responding to Learners Pack](#) (JISC, 2009b) indicate that learners have high expectations of institutional learning environments yet enjoy the flexibility of using their own personal technologies to develop assignments at times and in places of their own choice. Learners also value the chance to become partners in assessment design and, where possible, enjoy demonstrating their command of creative media in their assignments.

Projects funded under the [JISC TechDis HEAT scheme](#) illustrate that a more inclusive approach to assessment can benefit all learners while still enabling those with different learning preferences to demonstrate with flair and creativity what they know and can do. A choice of written, audio or video presentations featuring different perspectives on a topic, for example, encourages a deeper level of enquiry while also offering learners greater control over how they are assessed. Equally, online technologies and simulations used in the workplace or within distance and blended modes of learning provide richer and more authentic experiences of assessment, at the same time benefitting learners disadvantaged by traditional written formats.

However, it cannot be assumed that learners' increasing familiarity with technology translates into skilful and appropriate work in an academic context. [Information and digital literacy skills](#) form a key part of pre-assessment guidance, and the chance to become familiar with technology used in high-stakes assessments should be provided through a range of formative assessment opportunities.

## **Quality and effectiveness of feedback**

Many learners find feedback via digital audio and video more detailed and helpful. In contrast, written feedback is perceived as brief, unclear and difficult to recall. A more personal approach to feedback adds value to learners' experience of higher education, as is demonstrated by several [recent JISC-funded projects](#).

Assessment and feedback by peers is also valued: learners find that anonymous [online peer assessment](#) develops skills of self-appraisal and makes the assessment of group work fairer.



‘Currently, how feedback is structured means that [students] get a few handwritten comments at the end of an assessment that doesn’t really reflect how they can improve in the future. Students just want to have engagement with their tutors... to become better students.’

Kate Wicklow, Student Feedback Officer, National Union of Students

## Communication and skills development

The 2008 [JISC study on the role of e-portfolios in formative and summative assessment](#) reveals uniformly positive responses from learners towards the use of e-portfolios in assessment.

Apart from the convenience and organisational advantage of working within an online personal space, interaction with tutors and peers was seen as a key benefit: learners appreciated being able to receive just-in-time personal feedback through the communication tools within e-portfolio systems and, through selecting and presenting material in portfolios for different audiences, acquired skills relevant to their long-term learning goals, ranging from IT proficiency to skills of reflection and synthesis.

## To perform better in their studies, learners want to:

- Study in institutions that place a high priority on learners’ experience of assessment and feedback
- Be guided in their learning by practitioners who exploit technologies to make learning, teaching and assessment more effective and efficient
- Have opportunities through technology-enhanced practice to become confident, self-regulating learners
- Become partners in the design of technology-enhanced assessment and feedback

## Bev Panto WikiMaster, WikiVet

**WikiVet is an online wiki-based information source for vets developed by the Royal Veterinary College and veterinary schools in three UK universities. As with Wikipedia, content can be added and edited, but unlike Wikipedia, access and editing rights are restricted to the veterinary community, and the content is entirely based on the veterinary science curriculum.**

WikiVet draws on the knowledge of a wide range of experts, including international specialists, and content is passed for use only after three stages of peer and expert review. It is essential for vets to update and check their knowledge, so formative assessments in the form of interactive multiple-choice quizzes with expert feedback are an important element of the site.

Successful students, who understand better than anyone what is needed, have played an important role in the design of the quizzes.

The most inspiring thing for me about WikiVet is that, while providing quality assurance through the involvement of academic experts, it also draws on the wealth of skills, experience and enthusiasm that students have to offer. For students, this is an all-too-rare opportunity to take an active part in the creation of resources for formative learning and assessment. ●

[WikiVet](#) is a collaborative initiative involving UK veterinary schools with support from the Higher Education Academy and JISC funding.

## Voices on assessment and feedback

'As technology continues to develop in all spheres of life, this not only increases its potential for use within the lecture room and beyond – but also our expectation that this will happen.'

National Student Forum Annual Report 2009



# Understanding assessment and feedback in a digital age

**Case studies of real-world practice increase understanding of the relevance of new approaches and shed light on the processes involved in bringing about change. Importantly, case studies prompt reflection on how best to move forward in your own context.**

The aim of the case study section of this publication is therefore two-fold: to demonstrate how technology can enhance assessment and feedback in terms of learning quality and teaching efficiencies, and to stimulate debate as to the future direction of your own practice. The case studies thus provide a platform for:

- Building understanding of the different rationales for change – why should existing practices be revised?
- Exploring current examples of technology-enhanced assessment and feedback practices – what is available?
- Providing evidence of benefits and challenges – what needs to be taken into account when implementing change?
- Prompting questions – would we do some things differently?
- Supporting the process of change – what can be used, adapted or replicated in our context?

The case studies also reveal many of the processes involved in embedding technology in assessment and feedback practices. Embedding good practice across a department, faculty or institution is a gradual process that involves:

- Strategic decision making about goals and aspirations
- Applying principles of effective assessment and feedback to new developments
- Researching into learners' experiences to identify areas of priority

- Recognising potential barriers to implementation
- Designing individual practices that exploit technology for learning and/or efficiency gains
- Evaluating and sharing lessons learnt to refine subsequent applications of technology

Although individual case studies may illustrate only some of the above elements, in total the case studies provide a more detailed account of what is entailed in implementing technology-enhanced assessment and feedback practices. The case studies should thus be read in sequence.

As instances of real-world practice, the selected examples naturally reflect the context in which the tools and technologies were adopted or developed and the practice initiated. Nonetheless, an understanding of the close relationship between learning and assessment and feedback practice is explicitly or implicitly evident in each case study, underpinning the importance of taking a principles-based approach to the integration of technology into assessment and feedback practices.

Accordingly, Table 2: Enhancing assessment and feedback with technology highlights the key features and themes in the case studies and interprets these in relation to the 12 REAP principles of effective assessment and feedback.

To assist readers, the tools, systems and technical terms used in the case studies are explained in the **Glossary**. More detailed versions of the case studies are available online.

# Enhancing assessment and feedback with technology

## Components of effective practice

Component	Case study	Summary	Learners and learning context
The institution places a high priority on learners' experience of assessment and feedback	<b>Case study 1</b> Putting assessment at the heart of learning University of Glamorgan	An institutional vision for assessment is embedded into policy and practice	Full- and part-time undergraduate and postgraduate students; campus-based and mixed-mode learning
	<b>Case study 2</b> Planning and delivering high-stakes computer-assisted assessment University of Southampton	Careful planning and appropriate support and infrastructure facilitate the delivery of high-stakes computer-assisted assessment	Full- and part-time undergraduate students of nursing and midwifery; campus-based learning
	<b>Case study 3</b> Supporting the transition to degree-level study Loughborough College	Technology-enabled tutorial processes integrate learners into a culture of effective undergraduate learning	Full- and part-time Foundation degree and BSc Honours students of sports science; campus-based and mixed mode delivery in further education
Tutors exploit technologies to make learning, teaching and assessment more engaging, effective and efficient	<b>Case study 4</b> Designing interactive assessments to promote independent learning The Open University	Interactive computer-assisted formative and low-stakes summative assessments lay the foundation for independent learning	Level 1 science students; online distance learning
	<b>Case study 5</b> Making the most of a computer-assisted assessment system University of Manchester	A computer-assisted assessment management and marking system improves the quality and accuracy of assessment	Overseas students; on-entry English language diagnostic testing; campus-based and online learning

Table 2: Enhancing assessment and feedback with technology



Themes	Relevant REAP principles	Technologies
<p>Technology supports research into learners' views on assessment and feedback</p> <p>Research findings prompt exploration of new approaches</p> <p>Online assessment diary balances learners' workload</p>	<p>9. Involve learners in decision making about assessment policy and practice</p> <p>12. Provide information to teachers that can be used to help shape their teaching</p> <p>2. Encourage 'time and effort' on challenging learning tasks</p>	<p>Blackboard®</p> <p>Facebook®</p> <p>Microsoft® Access®</p> <p>QuestionMark™</p> <p>Perception™</p> <p>Turnitin®</p>
<p>Attention to the quality of on-screen summative assessment ensures validity and reliability</p> <p>Aligned online summative and formative assessment benefits learning</p>	<p>5. Ensure that summative assessment has a positive impact on learning</p>	<p>QuestionMark</p> <p>Perception</p>
<p>Technology supports tutorial guidance on good academic practice</p> <p>Learning is facilitated by formative online quizzes</p> <p>Learners use blogs to share digital resources</p>	<p>1. Help to clarify what good performance is</p> <p>2. Encourage 'time and effort' on challenging learning tasks</p> <p>10. Support the development of learning groups and learning communities</p>	<p>Hot Potatoes™</p> <p>Mahara</p> <p>Moodle™</p> <p>Quia Web</p> <p>Turnitin</p>
<p>Learners complete assessments at times and in places to suit them</p> <p>Differentiated levels of online feedback address learners' individual needs</p> <p>Feedback directs learners to course resources so they can self-correct</p> <p>Online system enables tutors to track the progress of learners in large groups</p>	<p>8. Give choice in the topic, method, criteria, weighting or timing of assessments</p> <p>3. Deliver high-quality feedback information that helps learners to self-correct</p> <p>4. Provide opportunities to act on feedback</p> <p>12. Provide information to teachers that can be used to help shape their teaching</p>	<p>OpenMark</p>
<p>Computer-marked assessment data provides efficiency gains and evidence for quality and curriculum review processes</p> <p>Computer-marked short-answer free-text questions identify learners' support needs</p>	<p>5. Ensure that summative assessment has a positive impact on learning</p> <p>12. Provide information to teachers that can be used to help shape their teaching</p>	<p>Assess By Computer (ABC), Assessment21 Ltd</p>

continued overleaf

continued from pages 26–27

Component	Case study	Summary	Learners and learning context
	<b>Case study 6</b> Enhancing the experience of feedback University of Leicester	Audio-recorded feedback and podcasts give work-based learners access to personalised guidance anytime, anywhere	Master's degree students of occupational psychology; work-based distance learning
	<b>Case study 7</b> Facilitating peer and self-assessment University of Hull and Loughborough University	WebPA, an online peer assessment tool, enables learners to develop skills of self-assessment by evaluating peers' contributions to group work	First-year undergraduate students of biology and chemistry; campus-based learning
<b>Opportunities exist to develop skills of self-regulation at all stages of learners' higher education experience</b>	<b>Case study 8</b> Reflecting on feedback University of Westminster	An online system prompts reflection on feedback and enhances dialogue between learners and personal tutors	First-year undergraduate students of life sciences; campus-based learning
	<b>Case study 9</b> Assessing my own professional performance St George's, University London	Medical students develop clinical decision-making skills by means of virtual patient software	Undergraduate- and postgraduate-entry medical students; campus-based learning
	<b>Case study 10</b> Assessment in an authentic learning context University of Strathclyde and Northumbria University	Interviews skills of trainee solicitors are assessed by standardised clients and captured on video for reuse in learning	Postgraduate students of law; campus-based learning

