

The PASS-IT project – Project on Assessment in Scotland Using Information Technology – is exploring the use of information and communications technology (ICT) for assessment in schools and colleges, by developing and piloting assessments for a range of qualifications.

The project, which will last for just over two years, is in two Phases, the first of which was completed in October 2003.

This leaflet provides an overview of the project, describing the background and identifying the outcomes which it will produce. It also outlines the activity undertaken in the first Phase. Towards the end of the leaflet there is a more technical summary of the research findings relating to Phase One.

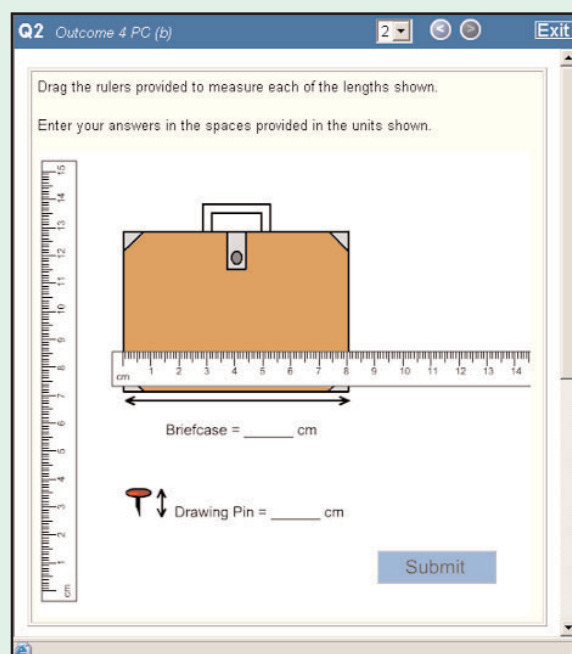
Overview of PASS-IT

PASS-IT is a Scottish Executive funded project which began in August 2002, the aim of which is to create, pilot and evaluate a number of different approaches to ICT-based assessment in Scotland's schools and colleges.

The project is a partnership between the Scottish Qualifications Authority (SQA), Learning and Teaching Scotland, BBC Scotland, the Scottish Further Education Unit and SCROLLA (the Scottish Centre for Research into On-Line Learning and Assessment at Heriot-Watt University). These key players in Scottish education are working together to investigate how best to exploit ICT-based assessment to enhance flexibility, to improve attainment and to support teaching and learning in the Scottish education system.

The outcomes of the project will include:

- A research report examining the viability and applicability of ICT-based assessments
- Guidelines on quality assurance for ICT-based assessments
- Good practice documentation on question writing
- Staff development and training activities for colleges and schools
- Recommendations for future activities and development
- Updates and dissemination events for students, parents, teachers and institutions
- Recommendations on a national implementation strategy.



Activity in Phase One

During Phase One (August 2002 – October 2003) the project team worked with SQA principal assessors and qualifications managers to develop a range of ICT-based assessments for National Assessment Banks (NABs) in Mathematics and Chemistry (Higher and Advanced Higher) and in HNC Computing. Figure 1 shows an example of an ICT-based question in Mathematics.

Between March and May 2003, pilots of the ICT-based assessments took place in seven schools and in three further education colleges. The participating centres contributed to the research aims of the project and an evaluation of the pilots.

