

Formative Feedback to Improve Learning on a Teacher Education Degree using a Personal Learning Environment

Magnus M B Ross and Mary P Welsh,
University of Strathclyde

Abstract— This paper reports on an action research project involving a structured, formative assessment feedback process, within a personal learning environment (PLE), to address concerns about effectiveness of previous course delivery. The project ran during session 2006-07 involving the use of a series of tutor mediated self and peer assessed core tasks associated with five distinct learning milestones. These were associated with identifiable blocks of lectures delivered by different staff involved in the programme. The series of Core Tasks placed progressively increasing demands on students so helping them develop more sophisticated learning skills as the year progresses. The PLE is used as the medium for self/peer assessment processes and for tutor feedback and mediation.

Index Terms— E-learning methods, methodologies and tools; Pedagogical and psychological issues; Real world experiences; Pilot projects/Products/Applications.

INTRODUCTION

This project was conducted in the first year education studies element of a 4 year teacher education degree for students intending to teach in primary schools in Scotland involving over 160 students per year. The course was identified in feedback as being a “difficult” class. Tutors saw a problem of lack of engagement with content and disappointing quality of resulting student work. There was a perception of mismatch between requirements for final summative assessment and work expected from students during the module.

STRATEGIC LEARNING DESIGN

The main strategy which the team wanted to introduce was one which would enable students to take greater responsibility for their own learning. This is notoriously difficult to establish, especially at the level of first year undergraduate study. Previous experience of the course delivery suggested that students generally had a fairly passive view of the learning process. This went along with expectations that tutors could somehow provide them with all the understandings needed for a successful outcome.

The team made an early decision to implement a learning design based on ideas on developing the use of formative assessment in a way that would allow such assessment to be used as an integral part of the learning process itself.

Increasing evidence from literature (Black & Wiliam, 1998; Gibbs & Simpson, 2004; Nicol & Milligan, 2006) on benefits of peer and self assessment methods in improving quality of student engagement and achievement led to the proposal to introduce a different teaching and learning approach in session 2006/07.

Three main research questions required to be addressed:

1. How can we change the assessment system to improve the learning experience of students?
2. How can we modify the leaning environment?
3. How can we offer timely, high-quality feedback to support student learning and achievement?

A. Elements of the intervention

- A self and peer assessment methodology supported by tutor mediation was adopted as the basis for formative assessment associated with each ‘Learning Milestone’.
- A PLE, already being introduced in other parts of the course, was utilised as the medium through which the formative assessment strategy could be implemented. This specialised platform, known as ‘Pebblepad’, also presented the opportunity to make it easier for students to make links between different modules;
- Formative assessment was designed around a series of 5 Core Tasks spread throughout the year. Each of these Core Tasks is clearly associated with the equivalent ‘Learning Milestone’. The Core Tasks are also designed to allow an incremental increase in the demands placed on students as the year progresses. The unifying theme throughout these tasks is to help students develop critical skills in considering the differing theoretical perspectives on learners and learning presented in the lecture programme.
- To maximise the effectiveness of tutor feedback, this was provided to only one sub-group in a tutor’s class for each Core Task submission. Different sub groups within a tutor group were

identified as the focus for tutor feedback for each Core Task. Students were then invited to participate in a further peer analysis and interpretation of both the submission and its tutor feedback to encourage development of professional reflective skills applied to their own work.

CONSTRUCTIVE ALIGNMENT

The starting point for the intervention was the realisation that nothing short of a complete reappraisal of the content structure and learning design was necessary. To do this it was necessary to consider how students were likely to perceive their own progress and experience through the work. With this in mind it became possible to identify a series of 'learning milestones' associated with what students were likely to see as completion of specific blocks or sections of work. This was made easier by the nature of the lecture delivery programme where different lecturers were already responsible for delivering separate 'blocks' of lectures usually over periods of three or more weeks at a time.

The identification of these learning milestones then made it possible to consider what might be appropriate formative assessment tasks to associate with each 'milestone'. It is this alignment of the learning experiences in the course with identified learning milestones and closely related formative assessment tasks (Biggs, 2003). Such alignment is central to the implementation of this blended learning approach

Formative tasks themselves had to be seen as a progression with the levels of challenge for students increasing incrementally. These tasks were also designed so that the 5th in the series could effectively double as a summative assessment instrument worth 50% of the tariff for the final examination. This strategy ensured that students could perceive explicit value from their engagement with the entire formative sequence. It also helped reduce the overall assessment burden on both students and staff involved.

