

Practical implementation of e-testing on a large scale, and implications for future e-assessment and e-learning

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e-Assessment

In recent years the adoption of e-assessment has taken off rapidly. Large numbers of people have taken on-screen assessments, indicating that the technology is entering the mainstream. BTL Group, which is a UK company specialising in the development and implementation of e-learning and e-assessment content and systems, has been heavily involved in the development of tests and delivery technology, and in the provision of ongoing delivery services.

On screen test delivery has grown particularly rapidly in the area of Skills for Life (literacy, numeracy and ICT), with at least three UK examination boards offering an on screen option. Current estimates are that well over 100,000 candidates have taken this option so far in 2005, as compared with zero three years ago. These tests are multiple choice and basically ask the same questions as the paper based equivalent – although the results are better on screen than on paper. Although this is not well understood it gives us a fascinating glimpse of the potential.

e-Assessment in the UK

Alongside this the UK government's Qualification and Curriculum Authority (QCA) announced a proposed blueprint in April 2004 which included the following key features.

- All new qualifications should include on-screen assessment
- Awarding bodies should accept e-portfolios
- Most exams should be available optionally on-screen (where appropriate)
- National Curriculum Tests should be available on-screen for those who want them
- On-Demand GCSEs to be introduced
- 10 new qualifications specifically for electronic delivery to be introduced.

These proposals were built around a timetable which leads to the movement to e-assessment becoming routine where appropriate in 2009.

Innovative Test Items

All this adds up to the cat being well and truly out of the bag. In practice a wide range of innovative test items are possible on screen that could not have been contemplated on paper.

At one level there are test items (“semi-innovative”) that could in principle be conducted on paper. They test things that could be tested on paper but use techniques that are only possible on screen. The many variants on “drag and drop” usually fall into this category, as do items such as “matching pairs”, and “click on the part of the picture that shows the...”.

At another level there are innovative test items that simply cannot be done in any other way. Examples of these are usually built around simulation, and include such things as virtual laboratories and virtual field trips, in addition to the well established skills trainers such as flight simulation.

Although there will be some obstacles, the reasons for using innovative items on screen will become utterly compelling. The extent to which tests on paper test “paper based” skills (and sometimes nothing else) will become clearer.

Assessment and Learning

Once assessment begins to use techniques that are only possible on screen then learning will need to reflect this and in many instances will also have to take place on screen (at least in part). In other words, e-assessment will drive e-learning to become something much more than textbooks on screen.

At the same time it is likely that Assessment for Learning (formative assessment) will play an increasing role. This has been widely researched (see Black and Wiliam 1998), largely in terms of the ways that feedback can be provided by teachers through verbal questioning, marking and peer and self-assessment. The provision of direct feedback for learners opens up a new dimension and of course is particularly important in the context of e-learning. In particular, feedback can occur at the level of the individual question or part question, and furthermore the feedback can be instant – an important factor from a motivational point of view. This is exploited in the btl engage™ technology (see below).

One further point is important in this context, and this is brought out by the flight simulation example. A simulator, once created, can be used just as well for learning as for assessing. In other words the assessment medium and the learning medium are the same. There is no point in putting anything on paper, and in fact the paper based skills are in many respects redundant. Thus for example a pilot can learn on a flight simulator and demonstrate that learning has taken place using the flight simulator. In fact the progress of the learning can be monitored automatically. *The same applies to the use of simulation in any learning context.*

There is not space here to go in detail into the implications of this, but it does mean that potentially many paper based skills (such as mathematics) will no longer be needed when a good quality simulation is available for both learning and assessing purposes. This will meet considerable resistance!

Practical experience

The author's company has worked with a number of key partners, including the UK government, examination boards and government agencies, and has been involved in the production and delivery of on-screen tests on a national scale via a large number of delivery locations including schools, colleges and learning centres. Practical lessons are being learned all the time and these include the following.

- As with paper based materials, good quality authoring remains crucial.
- Every detail of screen presentation is important, as is the quality of design.
- Results are often better on-screen than for the same questions on paper.
- High volume delivery is a realistic practical proposition.
- A majority of candidates prefer on screen testing.
- Instant feedback of results is very attractive to learners.

Itembanks

The introduction of on-screen testing on a large scale inevitably leads to the creation of itembanks of digital questions. This in turn creates opportunities for new approaches to testing. Individual questions can be pre-tested in the usual way, and once the itembank is large enough complete randomised tests can be assembled on demand. This in turn opens the door to “when ready” testing. There will no longer be any need to adopt the traditional approach of testing all candidates at the same time on the same day. The implications of this for the way that schools and colleges are organised are profound. Whilst it has been said for years that e-learning would have a major impact on schools, without much happening, there is every reason to believe that changes in assessment will have a much more immediate impact.

Learning Journey

One way to consider how e-learning and e-assessment might develop is to consider the “learning journey” each learner goes through. Typically this might involve some form of pre-assessment (screening, diagnostic etc), an individual learning plan, learning materials and formative and summative assessments. In a traditional context some of these items would be learner centred and some would be teacher centred. In the e-learning world this balance would change and the interplay between learning and assessment would be more complex.

One example is in the area of Skills for Life. It is now possible, using e-learning and e-assessment throughout, to complete a full learning journey from beginning (initial aspiration or need) to end (Skills for Life Certificate). My company has developed many of the materials, which are now widely available. In a number of other contexts it is now possible to go from an initial enquiry on Google, through paying on line, to a final qualification in a remarkably short period of time - without ever encountering a teacher.

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The above issues have led to the current approach to e-learning being re-considered. In the traditional Learning Journey, assessment (summative or formative) is preceded by learning – or rather it is preceded by teaching. On the other hand it is well known that the key to learner motivation is the internalisation of a problem or question, often giving rise to “cognitive conflict”, following which real learning can proceed.

The technology which drives btl engage™ was devised with this in mind. Learning always starts with a problem or a question, and the learner is offered a choice of three basic routes through the material. “Show Me” equates roughly to a traditional worked example; “Try Me” equates roughly to a traditional question, but with the added option of automarking and the correct answer being made available; and “Guide Me” achieves the same result as a teacher looking over the learner’s shoulder, but without the psychological pressure this normally involves. The latter has a focus on identifying errors immediately they occur, this being based on the view that if a learner knows the *location* of an error then this brings about a focus and a motivation which maximise the chances of the problem being solved without the learner having to be told.

Some initial trials are under way and it is hoped to be able to report the early results.

References: Inside the Black Box Black and Wiliam (1998). London:School of Education, King’s College.

*btl engage is the subject of patent applications in the UK and US.