Table 2: Enhancing assessment and feedback with technology



Themes	Relevant REAP principles	Technologies
<p>Feedback is made richer and more personal by audio recording</p> <p>Podcasts facilitate access to tutor guidance</p>	<p>3. Deliver high-quality feedback information that helps learners to self-correct</p> <p>1. Help to clarify what good performance is</p>	<p>Audacity®</p> <p>Blackboard</p> <p>Wimba Voice™</p>
<p>Learners set own criteria to assess others' work on group assignments</p> <p>Assessing others helps learners to self-monitor</p> <p>Learners engage in discussions that promote understanding of assessment objectives</p>	<p>8. Give choice in the topic, method, criteria, weighting or timing of assessments</p> <p>7. Facilitate the development of self-assessment and reflection in learning</p> <p>6. Encourage interaction and dialogue around learning</p>	<p>WebPA</p>
<p>Learners use an online tool to reflect on the process of assignment production</p> <p>Learners respond to their feedback in online learning logs</p> <p>Personal tutors use learning logs in discussions about learning</p>	<p>7. Facilitate the development of self-assessment and reflection in learning</p> <p>4. Provide opportunities to act on feedback</p> <p>6. Encourage interaction and dialogue around learning</p>	<p>Blackboard</p> <p>Google™ Apps</p> <p>Microsoft SQL Server®</p> <p>RSSBus Data Provider™</p>
<p>Virtual patients enable self-correction in clinical decision making</p> <p>Learners advise on designs of virtual patients</p> <p>Virtual patients provide motivational opportunities for learning by trial and error</p>	<p>7. Facilitate the development of self-assessment and reflection in learning</p> <p>9. Involve learners in decision making about assessment policy and practice</p> <p>11. Encourage positive motivational beliefs and self-esteem</p>	<p>Moodle</p> <p>OpenLabyrinth</p> <p>vpSim</p>
<p>Video replay enables learners to identify how far current performance meets desired goals and standards</p> <p>Video recordings enable learners to reflect on their performance and make improvements</p> <p>Simulation of real-world practice motivates learning</p>	<p>1. Help to clarify what good performance is</p> <p>7. Facilitate the development of self-assessment and reflection in learning</p> <p>11. Encourage positive motivational beliefs and self-esteem</p>	<p>Digital video technologies</p> <p>SIMPLE</p> <p>PebblePad</p>

# Putting assessment at the heart of learning

## University of Glamorgan

### Challenge

The University of Glamorgan's Centre for Excellence in Learning and Teaching (CELT) commenced a process of embedding assessment and feedback practice in line with the university's strategic vision of 'assessment FOR learning', following a [Change Academy](#) project mentored by the Higher Education Academy.

### Taking advantage of technology

CELT utilised a number of technologies when taking forward the aims of the Change Academy project, illustrating the wide range of tools available for use in assessment-related activities in higher education.

For example, although student representation on decision-making committees has long been established practice at the University of Glamorgan, a wider sample of students' views was sought via Facebook and online surveys developed in QuestionMark Perception. Using the outcomes of both technology-enabled and face-to-face research strategies, a database of evidence was assembled to inform and support change.

Following the research, participating faculties redesigned assessments to better engage students' interest and to align assessment strategies more closely with the university's blended approach to curriculum delivery.

Examples of technology-enhanced designs include sharable digital resources created in preparation for teaching practice (a credit-bearing assignment undertaken by students in the first term of an early-years education degree course) and a digital story-telling assignment involving online and peer

review (an assignment on an e-learning module taken by computing students). These and other innovative approaches to assessment have been assembled into an updatable handbook of effective practice available to all faculties via the VLE, Blackboard.

The timing and management of assessments has also benefitted from the application of technology. In response to students' requests for a more even workflow, module leaders in psychology entered all assignments into an Access database to form an assessment diary that made it possible to identify peaks and troughs in workload in different combinations of modules. Assignments could then be rescheduled or redesigned to enable feedback to be delivered on time and effort to be more evenly distributed. The diary has since been located on Blackboard and extended to all modular programmes in the university.

### Reflecting on the REAP principles

How might you use technology to involve learners in decision making about assessment policy and practice?



'It would be better if... there were different ways of assessing, rather than just all coursework and exams at the end... You do get quite enthusiastic about the first one or two, but when it gets to the fourth one, it does become so mundane and so dull.'

Student, University of Glamorgan

## Background

During 2008–2009, two faculties at the University of Glamorgan – the Cardiff School of Creative and Cultural Industries and Humanities and Social Sciences – took part in the one-year Change Academy project to revitalise assessment and feedback. The project has since been extended across all faculties.

## Transforming assessment practice

Initial research conducted by CELT revealed some inconsistency in students' experience of assessment. The assessment loading on first-year courses varied significantly and the timing of assignments did not allow students or tutors to manage their workloads efficiently. Students taking different modules simultaneously could find that assignments came in 'bunches' – a light workload, or even no assignments at all, during the first semester would often be followed after Christmas by multiple assignments with similar deadlines.

Students were often unclear about how assignments related to course outcomes and, because of bunching, were unable to use feedback from previous assignments to improve their grades. Most importantly, students at all levels of achievement wanted to know how they could improve their work:

*'I find that a real struggle [to know how to improve]... it would be nice to know what I need to do to get a first.'* Student, University of Glamorgan

To change assessment and feedback practice, CELT adopted a number of strategies. These included generating debate around the research findings, highlighting and sharing examples of good practice via the VLE, appointing faculty champions and acknowledging even small steps towards improved practice.

A key approach in the management of change has been to recognise that the most appropriate assessment strategies often come from the grassroots level; faculties and even individual tutors should be able determine what is best for

their context. (This finding has particular relevance to the adoption of technologies which may have greater benefits in one subject discipline than another.) Developments that are more widely applicable, however, can be disseminated university-wide. For example, a key outcome from the Change Academy project has been seamless access via the VLE to all assessment-related information and tools.

Another gain from the project has been the high status accorded to the 'student voice'; the database of evidence about assessment and feedback collected by the CELT team continues to challenge embedded practices and enable the development of assessment and feedback practice that supports rather than inhibits learning.

## Key points for effective practice

- A top-down strategic vision for assessment needs to be combined with faculty-based approaches to change
- Learners' views on assessment and feedback provide a valuable evidence base from which to implement technology-enhanced change

## Final word

Enhancing practice faculty by faculty takes account of the different requirements of subject disciplines and the varied needs of students. Innovations that are applicable across the disciplines can be shared via a VLE, an online forum or social networking platform such as Ning.

For detailed case studies, visit [www.jisc.ac.uk/digiassess](http://www.jisc.ac.uk/digiassess)



See also the video clip:  
Enhancing graduate attributes  
[www.jisc.ac.uk/assessresource](http://www.jisc.ac.uk/assessresource)

# Planning and delivering high-stakes computer-assisted assessment

University of Southampton

## Challenge

**Numbers on pre-registration and undergraduate courses in the School of Health Sciences at the University of Southampton are high; up to 600 students may take modules common to a range of first-year courses. Where the content of the modules is appropriate, on-screen assessment can make assessment processes more efficient, but the quality of computer-based delivery then becomes a high priority.**

## Taking advantage of technology

In the context of a factually based discipline and large cohorts, computer-assisted summative assessment reduces the time students spend in the examination room and eases the burden of marking for tutors. Computer-assisted assessment also provides institutional benefits such as consistently standardised marking and easier production of data for quality assurance and review purposes.

Pedagogic benefits can also be experienced if the assessment forms part of a coherent strategy to enhance learning. Formative assessments involving multiple-choice questions or short free-text answers offer anytime, anywhere opportunities for students to regulate their own learning and, with skilful design, can do more than test factual knowledge: for example, multiple-choice questions allied with challenging scenarios can test with some efficacy how far students have met higher-order learning objectives.

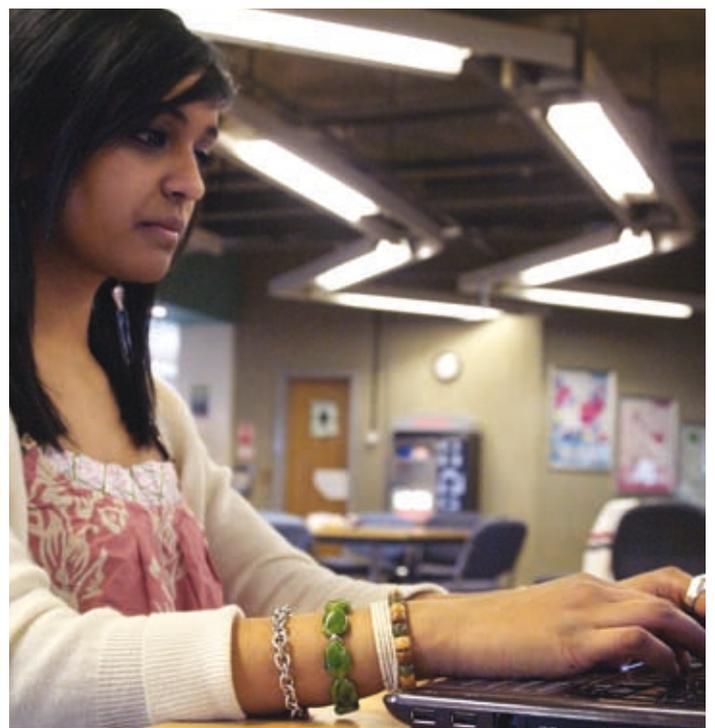
Where students make extensive use of technology in their learning – for example, by accessing resources, taking formative tests and submitting assignments online – it seems logical that at least some aspects of the curriculum are assessed by computer. The 2009 JISC [Report on Summative e-Assessment Quality](#) (REAQ) provides evidence that some students prefer to take assessments on a computer, because

they are more familiar with using a keyboard than writing longhand.

The report also highlights an additional gain: the 'e' factor ie aspects of computer-assisted assessment that would be time-consuming or impossible to reproduce in paper-based tests. These include animations and rich media, which add authenticity to the experience of assessment. Immediate, quality-assured feedback in formative assessment is a further advantage from computer-assisted assessment noted in the report.

## Reflecting on the REAP principles

How can you ensure that summative assessment has a positive impact on learning in your context?



‘Have a clear vision about what you are trying to do and why. Computer-assisted assessment is a different way of working and will affect many other aspects of the course... Having said this, we would not go back to paper-based tests.’