BLENDED LEARNING METHODOLOGY

The specific trigger for the innovation had been the realisation that an e-platform which was being introduced elsewhere in this undergraduate programme had potential to be used in a completely different way as a vehicle to facilitate self and peer based formative assessment processes.

There was no suggestion that the development would lead to a predominantly e-learning approach or that traditional approaches to lectures or tutor led seminars would be abandoned. What has now become clear however is that the new blend of methodologies involved has had a feedback effect leading to subtle and sometimes

significant changes in the normal operational practice across the whole range of learning experiences.

The outcome of the adoption of the particular blend involved has been to improve the quality of student engagement and learning but also to enable significant savings in staff time both in the seminar programme and in the time devoted to assessment activities.

RESEARCH METHODOLOGY

The project aimed to bring about changes in the organisation of the module and, early in the planning process, it was agreed that action research was the most appropriate design due to its ability to support a process of change in which the researchers would be active participants. The project would also be subjected to on-going development throughout its implementation.

The merits of action research as a method of improvement and involvement in educational settings have long been recognised. Robson (2002) highlights the emancipatory nature of its purpose:

'... It adds the promotion of change to the traditional research purposes of description, understanding and explanation ...' (Robson, 2002, p. 214).

Due to this underlying purpose, many of the best known action researchers in education have been practitioners in that context, or have been professional researchers supporting practitioners who wish to initiate change in the setting in which they work. Despite the fact that Kurt Lewin (1946), the researcher who coined the term "action research", was investigating organizational change in non-educational settings, the method remains popular among educators. Stenhouse (1975) in his seminal text, "An Introduction to Curriculum Research and Development", relates the usefulness of the method for educators. Elliott (1991) and Norris (1990) strongly advocate the approach. Kemmis and Wilkinson (1998) describe action research as a cyclical process, an approach developed further by Bassey (1998) who offered a very detailed outline of the various stages involved. Fullan (1982, 1991) highlights the importance of the process itself and latterly, McNiff and Whitehead (2003) comment on the ability of action to improve practitioners' practice *and* learning. Somekh (2006) argues for

'...a process of 'dialectical interpretation' that generates a substantial body of knowledge, communicatively validated and capable of becoming the basis for action.' (Somekh, 2006, p.30).

Action research has not been without its critics, Adelman (1989) questions the quality of educational action research, calling it 'inward looking and ahistorical'

(1989, p.179) Atkinson and Delamont (1985) question the rigour of the approach.

Despite these criticisms, action research remains one of the most effective ways of bringing about change in educational settings and was the method chosen by the research team who considered Bassey’s approach to be the most appropriate because of the detailed structure it provides:

TABLE 1

1. Define the enquiry	The director of the course was concerned by issues arising from student and staff evaluations of the course.
2. Describe the situation	Student engagement in the course was variable. There was a lack of standardisation in approaches to formative assessment of student portfolios by staff and students alike and that there existed a mismatch between tasks associated with course lectures and the final summative exam.
3. Collect evaluation data and analyse it	End-of-year student survey questionnaires and staff evaluations were analysed.
4. Review the data and look for contradictions	Although the students commented that peer feedback helped their learning, they also requested more individual comments on written work from tutors. The use of the e-portfolio was seen as one way of addressing this .
5. Tackle a contradiction by introducing change	The course was completely redesigned and a new tool for supporting students, the PebblePad E-Portfolio System, was introduced.
6. Monitor the change	Changes in the course structure and learning outcomes were monitored.
7. Analyse evaluative data about the change	A revamped end-of-year questionnaire was issued to all students. Student representatives and staff participated in focus group meetings carried out by external evaluators. The research team participated in a semi-structured interview conducted by the same evaluators. Quantitative data was analysed using SPSS. Qualitative data was analysed using NVivo.
8. Review the change and decide what to do next.	Case study evaluations produced by the external evaluators and by the research team informed future developments.

DATA COLLECTION AND ANALYSIS

A mixed-method approach to data collection allowed both quantitative and qualitative data to be collected and subsequently analysed. Previously evaluation of the module was carried out using a questionnaire, issued to all students, following the final summative exam. At the end of the second semester this year, three weeks before the final summative exam, the process was repeated. A modified version of the previous questionnaire was used

in order that some comparisons might be made between results. In the interests of triangulation, this modified version was created by research students from a different faculty of the university. These students were supported by input from external evaluators belonging to the REAP Project. Data from this questionnaire was subjected to descriptive statistical analysis, including missing value analysis, by a member of the module research team, using SPSS.

