Supporting open learners by computer based assessment with short free-text responses and tailored feedback

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EXTENDED ABSTRACT

It is widely recognised that feedback on assessment tasks has an important part to play in underpinning student learning, encouraging engagement and promoting retention (see for example [1], [2]). Online assessment provides an opportunity to give immediate feedback, but providing feedback which is targeted to an individual student's specific misunderstandings is more difficult. Multiple choice questions enable specific feedback to be provided in response to predefined responses, but these questions narrowly constrain how students may respond [3] and concern has been expressed over their reliability, especially when used for summative purposes [4].

Online interactive assessment has been used within the UK Open University since 2002 and is currently used for diagnostic, formative and summative purposes. The 'OpenMark' assessment system [5] is linked to the Moodle virtual learning environment (VLE) [6] and enables students to be provided with instantaneous and targeted feedback on their responses to questions of a range of types, including those requiring free-text entry of numbers, symbols and single words. The aim is to simulate 'a tutor at the student's elbow' [7], pointing out the student's error as specifically as possible, and providing a suggestion for how it might be corrected. The student is allowed three attempts at each question, with increasing amounts of teaching feedback provided after each attempt. The student is thus able to act upon the feedback in order to correct their answer and to learn from the process.

In an attempt to extend the application of assessment of this type, a pilot study is using an authoring tool supplied by Intelligent Assessment Technologies Ltd. (IAT)[8, 9] to write questions requiring free-text answers of up to around 20 words in length – typically a single sentence. The IAT authoring tool is linguistically based, which means that an answer such as 'kinetic energy is converted to gravitational energy' is recognised as being different to one such as 'gravitational energy is converted to kinetic energy', and an answer of 'The forces are balanced' is marked as correct whereas an answer of 'The forces are not balanced' is not. The tool looks for understanding without unduly penalising errors of spelling and grammar.

A novel feature of the current project has been the use of student responses to early developmental versions of the questions – themselves delivered online – to improve the answer matching. Another novel feature is the provision of targeted feedback for both specifically incorrect and incomplete answers, as illustrated in Figure 1. It could be argued that computer-generated provision of immediate and tailored feedback is particularly important to distance-learners, and OU students may also lack conventional entry qualifications for higher education study. However, several of the more generally applicable conditions identified by Gibbs and Simpson [10] 'under which assessment supports students' learning' relate to the provision of timely and relevant feedback.

Students have been observed performing the assessment tasks. Most claim that they wrote their responses as if for a human marker. However a few were conscious that they were being marked by a computer and anticipating (incorrectly) that only keywords were required, entered answers either in note form or in very long sentences. Most students enjoyed the assessment tasks and seemed comfortable with the concept of a computer marking free-text responses. Where the initial response was incorrect, most students were observed to use the advice provided by the feedback and many reached the correct answer.

A human-computer marking comparison has indicated that the computer's marking is typically indistinguishable from that of six subject-specialist human markers. The computer's marking was generally accurate, showing greater than 95% agreement with the question author.

Designing suitable questions, using the authoring tool to write the answer matching, and refining the answer matching in response to student responses is a time-consuming task, requiring skills in assessment design, a logical mind-set and some subject knowledge. This raises questions regarding the extent to which it is realistic to roll-out the use of assessment of this type, and whether it is better for the questions to be authored

by an academic or an expert in the use of the authoring tool. The project is also considering the extent to which assessment tasks of this type might be appropriate within different academic disciplines.

Many of the short-answer questions written as part of the project have proved remarkably robust, so a small number of questions of this type are being incorporated into regular interactive computer marked assignments (iCMAs) on a new distance-learning interdisciplinary science module. These iCMAs sit alongside the course's tutor-marked assignments (TMAs) as part of an integrated assessment strategy, in which the TMAs and iCMAs are used to support student learning in different but complementary ways. The iCMAs' primary function is to help students to pace their study through the course, but they carry some credit to encourage students to do them.

Keywords: Computer based assessment; free-text; feedback

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Figure 1 A free-text question with feedback tailored to the student's response