Helena Knowles, Senior Lecturer, School of Health Sciences, University of Southampton

## Background

The School of Health Sciences at the University of Southampton experimented with the use of QuestionMark Perception for formative assessment before applying the system to summative assessment in 2007–2008. The School has been supported in this initiative by the iSolutions team – a centralised service covering IT facilities.

## Transforming assessment practice

Over five years, iSolutions, in conjunction with the School of Health Sciences, has established procedures for the delivery of high-stakes computer-based assessments, addressing issues such as the security and reliability of the infrastructure and the logistical management of large-scale high-stakes computer-based assessment.

The process of ensuring quality starts some time in advance of test delivery, when post-test analysis from the previous year leads to the removal or rewriting of some questions and new questions are reviewed internally and by external examiners. Authoring questions for summative tests requires advanced-level skills for which academic tutors may need technical and pedagogic support, so the School works closely with iSolutions and the Learning and Teaching Enhancement Unit at the university to ensure the validity and usability of questions.

iSolutions’ protocols require academic authors to forward questions two to three weeks before an assessment is due to be taken, so that mechanical checks can confirm that questions perform correctly. Once a test is uploaded, iSolutions forwards the link to the academic team to check again that every aspect operates as intended. Adhering to an agreed sequence of actions is essential for reliability:

*‘Everyone needs to know their role, and when something needs to happen.’ Bill Warburton, CAA Officer, iSolutions, University of Southampton*

Students routinely use formative assessments devised in QuestionMark Perception, and take at least one practice

assessment in the same design and format to be used in summative assessment. On the day of the test, technical assistants support invigilators at test locations. Policies and procedures for computer-assisted assessment are closely aligned with regulations laid down by the university’s examinations office, and invigilators are expected to be familiar with, and able to enforce, both sets of guidelines.

Issues of authentication, security and integrity are often associated with high-stakes computer-based assessment. However, iSolutions has increasing confidence in both its procedural and technical systems. Checks on the identity and status of students, plus the use of encryption software, are minimising concerns over security and authentication. Technical breakdowns have also become less common as networks mature.

## Key points for effective practice

- **Alignment between methods of formative and summative assessment enables learners to progress with confidence**
- **High-quality summative computer-assisted assessment demands investment in infrastructure and staff expertise**

## Final word

Computer-assisted assessment requires as much attention to quality as traditional assessment. In compensation, the burden of marking and data management is reduced, and more rapid results yield pedagogic as well as institutional gains.

For detailed case studies, visit [www.jisc.ac.uk/digiassess](http://www.jisc.ac.uk/digiassess)



See also the podcast by Professor Don Mackenzie [www.jisc.ac.uk/assessresource](http://www.jisc.ac.uk/assessresource)

## Supporting the transition to degree-level study

### Loughborough College

#### Challenge

**Students commencing a degree course may have limited experience of the values and protocols associated with academic study at this level; alongside skills of information handling and academic referencing, students need to work collaboratively, reflect on their own and others' performance and increasingly manage their own learning. One of the first tasks for tutors is to establish a culture of sound academic practice. Institutional practices need to support the development of these skills.**

#### Taking advantage of technology

With assistance from the college's information and learning technologies (ILT) team, tutors on sports, exercise and fitness courses at Loughborough College combine technology with face-to-face strategies to help students make a successful transition into higher education.

All students have log-ins to LearnZone (the college's customised version of Moodle), which gives access to module and assignment information, online resources and formative assessments, and enables online submission of work via the assessment management and plagiarism-checking tool Turnitin. Once completed, all assignments are converted to PDF format and submitted via the Turnitin system, in which marking, moderation and return of assignments also take place.

Sport specialists understand the importance of personal motivation and formative tests and quizzes encourage students to take charge of their own learning. The interactive, anytime anywhere nature of the online formative assessments imparts a sense of control over the pace and timing of learning and promotes independent learning skills.

A further dimension in technology-supported approaches to assessment comes in the form of the Mahara e-portfolio system which is used for assessed individual and group activities. Students on work placements, for example, gain credit for exploring links between their theoretical knowledge and their experiences in the workplace, using the blogging tool in Mahara to record their reflections. Mahara also supports group research activities for a dissertation, in the process helping to build an online learning community that integrates students into the new and challenging environment of a degree course.

#### Reflecting on the REAP principles

To what extent is technology used in your context to clarify course goals and standards for learners?



'I like seeing my feedback online as it keeps it private and allows me to store it for future use without worrying about losing it.'

Foundation degree student, Loughborough College

## Background

Loughborough College's sports courses include a two-year Higher National Diploma and three Foundation degrees. A one-year BSc top-up programme is also available to students who have been successful in any of the two-year options.

During induction, students are introduced to the text-matching tool, Turnitin, and receive guidance on referencing skills and academic writing. The importance of academic integrity is then reinforced via the tutorial system. In addition, in the early stages of the Foundation degree courses, a 20-credit module, Personal, Professional and Academic Development, establishes the protocols associated with academic study.

## Transforming assessment practice

Technology now plays a key part in establishing a culture of effective undergraduate learning at Loughborough College.

In 2009, a paper-free system was introduced, enabling all activities associated with the assessment of assignments – submission, plagiarism checking, marking, moderation and verification – to take place online in Turnitin. Students submit assignments via Turnitin and, when assignments are marked and ready to view, log into the VLE, Moodle, to see their feedback and grades via the link to Turnitin. (Online moderation has only occurred so far on the BSc top-up course, but wider use is planned.)

Both subject tutors, who initially found it challenging to mark assignments and give feedback online, and students have come to appreciate the greater consistency of marking and easier access to feedback that the online system has introduced:

*'Turnitin enables feedback to be accessed quickly and more easily... so I can make the changes needed to improve my next piece of work.'* Foundation degree student, Loughborough College

Formative learning aims to embed skills of independent learning as well as instil good academic practice. While modules on the sports science Foundation degree courses

typically provide 10–12 weeks of lectures and seminars, not all of these take place face to face, and when a seminar is delivered remotely, Hot Potatoes and Quia quizzes are available anytime, anywhere on the VLE to enable students to assess their independent learning. Immediate results help students identify gaps in their knowledge and understanding.

A personal online technology such as an e-portfolio system offers further opportunities for the assessment of learning. The BSc students use the blogging tool in the Mahara e-portfolio system to explore links between their theoretical knowledge and their experiences while on work placement; they also support one another via the e-portfolio blogging tool when researching for their dissertation. By setting up their own blogs, students can upload and share digital resources such as RSS feeds, YouTube clips, online journals, newspaper articles and websites.

## Key points for effective practice

- Technology has a key role to play in establishing a culture of effective learning
- Technology-enabled approaches to assessment engage learners and encourage time to be spent on challenging tasks

## Final word

Technology adds an extra dimension in the establishment of effective learning, complementing rather than replacing traditional approaches such as face-to-face induction and personal tutorials.

For detailed case studies, visit

[www.jisc.ac.uk/digiassess](http://www.jisc.ac.uk/digiassess)



See also the podcast by Dr Mark Russell

[www.jisc.ac.uk/assessresource](http://www.jisc.ac.uk/assessresource)

# Designing interactive assessments to promote independent learning

The Open University

## Challenge

In a distance learning context, it is especially important that students receive high-quality feedback to enable them to progress with confidence. As a result, value has to be placed on the degree of interactivity in online formative assessments and on the immediacy and appropriateness of the feedback that students receive.

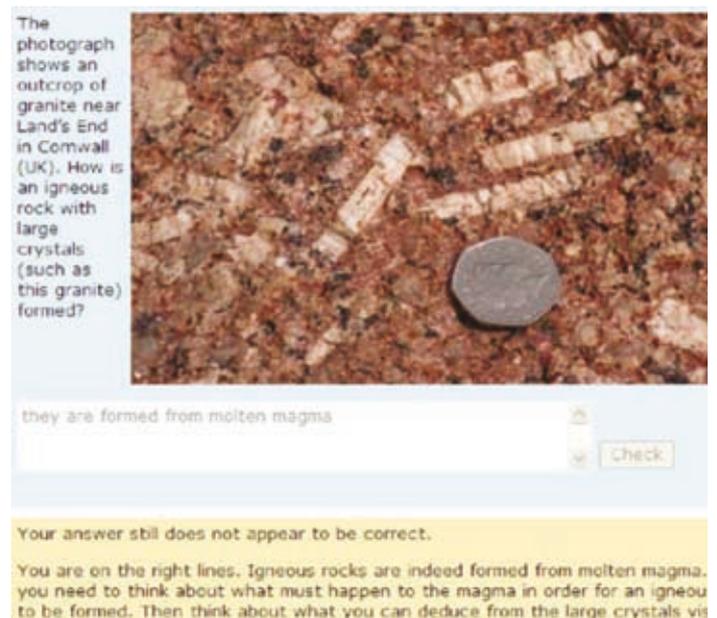
## Taking advantage of technology

The Centre for Open Learning of Mathematics, Science, Computing and Technology (COLMSCT) has led an initiative to embed interactive computer-marked assessments (iCMAs) in many of the Open University's distance learning courses. The iCMAs, such as those used on the interdisciplinary science course S104: Exploring science, are designed to:

- Increase learning potential through differentiated levels of feedback
- Inspire confidence and motivate learning
- Enable students to self-correct and pursue new lines of enquiry

The Open University's OpenMark assessment system, which supports the development and use of iCMAs matches students' answers with predicted responses, assesses whether answers are right or wrong, gives increasing levels of feedback with each wrong attempt, and directs students to relevant aspects of their course materials when necessary.

After each attempt, students receive immediate feedback – the timeliness of feedback is crucial to successful learning. Both question and answer are visible on one screen to allow students to make connections between the two elements. Correct responses usually score 100% at the first attempt, with lower percentages awarded for correct responses at the second or third attempt.



The photograph shows an outcrop of granite near Land's End in Cornwall (UK). How is an igneous rock with large crystals (such as this granite) formed?

they are formed from molten magma

Your answer still does not appear to be correct.

You are on the right lines. Igneous rocks are indeed formed from molten magma, you need to think about what must happen to the magma in order for an igneous rock to be formed. Then think about what you can deduce from the large crystals visible in the photograph.

Question designs ensure that students work out the answers for themselves using knowledge derived from course materials; selecting items from a list of uncontextualised multiple-choice options is discouraged. Instead, students become engaged in an interaction with the question which extends learning rather than merely checking what the student does or does not know.

OpenMark, a freely available, open source system, can support a range of question formats including free-text entry of up to 20 words. Trials in 2009 have shown OpenMark's answer-matching capability in short-answer free-text questions to be on a par with other options.