On the same occasion, a second questionnaire was administered, by the REAP evaluation team. This questionnaire was developed and analysed independently by the evaluators who also conducted focus group meetings, one for students, and one for staff. One of the evaluators also interviewed the two practitioner researchers. This qualitative data was analysed using NVivo. A case study evaluation was produced by the REAP team. The report created by the two practitioner members of the module research team formed the basis of this paper.

IMPLICATIONS FOR FUTURE PRACTICE

The concepts underpinning the whole process – use of formative assessment, the creation of reflective, self-regulated learners and the adoption e-learning technology to support this – have been the subject of considerable discourse. Concomitant with this has been a concern to address the challenges posed by the worldwide growth in student numbers, and subsequent change in the whole ethos of higher education. A similar concern has been the desire to encourage learners to develop lifelong learning strategies.

FORMATIVE ASSESSMENT

One of the underpinning aims of the course redesign was to improve the quality of the students’ learning behaviour and to develop in them an awareness of the benefits of reflective, self regulated learning – an awareness that would later be transferred to their classroom practice. During the process of re-designing the module, the research team was reminded of a comment made, in 1979, by Elton & Laurillard:

‘... the quickest way to change student learning is to change the assessment system ...’ (Elton & Laurillard, 1979, p.100).

One sustainable approach, which meets the requirements of addressing the needs of large classes, is the use of self- and peer based assessment. Black & Wiliam, (1998), and Boud, (2000), have highlighted the necessity for the relationship between the formative process and the final summative product, to be made explicit to both students and staff. In the course of a long research career, examining assessment practices in education, , Boud repeatedly returns to this point. His latest publication, ‘Rethinking Assessment in Higher Education’ (Boud &

Falchikov, 2007) confirms his belief that ‘assessment, rather than teaching, is the major influence on students’ learning’ (p.3).

Existing course regulations required students to undertake a final, summative exam based on 50 multiple-choice questions and on the evaluation of a previously seen journal article to probe their understanding of relevant literature and course materials. Consultation with staff working on the module identified a strategy to find a balance between formative assessment methods used during the module, and the final summative assessment. Formative assessments involved a system of student self- and peer assessment using the Pebblepad e-portfolio system. Peer feedback on individual core task submissions was provided through the same system.

The vital underpinning for the process was the extent to which this individual feedback was then utilised to inform the group synthesis response which was then subject to tutor review. Students needed to develop skills in monitoring the quality of their own work by active participation in the evaluation of the work of their peers. Tutor feedback to the group response was then made available on Pebblepad. Students were then able to compare their own original and group responses with the response on which tutor feedback had been provided.

Assessment was used to promote learning by encouraging reflection on the task and providing opportunities to reduce the gap between actual and desired performance. The resulting process has made gains not only in course content but also in implicit outcomes of enhanced professional social development. These should further improve professional practice in these classroom practitioners of the future. It should be emphasized that these social outcomes were only made possible because of the particular process of peer based formative assessment and the extent to which this contributed to the development of appropriate skills. Another vital element was that this form of peer based assessment is sustainable in large classes, (Boud, 2000), provided that an appropriate course design, based on social constructivist principles, is in place to scaffold learning.

Nicol & Macfarlane-Dick (2006) and Nicol & Milligan (2006) offered models where seven principles of good feedback practice are used to construct a framework promoting development of self-regulated learning, based on formative assessment. Nicol & Milligan (2006) move this forward, examining how technology might support its application.

Analysis of research literature by Nicol & Macfarlane-Dick (2006) led to the following seven principles:

‘Good feedback practice:

1. helps clarify what good performance is (goals, criteria, expected standards);

2. facilitates the development of self-assessment (reflection) in learning;
3. delivers high quality information to students about their learning;
4. encourages teacher and peer dialogue around learning;
5. encourages positive motivational beliefs and self-esteem;
6. provides opportunities to close the gap between current and desired performance;
7. provides information to teachers that can be used to help shape teaching.’ (Nicol & Macfarlane-Dick, 2006, p. 205).

