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**IDENTIFYING INNOVATIVE AND
EFFECTIVE PRACTICE IN
E-ASSESSMENT: FINDINGS FROM
SEVENTEEN UK CASE STUDIES**

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Identifying Innovative and effective practice in e-assessment: findings from seventeen UK case studies

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Abstract

The aim of this JISC funded project was to extend the understanding of what e-assessment meant to users and producers in the HE and FE sectors. A case study methodology was employed to identify and report upon best and current practice within this field of inquiry. This approach facilitated the identification of both the enabling factors and barriers associated with e-assessment.

The variety of applications of e-assessment studied and their innovation and general effectiveness indicate the potential of e-assessment to significantly enhance the learning environment and the outcomes for students, in a wide range of disciplines and applications.

Introduction

The implementation of electronic examinations is being investigated at school, Further Education and university levels throughout the UK. The 14-19 Education & Skills White Paper presented to Parliament by The Secretary of State for Education and Skills in February 2005 states: "In the medium term we expect e-assessment to make a significant contribution to cutting the assessment burden and to improving the quality and usage of assessment". This research which set out to identify current innovative and effective practice also starts to investigate whether e-assessment can match the claims made by the DfES.

A case study methodology (Gomm et al, 2000) was adopted in order to create a narrative framework within which the barriers and facilitators of e-assessment practice could be contrasted. This research approach was preferred since it not only offered an insight into the design of the overall study as shown in Figure 1 below, but also enabled 'how' and 'why' questions to be explored in depth during the course of the interviews (see Yin, 2003).

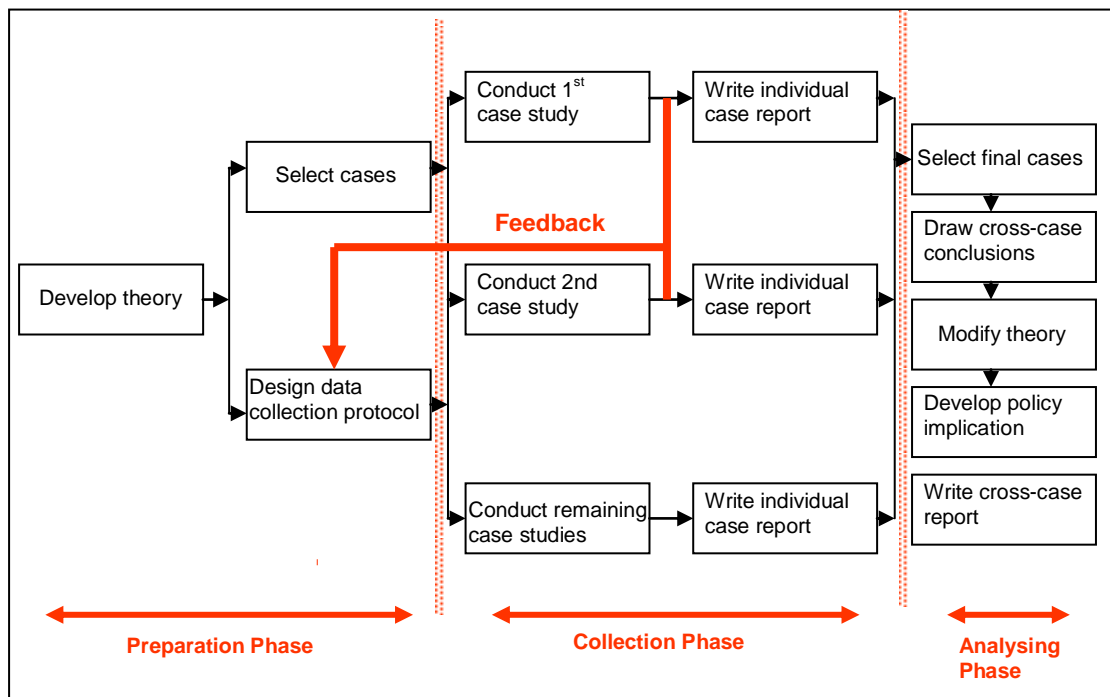


Figure 1: Case study methodology (Yin, Case Study Research, p.49)