### Reflecting on the REAP principles

What policies are applied in your context to ensure that formative assessment provides feedback that enables learners to self-correct?

'I enjoy the challenge of the iCMAs and particularly like knowing instantly whether I am right or wrong. I found these very useful in highlighting weaknesses that require further study.'

Student, S104: Exploring science, The Open University

## Background

S104: Exploring science is a level 1 course that offers a broadly based introduction to science and attracts around 4000 students a year.

The delivery of S104 is by paper-based course texts and DVDs, with peer and tutor support available to students via an online forum and email. The course is assessed by both computer- and tutor-marked assignments: eight iCMAs, each containing ten questions, operate in a summative but low-stakes capacity alongside seven tutor-marked assignments. At the end of the course, a synoptic tutor-marked assignment is matched with a longer iCMA.

## Transforming assessment practice

Each iCMA is closely linked to the programme of study and opens to students approximately two weeks before they are due to start reading a course text. Thus the iCMAs are designed to help students interact with course content as well as test their understanding once they have completed sections of the course.

The S104 iCMAs were initially intended to be tools for formative learning. However, data on students' use of iCMAs suggests that they engage more fully with iCMAs that carry credit, and so a low weighting is applied to each assessment.<sup>7</sup> However, as it is impossible to authenticate the outcomes as students' own unaided work, iCMAs have to remain low-stakes assessments, typically representing a small proportion of the marks given to tutor-marked assignments.

Producing iCMAs is a time-consuming process. Subject and technical expertise need to be combined with question- and feedback-authoring skills, and each question must be rigorously tested for impact, usability and accessibility if it is to be employed for summative purposes. However, for academic staff, benefits include easier tracking of students' progress, a reduced burden of marking and a developing

bank of reusable tests. The iCMAs also provide valuable insights into what students find difficult. Tutors can review the results of iCMAs, which are automatically transferred into the Moodle Gradebook, and adjust their teaching accordingly:

*'The data locked up in students' answers cannot be argued with. It is incredibly powerful feedback for teachers on the success of their teaching.'* Sally Jordan, COLMSCT Teaching Fellow and Co-chair of S104: Exploring Science, The Open University

From the students' perspective, iCMAs offer anytime, anywhere opportunities to assess their progress, receive feedback instantaneously and earn credit if successful. The strategy of positioning iCMAs alongside tutor-marked assignments also helps students pace their learning more effectively.

## Key points for effective practice

- Online formative assessments with differentiated feedback increase the capacity to learn independently
- Interactivity in assessment design prompts deeper and more active learning

## Final word

Formative assessment that invites interaction with course content helps to close the gap between students' current understanding and intended learning outcomes. Technology offers the potential to achieve this at scale.

For detailed case studies, visit

[www.jisc.ac.uk/digiassess](http://www.jisc.ac.uk/digiassess)



See also the podcast by Dr Helen Ashton

[www.jisc.ac.uk/assessresource](http://www.jisc.ac.uk/assessresource)

<sup>7</sup> For further information, see [www.open.ac.uk/colmsct/activities/details/detail.php?itemId=460d36feca124](http://www.open.ac.uk/colmsct/activities/details/detail.php?itemId=460d36feca124)

# Making the most of a computer-assisted assessment system

University of Manchester

## Challenge

Computer-assisted assessment systems are often seen as tools for question authoring and assessment management, when effective use of data from automatic marking can add value to curriculum review and quality assurance processes and to day-to-day teaching. Using a computer-assisted system for institutional and pedagogic gains is a challenge that can yield real benefits.

## Taking advantage of technology

As indicated by the 2006 [Quality Assurance Agency for Higher Education Code of Practice Section 6: Assessment of students](#), institutions are responsible for the academic standards of the awards made in their name. Data from medium- to high-stakes assessments provides valuable evidence to support the validity of qualifications and underpins routine processes of quality assurance, course validation, resource allocation and curriculum review. An archive of evidence derived from a computer-assisted assessment management system, for example, can help academic teams to:

- Conduct reliable checks on the outcomes of particular assessments
- Monitor differences in learners' achievement before and after a module redesign
- Check outcomes from the same assessment over a period of time
- Assess the support needs of students

Increased efficiency of marking and data management have pedagogic advantages as well, not least because the reduction in workload makes it feasible for tutors to assess learners' understanding more frequently – for example, at key points in a module or unit of learning with a high level of conceptual difficulty.



The information held in the system can also help shape subsequent delivery of the curriculum. In the short term, quick formative assessments can identify gaps in students' knowledge and understanding so that remedial action can be swiftly taken. In the longer term, easy access to assessment data over a period of time can yield valuable data about the success of particular pedagogic approaches.

This case study reveals how a computer-assisted assessment system that supports short-answer free-text question authoring facilitated faster and more accurate assessment of students' support needs, enabling the institution and its staff to become more effective in delivering the curriculum.

### Reflecting on the REAP principles

How might you use data from computer-assisted assessment systems to inform your teaching?

‘Information is at the heart of quality assurance. Assessment management systems can, if used effectively, give a full overview of assessment and enable information to flow through an institution to improve consistency and fairness.’

Peter Findlay, Assistant Director, Quality Assurance Agency

## Background

The University of Manchester Language Centre tests over 1,000 overseas students for proficiency in English language in an academic year. The majority of tests are taken within the first few weeks of term.

Assess By Computer (ABC), designed by academics in the computer science department at the University of Manchester and now marketed by Assessment21 Ltd, was the assessment delivery and management system used in a trial to improve the effectiveness of diagnostic language testing at the Language Centre.

As a computer-assisted assessment system, ABC offers a range of question formats, from multiple-choice (MCQ) to short-answer, free-text questions. Although ABC is often used for straightforward automated marking, human markers are able to apply their expert judgement when required, and the range of question formats supported by the system increases the flexibility of assessment design.

## Transforming assessment practice

The language proficiency test originally used by the Language Centre was based on MCQs and so had limitations as an accurate determinant of the grammatical and lexical ability of students: MCQs ask candidates to select from pre-determined options rather than construct their own answers, and so may produce false-positive results.

To increase the reliability of the test, the original questions were uploaded into the ABC system and supplemented with an additional layer of free-text questions so that the support needs of students on the borderline of pass and fail (ie those achieving in the region of 40% on the MCQ test) could be more accurately determined:

*‘Our hypothesis was that, given the chance to answer freely, the weakest candidates would give evidence of greater weakness than could be seen from MCQ results.’ Mary McGee Wood and John Morley, University of Manchester<sup>8</sup>*

The new questions were designed in gap-fill format in order to test students’ ability to place words in the right order and complete sentences with the correct grammatical elements. This more searching approach was designed to ensure that support would be given to students who needed it most.

Results of the trial showed that the gap-fill questions were able to give a more accurate picture of students’ linguistic weaknesses than were the original MCQs and provided evidence that some students were unable to understand the questions at all. Use of the ABC system had improved the discriminatory power of the language proficiency test without adding to the time and effort expended by academic staff.

## Key points for effective practice

- Computer-assisted assessment systems can improve the appropriateness, effectiveness and consistency of assessments
- Efficient assessment processes produce pedagogic as well as institutional benefits

## Final word

As a consequence of the efficiency gains from using a computer-assisted assessment system, more frequent formative assessments can occur, increasing the information available to tutors about the effectiveness of teaching and the support needs of students.

For detailed case studies, visit

[www.jisc.ac.uk/digiassess](http://www.jisc.ac.uk/digiassess)



See also the podcast by Dr Peter Findlay

[www.jisc.ac.uk/assessresource](http://www.jisc.ac.uk/assessresource)

<sup>8</sup> For further information, see Wood, M. & Morley, J. (2008) [Question Types in English Language Diagnostic Testing](#)



# Enhancing the experience of feedback

University of Leicester

## Challenge

The University of Leicester has devoted significant resources to developing distance and work-based learning courses, including a Master's degree in Occupational Psychology. However, as students working remotely are particularly vulnerable to giving up their studies prematurely, all aspects of a distance learning course have to work to maximum effectiveness.

## Taking advantage of technology

To tackle issues relating to student retention, strategies adopted by the occupational psychology team to support their students include online course delivery, audio-recorded feedback and podcasts of feed-forward guidance to assist students with writing assignments.

When the course was first offered in 2000, delivery was almost entirely paper based. Learning materials were sent to students by post; web links and a discussion forum on the VLE, Blackboard, were the only forms of technology, other than email, used on the course. Since 2007, delivery and management of the course has moved entirely online, using the VLE to provide rapid access to learning materials and support for students.

The use of audio-recorded feedback is the second stage of enhancing students' experience of the course. Using open source recording and editing software, Audacity, tutors have made the experience of feedback more immediate and personal.

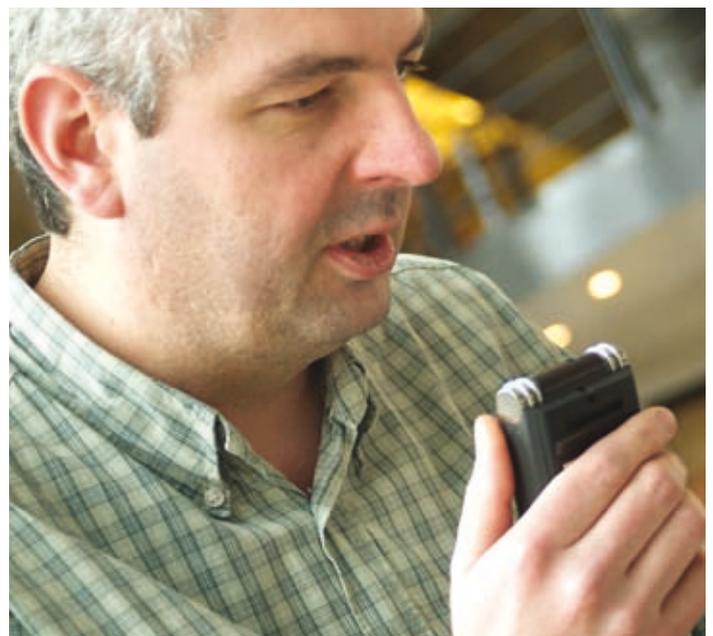
Audio recording is an inexpensive, widely available solution which has presented the occupational psychology team with remarkably few barriers. Once recorded, audio files of personalised feedback are sent to individual students and podcasts of guidance on forthcoming assignments are

distributed to groups via email or the VLE. The work-based distance learning students, for whom flexible access is important, have found audio-recorded feedback and podcasts particularly convenient: files can be downloaded onto an MP3 player or accessed by computer at home or at work.