Implicit within the structure, based on the work of Gibbs and Simpson (2004-5), is recognition of the need for effective assessment conditions:

‘Good assessment conditions support:

1. individual and group responses that require regular study activity out of class;
2. responses for each core task that are staged over a number of weeks;
3. staged responses that require progressively deeper levels of students’ understanding;
4. core task requirements that are clearly stated and are progressively more challenging.’ (Adapted from Gibbs & Simpson, 2004-5, pp. 12-15).

FINDINGS AND CONCLUSIONS

Preliminary findings from focus groups (anecdotal) and questionnaires (descriptive statistical analysis) have shown that, overall, the students were positive about this learning experience. Nevertheless, there are some significant anomalies. 72.2% of respondents reported that working collaboratively enhanced their learning, however, in spite of 67.5 % of respondents finding peer feedback helpful, only 50.9% found group feedback, offered by tutors, relevant to their own work! This would seem to imply that the students themselves have assumed the role of tutors for each other and are perceived as effective in that role by peers.

TABLE 2
PEER FEEDBACK WAS HELPFUL

Strongly agree	15.8
Agree	51.8
Neutral	24.6
Disagree	6.1
Strongly disagree	1.8

Students recognised that the process promoted development of professional skills. It was apparent, that whilst this had been achieved and peer based formative assessment had been effective in promoting reflection and

self-regulation, there were still some challenges to be faced. Typical comments were:

‘I liked working in groups for the core tasks. It helped me to understand things better when the group discussed it and bounced ideas off each other.’

‘The group work really helped me further my development and development of the content.’

TABLE 3

FEEDBACK WAS RELEVANT TO MY WORK

Strongly agree	4.4
Agree	46.5
Neutral	26.3
Disagree	17.5
Strongly disagree	5.3

It was recognised that use of the e-portfolio environment supported the blended learning process adopted in the module. 52.7% of respondents either ‘Strongly Agreed’ or ‘Agreed’ that this made an impact on their ability to engage in the course at a distance, but only 23.5% said it helped them organise their course work. Awareness of the wider benefits of blended learning appears still to be lacking and requires further research.

There was room for improvement in some significant aspects. Concern was expressed about lack of contributions by some students. Interestingly, there was a clear desire (82%) for increased tutor monitoring of group work processes:

TABLE 4

TUTORS SHOULD MONITOR GROUP WORK

Strongly agree	28.7
Agree	42.6
Neutral	12.3
Disagree	20.2
Strongly disagree	2.6

There was also a desire (64.9%), for individual written submissions to the group tasks, posted in the e-portfolio environment, to be marked by tutors:

TABLE 5

INDIVIDUAL CONTRIBUTIONS SHOULD BE ASSESSED

Strongly agree	22.8
Agree	42.1
Neutral	12.3
Disagree	20.2
Strongly disagree	2.6

Technical problems with the e-portfolio environment also caused some dissatisfaction with the process. In total, 68.3% of respondents either, ‘Strongly Disagreed’ or ‘Disagreed’, that they found working in PebblePad an enjoyable experience. The research team is keen to explore other avenues in this area, including alternative platforms/media.

TABLE 6

WORKING WITH ‘PEBBLEPAD’ WAS ENJOYABLE

Strongly agree	0.0
Agree	7.0
Neutral	23.7
Disagree	39.5
Strongly disagree	29.8

It is evident from the evidence above, that student engagement in different aspects of the course varied considerably. The research team is currently considering how these variations in experience might be minimised and welcomes input from interested parties.

The team recognised also that global trends in assessment were beginning to impact on higher education more forcibly than before. Throughout the last thirty years, researchers such as Elton & Laurillard (1979), Natriello (1987); Sadler (1987, 1988); Crooks (1988); have challenged traditional views on effective assessment practice and urged educators to adopt assessment methods which promoted assessment *for* learning, instead Peer of assessment *of* learning.

Three succinct extracts from the literature highlight main themes of this long debate:

‘... the quickest way to change student learning is to change the assessment system ...’ (Elton & Laurillard, 1979, p. 100).

One of the aims underpinning the project was to develop reflective, self-regulated learners who assume responsibility for their own learning. To help students develop these skills, they need to be given opportunities to set their own targets and work towards them. This process should include the fostering of skills in planning, implementing and evaluating learning. The role of motivation and assessment should also be explored.

