

Technology-Enhanced Summative Assessment

Assessment 21

As part of the JISC-funded Integrative Technologies Project (Integrate), a project being delivered in partnership between the University's flagship Business School and Education Enhancement Unit, investigations were undertaken into summative technology enhanced assessment.

Background

A Professor in the University of Exeter Business School approached the University's Education Enhancement Unit as he wanted to use technology enhanced assessment for a group of 117 M-level students studying his module Entrepreneurship: New Venture Development. The Unit had recently been awarded funding for a JISC project under the Transforming Curriculum Delivery strand for the Integrate project and the Professor's request for support fit well with the kind of work being undertaken.

Initial discussions with the Professor revealed the assessment would be summative and weighted at 50% of the module mark. Aside from that he was open to ideas as to how to do it. Early questions included how long should the exam be, given that students would be sat at computers for the duration, how many questions could be included, what types of question would be most suitable and where the students would sit the exam. It was initially decided to run an open book, two hour exam with a mixture of multiple choice and short answer questions. Being open book, the students would be allowed to sit the exam from any computer with an internet connection. This raised a number of issues, such as students' computers not being able to run the java-based exam software, not knowing whether the correct students were sitting the exam, students' losing their Internet connections etc.

The issue of students sitting the exam in groups and discussing their answers was less of an issue as it was felt that if the students were learning by way of their discussions, then there wasn't too much of a problem. In order to get round the problem of students' laptops not being up to scratch the idea was mooted that they should take them to one of the laptop clinics run by Desktop Support. In order to address the problem of Internet connections it was suggested that students could use their own equipment in one of the larger lecture theatres where Cat 5 and power sockets are standard. However, for a number of reasons, the idea of running an open book, any location exam was dropped in favour of an exam run under invigilated conditions.

Assess By Computer

Assess By Computer, or ABC, is a technology supported assessment tool produced by Assessment 21 Ltd. In common with other assessment tools, ABC offers electronic testing using a number of different question types. Tests are put together using Assessment21's setting tool and typical options include: length of assessment; whether or not to give feedback after the test; whether or not calculators are permitted (a soft calculator can be made available to students through the test environment); which

maths symbols are to be available; and whether support for a number of foreign languages is to be made available.

More information can be found on Assessment21's website, here: <http://www.assessment21.com/>

A key reason for choosing ABC for the exam was the reorganisation of marking. Instead of viewing questions that need manual marking script by script, student by student, answers are organised question by question. This allows a greater parity in marking as all questions can be compared side by side for likeness to the model answer and likeness to each other. This reorganisation can offer time savings as a marker can concentrate on a single question without the need to move from script to script.

Another powerful feature of ABC is the invigilation tool. The tool shows each student's location (when they enter their PC number and this is mapped to a room layout), whether or not their exam client is talking to the server, when the last backup of their work was made and whether or not the focus of their browser is still on the exam client or not. This is useful in closed book exams as it can highlight any students who are doing something else and an invigilator can look at their screen to check what they are doing. The invigilation tool can be monitored from a PC in any room and also allows invigilators in different rooms to use a text chat facility to report any problems or to ask questions about procedure, for example. The invigilation tool can also be used to allow (and disallow) access to the exam when everyone is ready to start.

Exam Duration

Further to discussions in the Education Enhancement Unit, it was felt that an exam of two hours duration would be too long a time to spend looking at a display screen. Whilst it may be true that people spend a lot longer looking at display screens both for work and social purposes, adjusting their focus to look away from the screen at times, it was felt that the provision for adequate breaks couldn't be catered for in an invigilated exam. The Health and Safety Executive suggest breaks of 5-10 minutes per hour and if there is no opportunity for a change in activity then rest breaks should be provided with opportunities to move around, or at least stretch and change posture (HSE, 2009). For this reason the exam was curtailed to ninety minutes. In part this was made possible by the weighting of the exam as it was felt that an exam weighted at 50% of the total module mark could be 90 minutes duration and still adequately test students' understanding.

The University's Disability Resource Centre (DRC) were contacted in relation to two students who were allowed extra time to complete exams – 15 minutes per hour. The DRC was asked if there were any specific reasons why the two students in question should not or could not complete a technology enhanced assessment. Each of the students was contacted by the DRC, but no further adjustments were necessary. During the exam another student came forward and said he should also have extra time, but didn't. This was checked with the Student Support office and the student was given the extra time necessary at the end of the exam.

Devising Questions

When writing the questions, a great deal of attention was put into appropriate wording and distractors for multiple choice questions, although it was felt that more keywords could have been used in questions, particularly those requiring free text answers, as a way of signposting for international students.

Exam Preparation

The Professor wrote the questions for the exam over the first 10 weeks of term whilst he was delivering the module. The questions comprised a mixture of multiple choice and short answer questions on all of the topics covered during the module. The exam was put together using Assessment21's Setting Tool, an environment that allows the input of a number of different question types, and uploaded to an Assessment21-hosted server. In order to familiarise students with the exam client, a trial run of the exam was run a week before the formal exam. This also gave the invigilators the opportunity to see how a technology supported assessment would run.