Podcasts delivered by RSS (Really Simple Syndication) feeds offer even further advantages, as newly recorded files are automatically downloaded to the desktop or mobile phone.<sup>9</sup>

## Reflecting on the REAP principles

What are the constituents of high-quality feedback? How might technology help learners to respond to feedback in your context?



<sup>9</sup> Lee, J. & Tynan, B. (2008) 'Podcasts and distance learning' in Salmon, G. & Edirisingha, P. (Eds), *Podcasting for Learning in Universities*, Chapter 9, pp. 92–102, Open University Press

'The most interesting thing was hearing someone's voice. I didn't feel quite so distant.'

Student, MSc Occupational Psychology programme, University of Leicester

## Background

The MSc Occupational Psychology course forms part of the JISC-funded Delivering University Curricula: Knowledge, Learning and INnovation Gains (DUCKLING) project, which aims to explore how technology can enhance the delivery of the curriculum for work-based distance learners. The two-year course can be studied part time while in employment.

## Transforming assessment practice

Involvement in the DUCKLING project has enabled the MSc Occupational Psychology team to demonstrate that audio-recorded feedback and podcasts offer considerable advantages in work-based and distance learning contexts. Students can access their feedback anytime, anywhere, and tutors have found recording feedback convenient and efficient, especially when giving the detailed feedback required on Master's dissertation drafts.

Feedback is also richer; tutors can expand on salient points, vary the tone, pitch and pace of the voice and add humour to build rapport, opening the door to an ongoing dialogue between student and tutor.

Commonly occurring issues can be addressed in generic podcasts which can be used again in subsequent years – the 'do it once and deliver it often' advantage of podcasts of guidance on forthcoming assignments is particularly appreciated by tutors:

*'We like the fact that you develop something once and deliver it often. And it has proved to be less time consuming than writing reports on drafts of the dissertation, which is where we have used audio the most.'* Tutor, School of Psychology, University of Leicester

In a short space of time, the course team has become confident in its use of the medium: spoken language naturally includes self-correction, pausing and repetition so tutors have found that a polished performance is not necessary. What matter to students are the clarity, immediacy and personal quality of the feedback they receive.

While it is difficult to establish empirically that oral feedback has a beneficial impact on students' cognitive development, students appear to be more attentive to spoken feedback; most respond positively to the intimacy of the spoken word and perceive tutors' advice as being 'clearer' and 'more detailed'. The personalised quality of oral feedback helps reduce the isolation of learning at a distance, and supports students in making necessary adjustments to their work.

Tutors have found the process convenient and efficient, even pleasurable. Once a lengthy, time-consuming process, giving detailed feedback now takes place with less effort and in a shorter time.

There is a sense of a journey just begun. Tutors are beginning to experiment with recording learning resources, such as a day in the life of an occupational psychologist. Also planned is the introduction of a Wimba Voice Board to enable students to give audio feedback to one another and to interact by voice with their tutors.

## Key points for effective practice

- Feedback that enables learners to self-correct brings about positive change
- Feed forward by podcast can make challenging tasks more achievable

## Final word

To maintain the impromptu quality of spoken language, having a plan or a pre-prepared template is preferable to using a script.

For detailed case studies, visit

[www.jisc.ac.uk/digiassess](http://www.jisc.ac.uk/digiassess)



See also the podcast by Professor Phil Race  
[www.jisc.ac.uk/assessresource](http://www.jisc.ac.uk/assessresource)

## Facilitating peer and self-assessment

### University of Hull and Loughborough University

#### Challenge

**While group work offers a number of benefits, especially in the context of large classes, assessment of individual contributions can be problematic. Peer assessment provides an insight into individual performances, but can be difficult to implement by face-to-face or paper-based methods.**

#### Taking advantage of technology

As an online tool, WebPA addresses some of the common issues experienced in the assessment of group work. In particular, its algorithmic approach enables accurate assessment of the process as well as the outcomes of group work.

Using WebPA, a student gives a score of up to 10 for each member of the group against a set of criteria decided upon in advance. The score the student gives to another group member is translated by WebPA into a fraction of the total marks awarded by that student to all members of the group. (For example, if one student gives a second student 4 out of the total of 14 marks awarded by the first student to all his or her group members, the second student would receive a score of  $4/14$  or 0.29.)

This result is added to the fractionalised scores given to that student by other members of the group to produce an overall WebPA score for the student, which can then be used to moderate the whole group mark. In this way, the student receives an individual mark which reflects his or her actual performance, as seen by other group members. The results of the exercise are immediately collated and are confidential; students do not see one another's scores, and the outcomes can be moderated by a tutor if any unusual circumstances apply.

From a tutor's perspective, WebPA provides a high degree of flexibility: the size of the groups, the assessment criteria, and

the pedagogic aims behind the exercise can all be determined according to the demands of the task and the disciplinary context. If students are able to set and apply their own criteria for the exercise, their ability to understand how they are assessed is further strengthened.



#### Reflecting on the REAP principles

To what extent do learners have opportunities for peer or self-assessment on the courses you teach?

‘It was an opportunity to meet people from the course outside my original friendship group. It highlighted my strengths within a group situation, making me realise I was able to make a valid contribution.’

Biology student, University of Hull

## Background

In 2006, a team of academics, learning technologists and developers from Loughborough University and the University of Hull acquired JISC funding to develop further an online peer assessment tool originally built at Loughborough.

Current practice at both Loughborough University and the University of Hull demonstrates that WebPA-supported peer assessment can be effectively integrated into most subject disciplines in which group work is assessed.

## Transforming assessment practice

From a student’s point of view, the opportunity to assess others can enrich the overall experience of learning. At the University of Hull, for example, peer assessment supported by WebPA is introduced in the early stages of a course to enable students in large first-year science classes to better understand how they are assessed: changing a student’s role from an assessee to an assessor prompts closer engagement with the intended learning outcomes and promotes self-regulated learning.

Paul Chin, first-year Biology Module Coordinator at the University of Hull, allocates a face-to-face session to introduce students to the aims of peer assessment and to explore the criteria used in the exercise. Experience has shown that doing so enables the purpose of peer assessment to be made clear, and saves time in the long run:

*‘It is critically important to allocate time within a face-to-face session to set up a peer assessment activity. Students will then see the importance of the activity and will understand what they have to do.’ Paul Chin, First-year Biology Module Coordinator and Manager of the UK Physical Sciences Centre, University of Hull*

A powerful way of increasing students’ involvement with the task is to ask them to develop their own criteria. This places students in the role of assessment designers and helps develop their ability to judge what is desirable or

undesirable. The criteria can be applied alongside discipline-specific objectives to assess important attributes such as leadership and collaborative and problem-solving skills, which are otherwise difficult to assess. And to establish a culture of constructive feedback, the criteria used for the peer assessment exercise can also include the quality of the marking process.

Peer assessment may have still wider benefits. Peer assessment increases opportunities for dialogue and interaction, helping first-year students integrate socially. Experiences at Hull also suggest that students work harder to ensure a successful outcome if they know they are to be assessed by their peers – the feedback of fellow students is hard to ignore.

## Key points for effective practice

- Active participation in the design of assessments clarifies for learners the goals and standards they are aiming for
- An online system makes peer and self-assessment achievable anytime, anywhere

## Final word

Both peer and self-assessment are valuable because they encourage high levels of reflection during learning and develop attitudes and skills that are valued beyond higher education. The power of these processes can be enhanced when students rather than tutors formulate the assessment criteria.

For detailed case studies, visit

[www.jisc.ac.uk/digiassess](http://www.jisc.ac.uk/digiassess)



See also the video clip:

Facilitating peer and self-assessment

[www.jisc.ac.uk/assessresource](http://www.jisc.ac.uk/assessresource)

## Reflecting on feedback

### University of Westminster

#### Challenge

**During 2008–2009, the School of Life Sciences at the University of Westminster researched into undergraduate students' responses to feedback. The outcomes revealed differences between student and staff perceptions of feedback, and an overall lack of student engagement with feedback on written assignments.**

#### Taking advantage of technology

Making use of widely available technologies, the School of Life Sciences introduced a system, known in the university as e-Reflect, that adds reflection into the cycle of assignment production, submission and feedback.

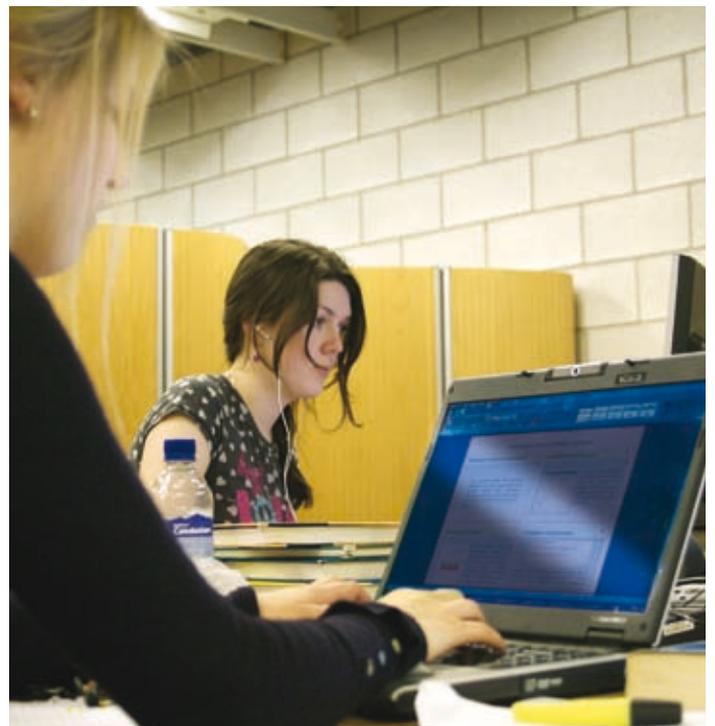
The e-Reflect process, initiated and owned by the student, is triggered by the receipt of a marked assignment. Using the subject tutor's feedback on the assignment, the student first completes an online questionnaire created in Google Apps and accessed via the VLE, Blackboard. To answer the questionnaire, students must engage closely with the feedback they have been given; questions focus on both the process and the outcomes of learning.

Data from the questionnaire is exported by Google Apps into a spreadsheet and fed into a SQL Server database via RSSBus Data Provider (a commercial application that facilitates transfer of data between systems). A report is then generated which records the results of the questionnaire and suggests changes to the student's study habits. Students use the report as a prompt when entering short reflective entries in a learning journal, using the blogging tool on Blackboard.

Personal tutors, who have access to their tutees' learning logs via Blackboard, can comment on the entries and gain a deeper understanding of the type of support and guidance

students require. As a result, the quality of dialogue during face-to-face or online personal tutorials has improved.