The adoption of a blended learning approach provided opportunities to bridge traditional and e-learning approaches. For this to succeed it is essential that differences are highlighted and a range of appropriate resources are developed. Students and staff must be made aware of the challenges involved and provided with strategies which allow them to experience success. This involves looking at the difference between synchronous and asynchronous learning, and also examining how differences in learning and teaching styles can be addressed. It requires an understanding that no matter

what blend of traditional and e-learning approach is used to promote learning, its effectiveness must be underpinned by rigorous planning and constant monitoring.

‘...Substantial modification to the learning environment through changes to regular classroom practice involves turning the learning culture around.’ (Sadler, 1998, p. 77)

This ‘turning the learning culture around’ has been slow to reach the higher education sector, but recent developments discussed by Boud, (2000), Biggs, (2003), Gibbs and Simpson, (2004), Gibbs (2006), and Nicol & Macfarlane-Dick (2006), would seem to indicate that a change of direction is beginning to take hold.

To maximise the impact of these developments, higher education institutions need to find ways of promoting formative assessment both to improve effectiveness of student learning and also to achieve efficiency gains in the deployment of staff. Skills which encourage the social construction of knowledge and understanding should be developed throughout the course. Students and staff working on the module need to be aware that, not only are they learning about learning from a conceptual viewpoint, but that they must engage in reflection on their own learning. The module should provide opportunities for students, and staff, to develop knowledge, skills and understanding of the entire learning process and of metacognition.

Students on the course have generally felt empowered, but there are some for whom the process has been painful,

‘I appreciate the necessity and advantages of working in groups, but this only works if all groups have the same commitment and level of input. Group work does not place the same incentive to study as individual work which is submitted and assessed individually.’ (Student, aged 39+).

‘... the quality of the feedback is the crucial issue ...’ (Sadler, 1998, p.78).

In this project, peer feedback has played a crucial role – a role supported by tutor mediation and by the e-portfolio system. However it must be emphasised that the e-portfolio system was only one tool. The vital factor underpinning the success of this particular blend of methods was the extent to which students and staff engaged in the peer assessment process. For this engagement to be maximized, learning outcomes for every aspect of the course need to be made explicit for both staff and students. Furthermore students need guidance in identifying the standards/ criteria that apply to their work and in making evaluations about how their work relates to these standards (Boud, 2000). The

experience of staff in making such judgments can provide the essential scaffolding for the student learning process.

It is interesting to note that, in response to questions in the end of year survey questionnaire, students seemed to prefer peer feedback to that offered by tutors. This is perhaps a measure of the effectiveness of the methodology in developing self regulating reflective skills. There are implications for tutor involvement and it can be argued that this outcome is beneficial for a system of higher education where classes are increasingly large and diverse and where tutors face increasing pressures and demands on their time.

It has become obvious that the benefits of the process have far outweighed the difficulties that have had to be overcome. Despite student fears about lack of preparation for the final summative exam, the arithmetic mean score for the written section rose from 59% in the academic year 2005-2006 to 70% in the 2006-2007. Peer based formative assessment has been seen to bring about learning, social and professional gains for all involved.

For the team, it has become obvious that the benefits of the process have far outweighed the difficulties that have had to be overcome. The exhilarating moments have more than compensated for the times when shortage of time has made it feel like a roller-coaster ride. The use of blended learning to support the development of reflective, self-regulated classroom practitioners who are skilled in formative assessment strategies requires further research and development. The research team involved in this project is ready to face the challenges this entails. Let the games begin!

REFERENCES

- [1] Adelman, C. (1989). The practical ethic takes priority over methodology. In W. Carr (Ed.), *Quality in Teaching: Arguments for a Reflective Profession* (pp. 173-182). London: Falmer.
- [2] Atkinson, P., & Delamont, S. (1985). Bread and dreams or bread and circuses: a critique of ‘case study’ research in education. In M. D. Shipman (Ed.), *Educational Research, Principles, Policies and Practices*. London: Falmer.
- [3] Bassey, M. (1997). Action Research for Improving Educational Practice. In R. Halsall (Ed.), *Teacher Research and School Improvement: Opening Doors from the Inside* (pp. 93-108). Buckingham, England; Philadelphia: Open University Press.
- [4] Biggs, J. (2003). *Teaching for Quality Learning at University* (Second ed.). London.
- [5] Black, P., & Wiliam, P. (1998). Assessment and Classroom Learning. *Assessment in Education*, 5(1), 7-74.