A number of people were present at the trial in order to ensure smooth running of the session and to offer specialist support if required. They included representatives from Desktop Support, the Integrate Project's Project Manager and Learning technologist, invigilators from the Business School and a technical specialist from Assessment21. The trial run was compulsory for all students and held under invigilated conditions. The questions presented were trivia-based and designed to give the students experience of each of the different question types that would be used in the formal assessment. Due to a timing issue, the students didn't receive their usernames and passwords until the trial run and they were handed out at the start of the session. This caused a fair bit of chaos and it is strongly recommended to issue all students their usernames and passwords prior to any exam taking place.

Holding the exam under invigilated conditions presented problems around the number of computers (and rooms) required. In this case, three rooms were needed, although one of those could be combined into one room seating 94. The other has 30 machines. When taking into consideration computer failure and the number of seats available, these two rooms offered the amount of space required. In order to test larger group of students either more rooms would be required so that each group of students sat the same exam, or a bank of questions would be required in order that each sitting or the exam had the potential to offer students sufficient different, but comparable, questions. As a rule of thumb it was felt that between 4 and 5 times questions presented at each sitting would provide an adequate number of questions. As final exam could be run in a single sitting 89 questions were presented. If a larger cohort had to sit the exam, say 400 students, in 4 sittings then somewhere in the region of 400 questions would be required to make up an adequately sized question bank to ensure sufficient randomisation.

ABC doesn't offer the facility to draw questions from a bank, although software suites that do would, under the many sittings model, effectively offer each student an 'almost unique' exam. For this reason, questions would need to be sufficiently comparable, such that two students sitting the exam would receive questions of very similar difficulty. Also, opportunities for academic dishonesty can be mitigated to an extent through the number of questions asked – the theory being the busier students are during

the exam, the less opportunities there will be to look at a neighbour's screen. Of course, students should be made fully aware what will be expected of them (how many questions in total, in each section, whether or not sections are equally weighted etc).

The Formal Exam

The trial run was invaluable in setting the scene for the formal exam and it meant that everyone involved knew what was going to be expected. Students all had the correct username/password details and knew which room to go to. The invigilators were prepared, the Desktop Support Team sent several people to help with computer issues when the students were getting logged in and Assessment21 were monitoring the exam remotely and at the end of a phone if required.

One student had a broken leg on the day of the exam and as the lift was out of order in the building being used special arrangements had to be made. In this case the student sat the exam on a networked laptop in an office in a different building with their own invigilator. Using the invigilation tool it was also possible to monitor the activity of this remote student.

The atmosphere in the exam rooms was one of intense concentration and students were busy throughout. It was noted that most students went through the exam the first time answering all of the questions they could and then came back to questions they found more challenging. Only two or three students finished the exam before the 90 minutes elapsed, with most letting out a groan as the exam client informed them they were out of time and would not be allowed to answer any more questions. As answers are saved automatically, all the students had to do was submit their final script. It was at this point the student who wasn't allocated the extra time he was entitled to was allowed to go back into the exam and was allocated the extra number of minutes. The procedure is very similar to what can be done if a student's computer fails and they must move to another machine and recommence the exam from their last backup. If the student hasn't noticed there is a problem with their computer the invigilation tool can be used to flag up unexpected events, such as backups being missed for a period of minutes. In this case students can be moved by an invigilator to another machine.

Despite the technology enhanced nature of the exam, no comments were made about it being either better or worse than a paper-based exam and, perhaps more importantly, no complaints were made. The final results for the exam revealed a wide spread of marks, suggesting that the questions were of appropriate difficulty.

Feedback

From invigilators:

Invigilators felt the exam went very smoothly and they were impressed with the depth of concentration in the room. Administrators from the Business School came to the exam part way through to see how things were going, as this was a first for them, and they were also impressed with how well the exam was running.

From students:

Liz to insert replies she got from students here.

From the Professor and marker:

Both the Professor who originally approached Education Enhancement for help with the exam and the additional marker working on the module enjoyed the experience of working with technology enhanced assessment. The additional marker was particularly impressed with how technology enhanced assessment removes some of the need to decipher what students are saying before deciding whether or not they had answered the question. Both academics involved in the project felt there was an efficiency to be gained in marking free text answers question by question rather than script by script.

Checklist of Things to Remember

Do the relevant areas of the institution know what you're planning to do and when?

Who will you turn to for support if there is a problem with the exam on the day?

Are the invigilators prepared for invigilating a technology enhanced exam?

Will you be able to have a trial run to ensure that everything works as expected?

Have you adequate signage for all the doors for the computer labs you'll be using?

Will you have adequate time to prepare the room prior to the exam?

Have you got enough computers to run the exam simultaneously for all students or will you need to run multiple sessions?

Have all of the students been issued with any usernames and passwords they will need to access the exam?

Should any of the students sitting the exam have any extra time allowed or have any other special arrangements made?

Will all of the computers you plan to use have the correct software installed?

Do all of the computers work properly and have all the necessary peripherals?

How will you ensure students are only using the software designated for the exam and not using the internet or other programs?

What will you do in the event some computers/peripherals fail during the exam?

Will you provide paper copies of the exam paper in case computers fail and students are not able to access the technology enhanced assessment?

Have you got a contingency plan in the event that the exam cannot run due to problems out of your control?

Are there enough chairs and are they in good working order?

Is there somewhere suitable to write any necessary instructions?

References

HSE, 2009. *Display Screen Equipment (DSE): Frequently asked questions (FAQs)*. Available from <http://www.hse.gov.uk/msd/dse/faqs.htm> [accessed 23rd November 2009].