The case studies spanned the HE and FE educational sectors in England, Northern Ireland, Scotland and Wales. Three further cases were incorporated from other sectors, including a contribution from the most recent British Citizenship Test, a continuing professional development application for nurses at Chesterfield Royal Hospital and a study of the Cambridge University's on-line admissions test, developed by Cambridge Assessment. Key personnel from twenty different sites were interviewed. These included the academic champion, the strategic supporter, tutors, students, developers and technologists.

Applications of e-assessment studied included:

- Large scale summative assessment
- University-wide formative e-assessment
- Confidence based testing
- e-Assessment in the Science and Mathematics domain
- e-Assessment being offered to large numbers of distance learners
- Mobile technology input to e-portfolio
- e-Assessment for continuing professional development
- Large scale e-assessment for the general public
i.e. British Citizenship test
- University entrance test produced by a public examination board

Sites of interest relating to these themes are illustrated in Table 1.

Case Study	e-Assessment Practice	Location & Type of Institution
1. Derby	Large scale summative assessment using the TRIADS assessment engine	HE England
2. The Open University	Numerous bespoke products including OpenMark and OpenMentor	HE England
3. Birkbeck	Assists part time students where English is not their first language. Feedback essential feature	HE England
4. Warwickshire	Assessment at work for the equine industry	FE England
5. West Suffolk	Mobile technology used to collect photographic evidence for e-portfolios on a Chef's course	FE England
6. Dundee	Staff development for quality in the delivery of e-assessment on a university-wide basis	HE Scotland
7. COLA Project	FE staff developed e-assessment questions for a repository used throughout Scotland	FE Scotland
8. Cardiff	Formative e-assessment in oral pathology	HE Wales
9. Coleg Sir Gar	IT for Business course developed and accredited by Edexcel. Formative and summative assessments	FE Wales
10. Ulster	Questionmark™ Perception™ used to supplement traditional notes and lectures	HE Northern Ireland
11. East Antrim	e-Assessment in process of becoming established throughout the Institution	FE Northern Ireland
12. Southampton, Plymouth, Loughborough	Commercial systems employed university wide throughout these three Universities	HE England
13. UCL & Glamorgan	Confidence based testing employed to encourage reflective practice for learners	HE England
14. Heriott-Watt/Surrey	Specialists in numeric and algebraic assessments also offer partial credits for answers	HE Scotland/England
15. Cambridge Assessment	Development of University of Cambridge entrance test	Public Exam Board
16. British Citizenship Online Examination	Government product produced by commercial company	e-Assessment for general public
17. Chesterfield Royal Hospital	Continuing professional development in	Professional

	medicines administration for nurses	development
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Table 1: e-Assessment sites investigated by the project

The e-assessment practices investigated, at all of the sites, were considered to be wholly or partially distinct from traditional paper and pencil tests with the majority of cases highlighting that they had broken new ground, either from a technical perspective or in their design to solve a learning or learning distribution problem. Four of the applications studied were new to the learning community. The majority of sites reported that they had seen an improvement in student results with their e-assessment applications, whilst over half declared an improvement in retention rates, with the introduction of new e-assessment practices.

One important finding was that the main driver for developing e-assessment was the prior identification of a real pedagogical need. For example at West Suffolk College, students on the chef's course are required to complete an electronic portfolio. For the last two years mobile technologies have been used by students and tutors to record evidence at their place of work such as photographs and video clips for e-portfolios. The e-portfolio used was supplied by Paperfree System Ltd (<http://www.paperfree.co.uk/>).

Students use their mobile phones to send pictures of their culinary creations produced in their working environment to their teachers at the college; these images were also included in their portfolios. Both tutors and students have reported that the teaching has become 'more alive' and this type of assessment has also assisted students previously labelled as under-achievers (because their writing skills were weak) to become more engaged.