- [6] Boud, D. (2000). Sustainable Assessment: rethinking assessment for the learning society. *Studies in Continuing Education*, 22(2), 151-167.
- [7] Boud, D., & Falchikov, N. (2007). *Rethinking Assessment in Higher Education: Learning for the Longer Term*. London: Routledge.
- [8] Bryan, C., & Clegg, K. (Eds.). (2006). *Innovative Assessment in Higher Education*. London: Routledge.
- [9] Crooks, T. J. (1988). The Impact of Classroom Evaluation Practices on Students. *Review of Educational Research*, 58(4), 438-481.
- [10] Elliott, J. (1991). *Action Research for Educational Change*. Milton Keynes: Open University Press.
- [11] Falchikov, N. (2005). *Improving Assessment Through Student Involvement Practical Solutions for Aiding Learning in Higher and Further Education*. London: RoutledgeFalmer.
- [12] Fullan, M. (1982). *The Meaning of Educational Change*. New York: Columbia University Press.
- [13] Fullan, M. (1991). *The New Meaning of Educational Change* (Second ed.). London: Cassell.
- [14] Gibbs, G., & Simpson, C. (2004). Conditions Under Which Assessment Supports Students' Learning. *Learning and Teaching in Higher Education*(1), 3-31.
- [15] Kemmis, S., & Wilkinson, M. (1998). Participatory action research and the study of practice. In B. Atweh, S. Kemmis & P. Weeks (Eds.), *Action Research in Practice: Partnerships for Social Justice in Education*. London and New York: Routledge.
- [16] Laurillard, D. (2002). *Rethinking University Teaching: A Conversational Framework for the Effective Use of Learning Technologies* (Second ed.). London: RoutledgeFalmer.
- [17] Laurillard, D., & Elton, L. (1979). Trends in research on student learning. *Studies in Higher Education*, 4(1).
- [18] Lewin, K. (1946). Action research and minority problems. *Journal of Social Issues*, 2, 34-36.
- [19] McNiff, J., & Whitehead, J. (2006). *All You Need to Know About Action Research*. London: Sage.
- [20] Natriello, G. (1987). The Impact of Evaluation Processes on Students. *Educational Psychologist*, 22(2), 155-175.
- [21] Nicol, D., J., & Macfarlane-Dick, D. (2006). Rethinking formative assessment in HE: a theoretical model and seven principles of good feedback practice. (Personal communication).
- [22] Nicol, D., & Milligan, C. (2006). Rethinking technology-supported assessment practices in relation to the seven principles of good feedback practice. In C. Bryan & K. Clegg (Eds.), *Innovative Assessment in Higher Education* (pp. 64-77). London: Routledge.
- [23] Nicol, D. J., & Macfarlane Dick, D. (2006). Formative assessment and self-regulated learning: a model and seven principles of good feedback practice. *Studies in Higher Education*, 31(2), 199-218.
- [24] Norris, N. (1990). *Understanding Educational Evaluation*. London: Kogan Page.
- [25] Robson, C. (2002). *Real World Research* (Second ed.). Oxford: Blackwell.
- [26] Sadler, D. R. (1987). Specifying and Promulgating Achievement Standards. *Oxford Review of Education*, 13(2).
- [27] Sadler, D. R. (1989). Formative assessment and the design of instructional systems. *Instructional Science*, 18, 119-144.
- [28] Sadler, D. R. (1998). Formative Assessment: revisiting the territory. *Assessment in Education*, 5(1), 77-84
- [29] Sadler, D.R. (1998). Formative Assessment: revisiting the territory. *Assessment in Education*, 5(1), 77-84.
- [30] Somekh, B. (2006). *Action Research A Methodology for Change and Development*. Maidenhead: Open University Press.
- [31] Stenhouse, L. (1975). *An Introduction to Curriculum Research and Development*. London.

AUTHORS

Magnus Ross and Mary Welsh,
 Department of Educational & Professional Studies,
 University of Strathclyde,
 Jordanhill Campus,
 Southbrae Drive,
 Glasgow G13 1PP,
 Scotland
m.b.ross@strath.ac.uk
mary.welsh@strath.ac.uk

Manuscript received 18th June, 2007. This work was supported in part by the Re-Engineering Assessment Practice (REAP) Project funded by the Scottish Funding Council under its e-Learning Transformation Programme.