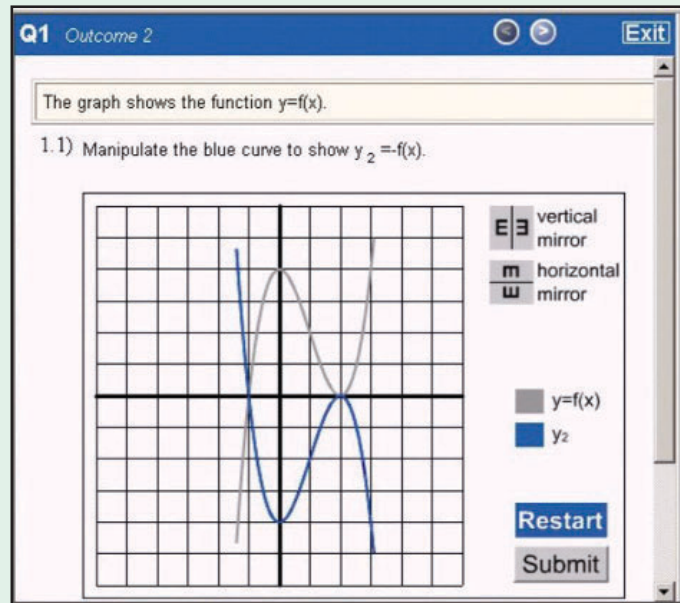


Figure 1

Evaluation

An evaluation towards the end of Phase One sought to capture experiences and perceptions of ICT-based assessment, and to identify issues concerning their practical and organisational delivery. The evidence gathered from centre staff highlighted a wide range of issues, including:

- Timing of the pilots
- Nature of the assessment
- Technical issues
- Organisational issues.

The outcomes of this evaluation have helped in the planning of phase two and in the development of the research aims of the project.

Research

The scope of the research was broad, encompassing many aspects of learning and assessment. In Phase One, the project sought to:

- Examine the impact of medium of delivery
- Explore the effect of providing 'steps' in the assessment questions and feedback on student performance
- Gather and analyse student and staff experiences and perceptions of ICT-based assessments.

One of the unusual features of the assessment design approach and CUE software used to pilot the assessments is the capability to break down questions into several distinct parts or 'steps' as shown in Figure 2. This provides students with a choice of whether they answer questions in one or more parts, which can then be reflected in the marking strategy.

This section summarises the research report on Phase One.

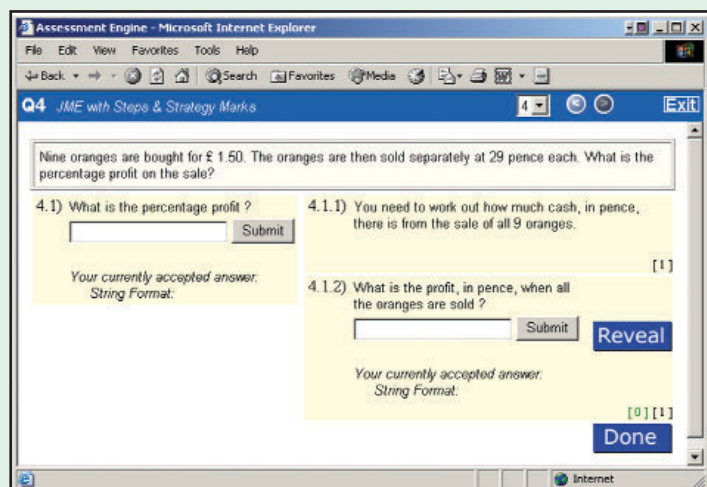


Figure 2

Traditional tests in Chemistry, Computing and Mathematics were chosen for research over 10 centres with more than 400 candidates. The research questions addressed varied from subject to subject and are summarised opposite.

Research findings in Phase One (August 2002 to October 2003)

Moving from a paper examination to one on computer involves several changes. For example, the questions may have to be reworded and/or rephrased to allow the answers to be entered via a keyboard or mouse. Thus, in Chemistry and Computing, in line with earlier studies in Mathematics (1, 2), the following questions were posed:

- Does changing the medium for test delivery have an effect on the marks obtained?
- Does changing the wording for ICT delivery have an effect on the marks obtained?

Analysis of the research findings took account of ability, gender, school and class. There was no evidence of an effect in Chemistry and Computing as a result of a change of medium or wording. In Chemistry, there was a small gender bias, with slightly higher average marks for male students.