Students taking part in the pilot of the e-Reflect system in 2009 were undergraduates in the second semester of their first year. A second group of students was introduced to the system at the start of their first year of study in 2009–2010. In total, around 400 students have taken part in the pilot of the e-Reflect system, which has subsequently been adopted more widely across the university.



#### Reflecting on the REAP principles

How can learners act on feedback in the context in which you teach?

'If someone is listening to us, we have the chance to improve or change the way we think.'

Student, School of Life Sciences, University of Westminster

## Background

In 2008, the School of Life Sciences at the University of Westminster gained JISC funding under the Transforming Curriculum Delivery programme to embed technology-supported reflection into assessment and feedback. The project, Making Assessment Count, has led to the development of an innovative feedback system known as e-Reflect.

## Transforming assessment practice

Before commencing work on Making Assessment Count, the project team conducted questionnaire research with 125 first-year students during the middle of the first semester in 2008–2009. Thirty-five members of the teaching team were asked the same questions in order to compare their perceptions of feedback with those of their students.

Results from the student questionnaire indicated that, although students claimed to read and value feedback from subject tutors, they were often recalling rather than responding constructively to the feedback they received. The tutor questionnaires confirmed that feedback had insufficient impact on students' performance.

In addition, personal tutors rarely saw the feedback given by subject tutors and depended on their tutees to pass on information. The personal tutorial system was, as a result, likely to disseminate generalised rather than tailored advice. The increasing size of student cohorts and the modular structure of courses tended to exacerbate this problem.

In the light of the research, the project team set out to make feedback the central component in an active cycle of reflection and dialogue. The process had to be owned and initiated by the student and act as a bridge between subject tutor, student and personal tutor:

*'The onus is on the student to think strategically about what went well or not so well.'* Gunter Saunders, Director of Technology Enhanced Learning, University of Westminster

Take-up of the e-Reflect process has been encouraging: among approximately 400 students participating in the pilot, over 300 completed the questionnaire and 230 went on to

make entries in learning journals, although use of the system was not compulsory. The report, which includes graphical representations of a student's grades across all modules studied, has proved particularly popular.

The value gained from face-to-face tutorials has also increased. Through the learning journals, personal tutors have a clearer insight into the problems students are experiencing and can enter into a better-informed dialogue about the learning strategies that students need to adopt. Students acquire confidence in judging their own performance and, with better understanding of their strengths and weaknesses, gain greater autonomy as learners.

## Key points for effective practice

- An active response to feedback is at the heart of effective learning
- Interaction and dialogue around learning increase learners' capacity to respond to feedback

## Final word

It is still the responsibility of the student to think strategically about what went well or not so well in an assignment, but the e-Reflect process generates the information that both students and tutors need to identify where improvements might be made.

For detailed case studies, visit

[www.jisc.ac.uk/digiassess](http://www.jisc.ac.uk/digiassess)



See also the video clip:  
Reflecting on feedback

[www.jisc.ac.uk/assessresource](http://www.jisc.ac.uk/assessresource)

# Assessing my own professional performance

## St George's, University of London

### Challenge

**Clinical decision making is an essential part of medical education, yet students need opportunities to learn from their decisions without putting real patients' lives at risk.**

### Taking advantage of technology

Using patient cases (a form of problem-based learning in which students make clinical decisions in response to an unfolding medical scenario), medical students at St George's, University of London are exposed to the complexity of clinical decision making before commencing work in the real world.

A virtual patient – a web-based simulation of a real-life clinical scenario used in medical education and assessment – is basically a problem-solving exercise. In the simplest version, students make decisions based on the information given online and receive immediate expert feedback. In more complex versions, the range of choices is greater and each decision leads down a branched narrative in which information and choices available at a later stage depend on the choices the student made earlier.

Until recently, the problem-based learning scenarios used by medical students at St George's were paper-based and linear. Now, online virtual patients offering multiple pathways are providing a more authentic learning experience, and one that can be tailored to different contexts of use, either for face-to-face collaborative group work as part of the mainstream delivery of the curriculum or as self-directed formative assessments.

The virtual patients at St George's are created in vpSim, a specialist virtual patient program, and accessed online via the VLE, Moodle. Students appreciate the motivational quality of

the resources, especially the branched versions which allow them to explore different routes when treating a patient's symptoms – by trying out all options, students can see for themselves the consequences of their decisions.

As a result, a richer and deeper understanding is constructed aided by self-assessment (as a result of working on the case) and by feedback from tutors and peers (if the virtual patient is designed for group work).

### Reflecting on the REAP principles

How could technology-enhanced assessment be used in your context to activate learners' motivation to learn and to become more successful in their learning?



#### Patient Presentation

You are the Casualty officer in Accident and Emergency when Toni Hutchinson, a 26 year old, is brought in by ambulance with severe breathing difficulties and covered in an allergic rash. She had been eating in a nearby restaurant, and then complained of breathing difficulties, hoarseness and dizziness and then collapsed. She is very frightened and difficult to understand clearly.

She says she develops mild rashes after take-away meals and vigorous exercise. She had eczema as a baby and still gets patches of eczema, sometimes needing steroid creams. She steers clear of nuts.

Blood pressure: 85/50

Pulse: 120 beats per minute, regular

Respiration: 26 breaths per minute

Toni is in poor condition. You have to think quickly what to do.

Give her an IV injection of adrenaline

Give her an intramuscular injection of adrenaline and IV antihistamine and hydrocortisone

Give her an IV injection of adrenaline IV antihistamine, and IV hydrocortisone

Give her an intramuscular injection of adrenaline

'We tried hard, and we still killed the patient! I will never, ever, forget that!'

Student, St George's University, London

## Background

The curriculum at St George's has for some years been based around problem-based learning using paper-based resources. Now virtual patients have extended the scope of the approach.

Each week, students access a new virtual patient from the VLE, Moodle, and work in groups under the guidance of tutors to resolve the medical issues raised by the case. Virtual patients designed for independent formative assessment are also provided online, and are linked thematically to the content of face-to-face sessions for that week.

## Transforming assessment practice

The move from paper-based cases to a curriculum designed around virtual patients involved students as evaluators and co-designers. The results of these early trials were sufficiently positive for St George's to replace paper-based cases with virtual patients in the transitional year, a year during which students entering medicine from different routes are brought together for a combined programme of problem-based learning and clinical experience.

Most students who took part in the initial trials appreciated the interactivity and flexibility of the virtual patients. Unlike the paper-based linear versions, the virtual patients (especially the branched versions) allowed them to explore different approaches to treating patients' symptoms, and to see for themselves the consequences of their decisions:

*'More than once we deliberately went down the "wrong" track to see what happened. Very useful to do this on a virtual patient...'* Student, St George's University, London

Students also acted as advisers on the design of virtual patients for formative assessment, and helped to determine issues such as scoring – for example, whether negative scoring (losing marks from a perfect score for each incorrect answer) or gaining marks for right answers is the best approach.

The design of virtual patients for formative assessment is still evolving in the light of students' feedback. Trials during the academic year 2009–2010 revealed that students like to test their clinical knowledge by means of multiple-choice questions embedded in the narrative which provide immediate expert feedback. Students are similarly involved in the development of virtual patients for low-stakes summative assessment, which is planned for the academic year 2010–2011.

Virtual patients offer something additional to medical education: a means of developing and assessing skills that cannot be acquired or assessed in any way other than in real-life practice – the process of clinical decision making. Students are able to combine knowledge, reasoning and clinical skills in a safe environment with the freedom to learn from both 'good' and 'bad' decisions.

## Key points for effective practice

- Simulations of real-world practices offer innovative opportunities for assessment and self-assessment
- Learners have a greater stake in their learning if able to co-design aspects of assessment and feedback

## Final word

Feedback on the virtual patient initiative has made it clear how much students benefit from the freedom to fail in the safety of an online environment. The richest learning experience comes from getting something wrong and being able to self-correct.

For detailed case studies, visit

[www.jisc.ac.uk/digiassess](http://www.jisc.ac.uk/digiassess)



See also the podcast by Professor David Nicol  
[www.jisc.ac.uk/assessresource](http://www.jisc.ac.uk/assessresource)

## Assessment in an authentic learning context

### University of Strathclyde and Northumbria University

#### Challenge

The complex mix of interpersonal, legal, ethical, interpersonal and transactional skills needed by graduate law students and trainees is the most difficult to teach and the least likely to be assessed effectively by traditional methods. To acquire these skills, students and trainees need exposure to real (or close to real) experience of interactions with clients.

#### Taking advantage of technology

Assessment of legal interviewing skills at the Glasgow Graduate School of Law (GGSL) initially depended on the filming of student-to-student role play.

On reflection, tutors felt that recreating the totality of the experience of interviewing a client, including the emotional and physical presence of a client, was vital to both the acquisition and assessment of legal interactional skills. The use of 'standardised clients' – lay people trained to assess students' interactional skills while playing the role of clients seeking advice – was introduced to provide a sense of lived experience.

Interviews are filmed using a consumer-quality digital video camera connected to a computer with a 15-inch monitor. The recording is set in motion at the start of the interview by the person playing the client. (It is important to select equipment that is easy to operate by someone with reasonable rather than expert technical skills.) Once an interview is over, the client commences his or her assessment of the student, using the touch-screen monitor to start and stop the recording to assess the student-lawyer's skills with greater accuracy, if required.



Students and tutors have also found that replaying the interviews on video is a powerful tool for learning. The video camera, like a mirror, enables students to perceive what they may previously have been unaware of, so that they can see for themselves how far their current performance matches the goals and standards they aspire to attain.

Most importantly, delivery and assessment of the curriculum are more appropriately aligned: the mode of assessment is in itself a process of learning which prepares students for the world of work. And, unlike role play or work placements, digitised resources can be accessed anytime anywhere.

#### Reflecting on the REAP principles

How might technology be used in your context to facilitate reflection and self-assessment in competency-based learning?

‘It was excellent to have a “real” client to interview. After the initial horror of watching yourself on video, it actually proved really useful.’

Graduate trainee, Professional Competence Course, Glasgow Graduate School of Law, University of Strathclyde

## Background

The Glasgow Graduate School of Law (GGSL) at the University of Strathclyde has become known for its technology-enhanced approaches to legal education. In another GGSL initiative, known as [SIMPLE](#) (SIMulated Professional Learning Environment), trainee solicitors gain experience of legal transactions in a virtual town complete with a business directory, map, clients and documents to simulate the experience of working in a real-world solicitor’s office.

The standardised client initiative extends the potential of SIMPLE by focusing on the face-to-face skills used in client interviews. Both initiatives are now being carried forward at Northumbria University and the University of Strathclyde.

