A short course assessment strategy with formative impact

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Summary
An online system has been developed for the summative and formative assessment of a short Open University ‘Maths for Science’ module. The system provides students with prompt feedback that is detailed and targeted.

The assessment system has been well received by students and is currently being adapted for use by other Open University courses.

The Project relates to several of the 11 conditions for effective formative assessment, most closely:

- Sufficient feedback is provided, often enough and in enough detail
- The feedback is provided quickly enough to be useful to students
- Feedback focuses on learning rather than on marks
- Feedback is acted upon by students in order to improve their work or their learning

Module Details

Name S151 Maths for Science
Details 10 CATS points, Level 4, studied by about 1500 mainly-mature students per year.

Teaching methods This OU course comprises printed materials and a CD-ROM. Support is provided via a telephone advice line and a computer conference.

Other information The single summative assessment is delivered online and includes targeted feedback.

The challenge
The Course Team wanted to provide feedback that was detailed and targeted to the precise mistake that had been made, and to do so promptly. With these characteristics, the summative assessment would have a formative function.
Initial analysis

Reflection on current practice pointed towards the desirability of providing students with personalised and detailed feedback. The use of a web-based system would enable this feedback to be given instantaneously.

Questions delivered by CD-ROM and with a purely formative function have been used on several OU science courses and have been well received by students. Technological developments gave confidence that an online assessment could be delivered reliably to students' home PCs, and that student record systems would be robust. In addition, it had become reasonable to assume that students taking this course would have access to the Internet.

Changes introduced

An online assessment system was developed, with each End of Course Assessment ECA containing 35 questions. Most questions exist in several variants but the feedback provided is specific to the actual question that has been asked. Students can make up to three attempts at each question, with increasing feedback provided after each incorrect attempt. A full solution is provided after three attempts. The marks awarded decrease in line with the number of attempts. The ECA is available to students for the final 3-5 weeks of each presentation and within that time, students can spend as much time as they wish on the assessment.

A purely formative ‘Practice Assessment’ (PA) is also provided. This is available throughout the course and can be attempted as many times as a student wants.

Measuring the effects of the changes

The course and its assessment package have been extensively surveyed using a modified version of the Assessment Experience Questionnaire AEQ (Gibbs and Simpson 2004) and other course-specific questionnaires. In addition, log files give detailed information on student usage.

Discussion and evaluation

The online assessment has been very well received by students, with many comments such as ‘perfect for distance learning’ and ‘I found submitting on the web very convenient’. 79% of those who returned the 2002 S151 Questionnaire would like the OU to develop more online assessments of this type.

For the January 2003 ECA, the median time spent online on the ECA was just over 3 hours, in 5 sessions spread over 32 hours. The range of online time was large (from 47 minutes to 8 hours, in 1 to 28 sessions) but there was no obvious relationship between time spent on the ECA and score. By January 2005 a function had been added to the ECA, in response to overwhelming student demand, which enabled students to print the entire assessment before attempting any questions. This reduced substantially the average time spent online (the median was reduced to 88 minutes, with a range from 13 minutes to 6.8 hours), but the ECA performance (pass rate, distribution of marks etc.) was otherwise unaffected.
There is clear evidence that the prompt feedback was acted upon. For example, in a question which asked for an answer to a specified number of significant figures, all of the incorrect responses were corrected by the next attempt. However, evidence relating to student perception and use of the feedback provided is somewhat contradictory. On the one hand, 74% of students who completed the 2002 S151 Questionnaire agreed that ‘the instantaneous feedback associated with the feedback helped me to learn’ and 79% agreed that the feedback had helped them to obtain the correct answer at a subsequent attempt. Yet, the AEQ scores for timing, quantity and quality of feedback were not as high as expected. There are three possible explanations for this apparent contradiction.

1. Students and course teams understanding of ‘feedback’ are different.
2. Successful students do not experience the full available feedback.
3. For some students, the focus remains on marks rather than learning.

Students who attempt the PA (however briefly) are very much more likely to submit the ECA though this relationship may not be causal. There is no evidence that students who spend longer on the PA are more successful in the ECA. However, students who have attempted at least 25 of the 42 questions on the PA seem to be more likely to pass the ECA.

The project has been highly successful in providing students with instantaneous and targeted teaching feedback on summative as well as formative online assessments, at the same time as saving script marking costs. A useful side effect has been an increased understanding of students’ mathematical misconceptions, gained from analysis of the data-files for each question.

References