The course has been able to demonstrate an increase in retention and achievement since using this form of e-assessment. It has increased student motivation. This model of assessment is attracting attention from the Performing Arts and other vocational courses at the College.

Other factors found to be significant in establishing widespread adoption of e-assessment throughout an institution, included active support at senior institutional management level coupled with strong staff development and, pedagogical and technical support for tutors from central services.

One of the barriers to expanding e-assessment practice identified by this study is the time and expertise required to develop innovative questions. The COLA project has addressed this issue by forming a consortium of colleges in Scotland whereby learning content is developed and shared (Sclater & MacDonald, 2004). One of the main drivers for adoption of e-assessment in this case study was the availability of funding. The Funding Council had given monies to all of the colleges to buy virtual learning environments and there was a general view that online assessment would encourage staff to use the VLEs more.

This research also uncovered different ways of employing confidence level testing. Glamorgan in their MCQ tests, require the students to indicate the level of confidence in the correctness of their answer they have selected. This gives the tutors some way of identifying misconceptions which can then lead

to pedagogical changes. Another use has been identified, at UCL, for the classes in medical diagnosis. Here the aim is to assist the students in building their 'aura of confidence' with their professional expertise.

Barriers to cross-institutional adoption of e-assessment included organisational structures that favoured autonomous academic departments, coupled with limited centralised support. Whilst such organisational structures may favour innovative developments within these pedagogically tight and discipline-focused departments, the potential for wider dissemination of the e-assessment methodology across the institution is more restricted.

The role of formative assessment and its effect upon teaching and learning was raised by a number of interviewees. Its advantages were stressed by Birkbeck in their Molecular Cell Biology course. They developed e-assessment (using the TRIAD engine, Mackenzie et al, 2004) to particularly assist students returning to Higher Education after a long leave of absence to gauge their own learning progress. This group had deliberately designed the course materials to encourage deeper learning for the students. The team also showed in their 2001 study that frequent use of computer based assessments were especially beneficial to the many students on programmes where English was not their native language (Baggott & Rayne, 2001). Patterns of use of formative CBAs have also been examined and students surveyed (using validated questionnaires) to gain an understanding for the development team of the effect of this type of CBA on study behaviour. These analyses suggest that student learning benefits from the type of e-assessment approach that has been adopted by Birkbeck. Students also appreciated this type of assessment and one student explicitly stated:

"These tests help you reflect upon what you don't know"

and

"...not a boring way to learn"

The British Citizenship Online test which was commissioned by the Home Office is being used by about 60,000 applicants each year. The advantages identified by the commercial group who produced this assessment, was that a tried and tested assessment engine had been chosen to deliver the project. Therefore the project did not start from scratch and could be delivered on time. The driver for adoption of e-assessment for this particular application was that research had shown that learners are more responsive and less nervous if the test is delivered online. e-Assessment is also open to more statistical analysis and its objectivity can be demonstrated easily.

Conclusions

The variety of applications of e-assessment studied and their innovation and general effectiveness indicate the potential of e-assessment to significantly enhance the learning environment and the outcomes for students, in a wide range of disciplines and applications.

The studies illustrate that the principal facilitators for effective implementation of e-assessment include active institutional support from senior management with strong staff development, pedagogical and technical support for tutors

from central services. The role of pedagogically sound, imaginative design for e-assessment on the part of tutors is often a significant factor in its success.

Drivers for adoption of e-assessment included perceived increases in student retention, enhanced quality of feedback, flexibility for distance learning, strategies to cope with large student/candidate numbers, objectivity in marking and more effective use of virtual learning environments.

The principal barrier to development of institution-wide e-assessment remains one of academic staff time and training. Dissemination of pockets of innovative e-assessment practice across an institution can be hampered by organisational structures that favour autonomous academic departments, and limited centralised support.

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