## Transforming assessment practice

Standardised clients are trained to assess students’ interviewing skills in exactly the same way with each student, thus standardising the process of assessment more accurately than could be achieved in student-to-student role play.

From the student’s perspective, an interview assessed and recorded by a standardised client is an authentic learning experience as much as a test of skills. If used for formative learning, the video not only provides a record of the interaction between standardised client and student-lawyer but also acts as a means of unlocking deeper learning. Students are able to recall their thought processes more readily when watching videos of their own performance and are better able to analyse why they took a particular approach. Their ability to assess and adjust their own performance is significantly improved as a result.

Results of a trial in which both tutors and standardised clients assessed students simultaneously showed a high degree of correlation between the scores given. As a result, the GGSL has confidence in the validity and reliability of the system and no longer uses tutors to assess client-facing communication skills. Instead, student-lawyers are

assessed by and receive feedback from their clients, as would happen in the real world.

The standardised client initiative has introduced authenticity into assessment and feedback practice: students are exposed to practice in settings that mirror the real world of work and receive feedback from professional or knowledgeable sources in ways that prompt active self-correction. If combined with reflection in an e-portfolio tool, such practice can provide a powerful trigger for personal development planning as well as prompting sustained and detailed self-evaluation.

## Key points for effective practice

- Simulation and video technologies help clarify for learners what constitutes good performance in a professional role
- Authenticity is as important an element in assessment as it is in learning

## Final word

The benefits of combining the SIMPLE simulation with video-recorded standardised client interviews are currently being realised. The results will inform future applications in other subject disciplines in which client-facing skills are important – for example, architecture, social work, medicine and the health care professions.

For detailed case studies, visit

[www.jisc.ac.uk/digiassess](http://www.jisc.ac.uk/digiassess)



See also the video clip:

Putting principles into practice

[www.jisc.ac.uk/assessresource](http://www.jisc.ac.uk/assessresource)

# A changing landscape

**The case studies highlight how the assessment and feedback landscape in higher education is changing as technology applications increase. While change in each context has been driven by different issues, the way these issues have been addressed has some commonality.**

Firstly, technology is being used more effectively to enhance the quality of practitioner-led assessment and feedback. Examples provided here include improving the personal quality of feedback by means of audio recording (**Case study 6**), assessing student performance with greater accuracy and on a large scale by means of a computer-assisted assessment system (**Case study 5**) and designing interactive online formative assessments with high-quality feedback for distance learners (**Case study 4**).

Secondly, technology is enabling learners to become active partners in the assessment process. Examples include online problem-based scenarios that enable medical students to check their own diagnostic skills (**Case study 9**) and video-recordings of legal interviews that prompt reflection and

self-assessment (**Case study 10**). The development of an online tool for peer assessment, WebPA, has been a further significant step towards enabling reflection, peer and self-assessment on a large scale (**Case study 7**).

Thirdly, technology is helping practitioners and institutions become more efficient in their management of assessment. Increased numbers, greater demand for distance learning and the need to prepare learners for professional practice require that as much as possible of the routine burden of assessment is minimised (**Case study 2**). Technology is also helping to maximise the value of tutor-learner interaction and dialogue (**Case study 8**) and reduce time-absorbing administrative procedures (**Case studies 3 and 5**).

Linking the case studies to the 12 REAP principles illustrates the value of taking a principles-based approach to ensure that implementation of technology adds value to current practice. While the REAP principles (see page 15) have been applied retrospectively to the case studies, reflecting on the relationship between the described practice and the





12 principles helps to understand better how to harness the affordances of technology to good effect.

The case studies also reveal how the principles act as building blocks for each other. For example, when learners are given opportunities to engage in self-assessment (**Principle 7**) they focus more closely on the assessment criteria which in turn develops a better understanding of what constitutes good performance in their discipline (**Principle 1**). Such processes can be discerned in **Case studies 7** and **8**. Similarly, spending time and effort on challenging learning tasks (**Principle 2**) often leads learners to engage more regularly in reflection on their

learning (**Principle 7**), and even to act on the feedback they generate for themselves (**Principle 4**). Evidence of this can be found in **Case studies 8, 9** and **10**.

Assessment and feedback take place in increasingly demanding and time-constrained contexts. As a result, we need to understand as fully as possible how to achieve the most effective outcomes in the most efficient and resourceful ways. Applications of technology such as these provide valuable insights into the nature of assessment and feedback in a digital age.

## “ Dennie Wilson Senior Lecturer in Dance, University of Wolverhampton

### Assessment of the BA Honours degree in Dance at the University of Wolverhampton comprises 80% for a group performance and 20% for a supporting webfolio in PebblePad, the e-portfolio system adopted at Wolverhampton.

Despite careful teaching, we were finding that promising students were not fully achieving their potential in group work. We needed to build their conceptual understanding and enable transfer of that understanding into their assessed work. Video was a natural medium to use: the module explores the relationship between live and filmed performance, and students learn camerawork and editing alongside choreographic and performance skills. So, in 2008, we produced a sequence of video podcasts that are fully integrated into learning and teaching on the module.

Combined with the e-portfolio system, PebblePad, the video podcasts have transformed the way students respond to group work. All work associated with the module is located on PebblePad, and can be downloaded

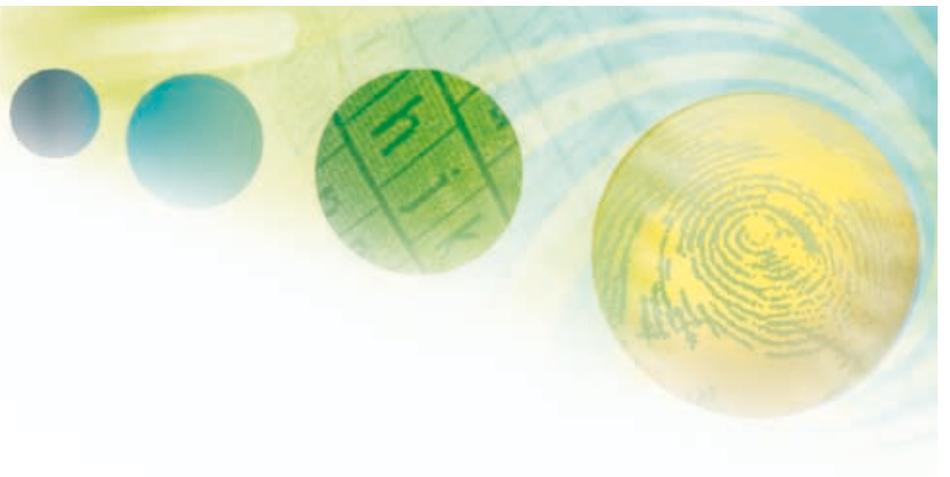
onto iPods, and students have both individual pages and a group webfolio on PebblePad. Students access their learning resources via PebblePad, build up a dynamic account of their development as a group and as individuals in their webfolio, and use the system's blog to reflect on elements of dance choreography included in the podcasts. Tutors can track individuals' contributions to group work and intervene when necessary.

The impact of the two technologies has been considerable. Students' choreographic achievement has been enhanced by anytime, anywhere access to the podcasts, and the single, integrated environment provided by PebblePad has produced more agile and creative responses. The webfolios, rather like online sketchbooks, enable students to explore ideas about colour, design and use of space and multimedia, making the task a pleasure rather than work. Most importantly, students engage more deeply with their learning, develop greater conceptual understanding through peer and self-review and, as a consequence, achieve more. ”

## Voices on assessment and feedback

'Assessment is a central feature of teaching and the curriculum. It powerfully frames how students learn and what students achieve. It is one of the most significant influences on students' experience of higher education and all that they gain from it. The reason for an explicit focus on improving assessment practice is the huge impact it has on the quality of learning.'

Boud and associates (2010) Assessment 2020: Seven propositions for assessment reform in higher education



# Conclusion

**The aim of this guide has been to take the first steps towards determining what characterises effective assessment and feedback in a digital age.**

This is necessarily an evolving story. As new technologies emerge, and our understanding of the potential of established technologies increases, those involved in designing assessment and feedback will refine their practices further. In the process, the underlying aims of assessment may themselves change, with the focus likely to fall increasingly on:

- Capturing the processes as well as the outcomes of learning
- Supporting learners in self-monitoring and self-assessment
- Activating peers to become both drivers and assessors of learning
- Involving learners in the design of assessment and feedback

In addition, assessment and feedback practices are likely to adapt to fit the changing circumstances of higher education. Issues of increasing importance include:

- Designing assessment and feedback for distributed and distance learning contexts
- Exploring the potential of technology to enable more efficient use to be made of practitioners' time and effort
- Developing a seamless digital environment in which all learning- and assessment-related activities take place and in which the evidence from these activities is consolidated

What remains constant is that an effective vision for the application of technology to assessment and feedback is based on an understanding of what is educationally desirable and what is already known about quality in assessment and feedback. Innovations first need to be tested against principles of effective assessment and feedback, and their merits considered within the disciplinary context in which they will be used. Guidelines developed under the JISC-funded ESCAPE project at the University of Hertfordshire provide a brief summary:

## **Good assessment for learning...**

- Engages students with the assessment criteria
- Supports personalised learning
- Ensures feedback leads to improvement
- Focuses on student development
- Stimulates dialogue
- Considers student and staff effort

The online resources that accompany this publication enable you to investigate further the potential of enhancing assessment and feedback through technology and to consider the most appropriate approaches for your context. Further information about these resources can be found on page 60.



Reviewing trends over the last decade and looking forward to the immediate future reveals a shift in focus from institutional ownership of assessment and feedback towards greater learner participation in assessment and feedback

processes. At the same time, institutions are aiming for greater efficiency in learning, teaching and assessment practices while still upholding the value systems that surround assessment.

	Where did we start?	Where are we now?
Technologies	On-screen test delivery and authoring systems; content interoperability standards; e-portfolios used as digital repositories; electronic voting devices (clickers); VLEs; anti-plagiarism software; online submission.	<i>These and...</i> interactive, adaptive assessments with differentiated feedback; increasing use of Web 2.0 technologies and multimedia in assessment; process of learning captured and assessed in e-portfolios; streamlined computer-assisted marking and data management; audio-recorded feedback...
Institutional perspective	Variable levels of support for computer-assisted assessment; early-stage e-administration of assessment data; personal laptops and Tablet PCs supplied for on-screen marking; institutionally owned hardware and software provided for assessments.	Institution-wide policies to enhance assessment and feedback; drive towards alignment between blended learning, assessment and feedback; streamlined flow of assessment data into course review and curriculum design processes; drive towards greater efficiency...
Pedagogical perspective	Focus on transmission models of learning and teaching and tutor-led assessment and feedback; written assessment formats predominate; focus on measuring knowledge and understanding.	More varied technology-enabled assessment formats; online peer and self-assessment, which increases learner participation in assessment processes; a growing number of domain-specific assessment tools; technology-enabled capture of processes as well as outcomes of learning...
Learner perspective	Variable levels of ICT proficiency; improving off-campus access to online or VLE-based formative assessments; institutionally owned technologies depended on for assignment production; evidence of a digital divide.	Use of personal technologies in learning, but with traditional modes of assessment and feedback still predominating; online submission, marking, moderation and feedback improve timeliness; assessment designs encompass graduate attributes; the digital divide narrower but still evident...