In Higher Mathematics, earlier investigations at Heriot-Watt University required further study. For instance, in a paper examination, partial credit can be gained for answers which are incorrect but contain some of the correct ideas. Such credit is normally awarded on the basis of the number of learning outcomes that have been satisfied. The following questions were therefore asked:

- How does the student performance on paper where partial credit is awarded compare with performance on an ICT exam in which optional steps are available (but where marks may be lost for making use of the steps)?
- How does the student performance on paper where partial credit is awarded compare with performance on an ICT exam in which the student is given immediate feedback in the form of ticks and crosses to indicate where an answer is right or wrong and, if wrong, given the opportunity to resubmit the answer as often as desired?

Ability, gender, school and class were again variables in the statistical model. There was no evidence of a difference between the paper-based and ICT-based varieties of the Higher Mathematics NAB unit 2 test. Not surprisingly, there was some evidence that students in the middle range of ability took advantage of steps in a few of the questions.

In Advanced Higher Mathematics, the same issue of partial credit occurs as in Higher Mathematics but the questions are at a more advanced level, giving rise to more complex issues. The research question in this part of the study was formulated as follows:

- How does the student performance on paper where partial credit is awarded compare with performance on an ICT exam in which steps are available to the student (but at a penalty of losing marks)?

The Advanced Higher Mathematics NAB unit 1 was split into two half tests, with students in two schools taking one of the half tests on paper and the other half test on computer. The statistical tests revealed weak evidence of a difference between the two forms of the test, but only in one question where follow-through errors occurred for those taking the computer test. There was weak evidence of a gender effect, with females scoring more marks on average.

The research has sought to identify questions that cause no difficulty in translation from paper to computer, and those that do, and to identify the resulting issues which need to be addressed.

There has been an emphasis on special educational needs throughout the study. Efforts have been made to produce tests on computer in which the user can change font in size, style and colour with, in addition, a choice of background colour. The tests can be used with the screen reading package JAWS to help blind and partially sighted users.

Finally, PASS-IT has been able to provide a broad study ranging from answers in the form of mathematical expressions to those involving free text responses. In the former case, the technology developed at Heriot-Watt University has been employed (see (3) for more details), while in the latter case, the services of the software firm Intelligent Assessment Technologies (IAT) have been used (4), based on their own technology, to investigate present and future capabilities of automatic marking of free text responses.

Intelligent Assessment Technologies, in a separate report (5), addressed the ability of their technology to mark electronically a range of short free text responses in Mathematics, Chemistry and Computing. Their report predicts the number of student responses needed to provide more accurate automatic marking of free text responses across this range of subjects. Their engine experienced some difficulties with mathematical notation and the more open-ended questions in Computing, but coped very well with free text responses in Higher Chemistry.

Phase Two

Phase two of PASS-IT, which will continue until October 2004, will carry forward the development of ICT-based assessments, extending to a range of new subject areas and levels including:

- Maths Access 2 and 3
- Maths Intermediate 1 and 2
- Music Higher
- French Higher
- English Intermediate 1.

Project staff will again be working with subject specialists to explore ways in which existing paper-based assessments can be transformed, amended and re-designed for an ICT-based format. A number of centres across Scotland have agreed to participate in the pilots between December 2003 and May 2004.

During this Phase there will be further exploration of some of the research issues addressed in Phase One. These will include: the effect of medium of delivery where listening forms part of the assessment, for example in languages and music; the use of 'steps' in subjects other than mathematics; the validity of different styles of questions for assessing the same learning outcome; and the potential for automated short text assessment in a range of subjects. Also of particular interest in Phase Two is the exploration of special educational needs in relation to ICT-based assessments.

ICT-based assessment has the potential to enhance the assessment process, offering teachers and students new opportunities for flexible and diverse assessments, as well as assisting in the integration of learning and assessment. The outcomes of PASS-IT will help to inform the future direction of research and highlight issues concerning implementation and scale up.

Acknowledgement

The PASS-IT team wishes to thank all the teachers, lecturers, technical and other staff in schools and colleges who welcomed the PASS-IT team, and who have helped and continue to assist with the collection of data for the project.

Further information about PASS-IT can be found on the project website:

<http://www.pass-it.org.uk>.

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