'The important thing is not to assume that we have to forget everything that is known about assessment and feedback just because we now have technology.... What we know about validity, reliability, transparency and authenticity of assessment still applies. We have to... uphold all of those values, but also use the new tools appropriately.'

Phil Race, Emeritus Professor, Leeds Metropolitan University

Technology is likely to move centre stage in the drive to extract maximum value from the way in which higher education is currently delivered and assessed. In this

context, there is a clear imperative to understand more fully some of the principles that underpin effective use of technology in assessment and feedback practice.

#### Where will we be in the future?

*These and...* richer, more authentic ways of assessing learning via e-portfolios, simulations and online scenarios; personal feedback by video, audio and digital ink annotation; large-screen handheld devices used for fast on-location assessment, marking and feedback...

Whole-course redesigns; personal technologies used for assessment and feedback in institutional contexts; computer-assisted assessment delivery using green technologies; institutional demand for greater efficiency; fully interoperable data exchange systems...

Focus on learning outcomes rather than taught curricula; learner choice over assessment format; participation by learners in designing assessment and feedback; integration of rich media; focus on holistic, authentic assessment opportunities supported by technology...

Ability to use personal technologies in assessment; greater opportunities to use creative media in assignments; technology-enabled peer and self-assessment as common as tutor assessment; increased choice over timing, format and mode of assessments...

#### Steps towards effective technology-enhanced assessment and feedback

- Applications of technology to assessment and feedback are embedded in the institutional and/or faculty vision for high-quality learning, teaching and assessment
- Principles of good assessment and feedback underpin the use of technology – for example, assessment designs exploit technology to motivate learning, encourage time on task, facilitate self-assessment and enable learners to act on feedback
- Applications of technology are informed by a clear understanding of the purpose of the task, the ICT skills and diverse needs of learners and the specific requirements of the contexts in which the assessment or feedback takes place
- Technology is used to facilitate enhancements previously difficult to achieve at scale such as peer assessment
- Optimum use is made of e-enabled assessment management and administration systems to monitor learners' progress and improve teaching and learning
- Technology augments, streamlines or enhances current provision, and is not used for its own sake

# Glossary

This section draws on definitions given in the extended version of the JISC/QCA (2006) [e-Assessment Glossary](#).

**Adaptive test:** A computer-assisted assessment in which a question is selected on the basis of performance in previous question(s).

**Algorithm:** A step-by-step computational process for problem-solving or response matching.

**Assessment for learning:** The process of seeking and interpreting evidence of performance to identify where learners are in their learning, what their next learning goals should be and how to achieve them.

**Authentic assessment:** An assessment that presents a real-world challenge and requires application of knowledge and skills in either a real-life or simulated setting.

**Authentication:** Use of specialised software to authenticate the identity of the user of a computer terminal.

**Blog (web log):** An online reflective journal on which other internet users can post comments.

**Blogging tool:** Blogging tools include licensed and free software, e-portfolio and VLE-based tools. Blogging tools within most VLEs enable access to be restricted to members of a closed group (for example, a course, module or tutorial group). See Virtual Learning Environment (VLE).

**Computer-assisted assessment:** The application of computers to assessment processes, including delivery of tests, capture of responses and marking by either computer or human marker. See e-assessment.

**e-Assessment:** e-Assessment is sometimes used to refer solely to on-screen assessment but, in its broadest sense, can refer to all technology-enabled assessment activities. See 'computer-assisted assessment' and 'technology-enhanced assessment'.

**e-Portfolio:** A body of digital evidence assembled by a learner to demonstrate his or her abilities and achievements in which the learner may also reflect on the process as well as the outcomes of learning. Tools and systems for e-portfolio development range from licensed commercial systems to open source and VLE-based tools.

**Electronic voting system (EVS):** A system in which computer software collects and records responses via handsets (also known as 'clickers') to questions posed during a class, lecture or presentation. Collated responses can be displayed for whole-group discussion.

**Feedback:** Qualitative information about their performance given to learners after an assessment.

**Feed forward:** Advice on forthcoming work based on feedback previously given.

**Formative assessment:** Assessment that provides developmental feedback to a learner on his/her current understanding or skills.

**High-stakes assessment:** An assessment of which the outcomes are of high importance and affect progression to subsequent activities.

**iCMA:** Interactive computer-marked assessment which engages learners in an interactive exchange around one or more learning outcomes with instant feedback and multiple attempts for learners who answer incorrectly.



**ICT:** Information and Communication Technology.

**ILT:** Information and learning technology, a term used in further education for functions relating to e-learning.

**Low-stakes assessment:** An assessment which carries a low weighting.

**Managed Learning Environment:** An institutional system for managing information in which separate systems – for example, student record systems, course data and Virtual Learning Environments – are joined into one environment.

**MP3 player:** A portable device that stores and plays content in MP3 digital audio formats.

**On-screen test:** An assessment delivered via a computer screen; a subset of e-assessment and computer-assisted assessment.

**Open source:** Software applications and components for which the source code is freely available for use or modification as required.

**PDF:** Portable Document Format (a file format created by Adobe® Systems).

**Peer assessment:** Assessment of a learner by fellow learners typically following the same programme of study.

**Podcast:** A recording made available for download from a website or VLE by syndication (a process of making content available to other sites by means of RSS feeds). The term is now also used to cover recordings distributed by email and played back on either a computer or portable MP3 player.

**RSS (Really Simple Syndication) feed:** A method of electronically aggregating updated content and distributing it via designated websites to subscribers.

**Self-assessment:** A judgement a learner makes about his or her level of attainment in relation to the stated learning outcomes for the activity or programme.

**Short-answer free-text questions:** A computer-marked question which invites free-text entry, typically up to 20 words.

**Summative assessment:** Final assessment of a learner's achievement, which, if high-stakes, may lead to the awarding of a formal qualification.

**Technology-enhanced assessment:** Use of technology to extend or add value to assessment and feedback processes.

**Validity:** The extent to which an assessment tests the abilities it is intended to test.

**Virtual Learning Environment (VLE):** An online system comprising a range of tools to support learning and the management of learning.

**Virtual patient:** A web-based simulation of a real-life clinical scenario used in medical education and assessment.

**Web 2.0 technologies:** Online collaborative tools and services: for example, media-sharing sites such as YouTube, social networking sites such as Facebook, collaborative publishing tools such as wikis and blogs, and social bookmarking tools such as Delicious.

**Webfolio:** A term used in the PebblePad e-portfolio system to refer to web pages created by individuals or groups of learners to provide evidence-based accounts of themselves and their learning.

**Wiki:** A series of web pages which users can add to or edit via any browser.

# Further information

## JISC

e-Learning programme

[www.jisc.ac.uk/elearningprogramme](http://www.jisc.ac.uk/elearningprogramme)

### Key activity areas

- [Technology-enhanced Assessment](#)
- [e-Portfolios](#)

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## Tools and technologies

[Assess By Computer](#)

[Audacity®](#)

[Blackboard®](#)

[Computerised assessment by peers \(CAP\)](#)

[Facebook®](#)

[Google™ Apps](#)

[Hot Potatoes™](#)

[Mahara](#)

[Microsoft® Access®](#)

[Microsoft® SQL Server®](#)

[Moodle™](#)

[Ning](#)

[OpenLabyrinth](#)

[OpenMark](#)

[PebblePad](#)

[QuestionMark™ Perception™](#)

[Quia Web](#)

[RSSBus](#)

[SIMPLE](#)

[Turnitin®UK](#)

[vpSim](#)

[WebPA](#)

[Wimba Voice](#)

## Other agencies offering guidance on assessment and feedback

[Assessment Reform Group](#)

[Assessment Standards Knowledge Exchange \(ASKe\)](#)

[Centre for Excellence in Teaching and Learning in Assessment for Learning](#)

[Institute of Education University of London](#)

[JISC TechDis](#) (for guidance on inclusivity)

[The Higher Education Academy](#)

[The Higher Education Academy Subject Centres](#)  
(for discipline-specific guidance)



## Supplementary online resources

The supplementary resources which accompany **Effective Assessment in a Digital Age** open up additional opportunities to learn more about the topics and themes covered in this publication.

Included in these resources are detailed versions of the case studies, video case studies and video and podcast material from the JISC Assessment Symposium 2010.

To meet the different requirements of users, some resources are provided in alternative formats. These include Adobe® Acrobat® PDF and Microsoft® Word® versions of the publication and transcripts of the multimedia resources. The publication can also be ordered free of charge in hard copy.

Video clips are available in Windows® Media® and QuickTime® file formats and the podcasts as MP3 files. Downloadable transcripts are available alongside these resources for users of screen readers.

All the supplementary resources provide flexible and timely access to information and can be combined with locally available resources to generate wider discussion, for example in professional development contexts.

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<b>Publication</b>	Adobe Acrobat PDF and Microsoft Word formats <a href="http://www.jisc.ac.uk/digiassess">www.jisc.ac.uk/digiassess</a>
<b>Full-length case studies</b>	Microsoft Word format <a href="http://www.jisc.ac.uk/digiassess">www.jisc.ac.uk/digiassess</a>
<b>Online resources</b>	Windows Media, QuickTime and MP3 file formats <a href="http://www.jisc.ac.uk/assessresource">www.jisc.ac.uk/assessresource</a>
<b>Videos</b> Windows Media and QuickTime file formats	Enhancing graduate attributes University of Bedfordshire Facilitating peer and self-assessment Loughborough University and the University of Hull Putting principles into practice University of Strathclyde Reflecting on feedback University of Westminster Voices from the JISC Assessment Symposium 2010
<b>Podcasts</b> MP3 file formats	<b>Dr Helen Ashton</b> Heriot-Watt University <b>Dr Peter Findlay</b> Quality Assurance Agency for Higher Education (QAA) <b>Professor Don Mackenzie</b> University of Derby <b>Professor David Nicol</b> University of Strathclyde <b>Professor Phil Race</b> Leeds Metropolitan University <b>Dr Mark Russell</b> University of Hertfordshire <b>Kate Wicklow</b> National Union of Students <b>John Winkley</b> AlphaPlus Consultancy

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## Effective Assessment in a Digital Age

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