E-learning Transformation Project led by the University of Strathclyde

Category of Bid B: Support for Students and the Promotion of Learning

Re-engineering Assessment Practices in Scottish Higher Education.

Outline of Proposed Activities

The aim of this project is to transform thinking about, and practices of, assessment across the Scottish HE sector. Assessment is one of the most important drivers for transformational change; it determines both how and what students study. Yet, research shows that prevailing modes of assessment increases in teacher work rather than student learning. There is a need to rethink institutional assessment systems - away from a model where teachers transmit marks, to one where students develop, over the course of a degree, their own ability to self-assess and self-correct.

This project will involve curriculum re-engineering within three institutions and the dissemination of improved models of assessment practice supported by technology across the HE sector. Each partner will pilot a range of e-learning technologies and processes that support assessment. The initial focus will be on large enrolment first year classes, with more than 3000 students involved in the first implementation. The scope will be broad, going well beyond online tests and simulations to include classroom communication systems, virtual learning environments, e-portfolios, management systems and online-offline models. The project will demonstrate how teacher workload can be reduced and learning quality enhanced. Models of departmental transformation, re-engineered assessment practices, planning tools, web-based resources and a programme of dissemination will ensure that the whole Scottish HE sector benefits. A cost-benefit analysis of changes in departmental workload and assessment processes will provide evidence of effectiveness. The impact of curriculum redesign, and the increased use of technology, on organisational structures and processes and on the roles and responsibilities of staff, will be evaluated.

Rationale for Funding

- Assessment is the key cost in Scottish HE today. It consumes a large part of staff teaching time; and, in the majority of cases costs are in direct proportion to the number of students (i.e. it does not achieve economies of scale).

- This project will be grounded in (i) educational evaluation and in (ii) systematic cost benefit analysis. The project team have already innovated and published in both these areas.

- A large amount of preparatory work has been carried out in advance, across the support services and with departments and faculty to enlist commitment to transformative action on assessment in the institutions.

- This project will bring together a range of ICT technologies plus a rich input of pedagogical/educational methods and ideas. A variety of different course re-design models will emerge from the range of departments/disciplines involved.

- Beyond the important improvements to be expected from these re-engineering cases, the accumulated experience gained will be a powerful basis for rolling out further changes and successes in Scottish Higher Education Institutions.

E-learning Transformation Projects
Category B: Support for students and promotion of effective learning

Re-engineering Assessment Practices in Scottish Higher Education.

Lead site: University of Strathclyde, Glasgow

1. Contact details for project leader.

Professor Kenny Miller, Vice Principal for Teaching and Learning, University of Strathclyde, McCance Building, 16 Richmond Street, Glasgow G1 1XQ
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2. Details of other members of the project team.

- Catherine Durkin, Project Manager, Virtual Learning Environment
- Michael Coen, Manager, PReDICT, Policy, Research and Development in Information and Communication Technology in Education
- Dr Allison Littlejohn, Centre for Academic Practice, University of Strathclyde (Dr Littlejohn will be taking up a Chair at Dundee University in April 2005 but will continue to collaborate with/advise the three Universities on this project)

All five Deans of Faculty at the University of Strathclyde support this proposal. Other members of staff named below have helped in the construction of this proposal.

- Professor Jim Boyle, Mechanical Engineering, Chair, Virtual Learning Environment Implementation Group
- Nigel Kay, Director of Information Strategy
- Shona Cameron, Director, Learning Services
- Professor Kathy Kane, Physiology and Pharmacology

- Dr Brian Furman, Dean of Science
- Professor Alan Wilson, Vice-Dean (Academic), Strathclyde Business School
- Professor Neal Juster, Dean of Engineering
- Barry Walters, Dean of Faculty of Law, Arts & Social Sciences.
- Iain Smith, Dean of Faculty of Education

3. Summary of the relevant skills and experience these staff will bring to the project. (CVs may be appended to the proposal)

[See appendices]

Collaboration

4. Contact details for each partner higher/further education institution.

Glasgow Caledonian Business School

- Dr Gillian Roberts, Glasgow Caledonian University, Caledonian Business

Other staff at Glasgow Caledonian Business School who developed this bid:

- John McKay, Acting Dean, Caledonian Business School.
- Liz Vaughan, Associate Dean Quality, Caledonian Business School
- Linda Creanor, Learning Technology Adviser, Glasgow Caledonian University

University of Glasgow

- Dr Steve Draper, Psychology Department, University of Glasgow

5. Details of their role in the partnership.

Each University is different in type, culture and context and have different areas of expertise in assessment and in e-learning. This project will build on existing work and these joint areas of interest and will extend the range of contexts and cultures in within which curriculum re-engineering is implemented and compared.

- **Glasgow Caledonian Business School** will implement assessment re-engineering using technology, initially within the core modules in six of the eight disciplinary divisions of the Business School, but sharing experiences across the whole Business School over the duration of the project. This will establish models for transformational change across a single faculty within a new university (post-1992). The Caledonian Business School also has a special interest in developing the use of an interactive business simulation or game for students studying core modules. The purpose is to develop students' problem-solving and decision-making skills in authentic contexts and to provide enhanced feedback. Departments at SU (e.g. marketing) and GU will be able to draw on the CBS experience in this area. [see, answer to question 10 and Appendix 4 for more detail]

- **The University of Glasgow** will develop, exchange and help embed the use of electronic voting systems (EVS) for assessment and feedback purposes in participating departments within the partner institutions. Also, the technology-supported assessment methods and change management processes developed at the Strathclyde and Glasgow Caledonian Universities will be shared with the University of Glasgow and applied in the first instance to the redesign of the level-two psychology course. This will establish the relevance of transformational change within an ancient university. [see, answer to question 10 and Appendix 5 for more detail]

6. Contact details of other partners (e.g. private sector firms and/or other publicly funded bodies).

- Higher Education Academy: Programmes Directorate (Dr Lawrence Hamburg, Senior Advisor for E-learning)
- Universities Scotland: Educational Development Sub-committee (Chair: Dr Bob Matthew, University of Glasgow.)
- JISC Regional Support Centre: Scotland, South and West (Dr Charles Sweeney)
- WebCT (Richard Burrows, Regional Account Manager, Scotland and north England)

- The Centre for Academic Transformation, Rensselaer Polytechnic Institute, New York State (Dr Carol Twigg, Executive Director).
- David Boud, Professor of Adult Education, University of Technology, Sydney.
- Blackboard (Carl O'Keefe, Senior Regional Sales Manager, UK and Ireland)

7. Details of their role in the partnership.

The Higher Education Academy: Programmes Directorate will support dissemination of outcomes in Scotland and UK through the generic and subject centres (see email from Senior Advisor for e-learning attached in Appendix 1)

Universities Scotland: Educational Development Sub-committee (comprises heads of teaching and learning units in Scottish HE) will support dissemination of outcomes across the Scottish HE sector through workshops and programmes.

JISC Regional Support Centre: Scotland South and West will support dissemination to FE colleges.

The Centre for Academic Transformation (CAT), Rensselaer Polytechnic Institute, New York State has demonstrated the feasibility of transformational change supported by technologies in over 30 US institutions. The University of Strathclyde has a Memorandum of Agreement with Rensselaer. This project through consultancy arrangements will draw on the experiences of, and the methodologies used by the CAT and US institutions to effect cost-savings and learning quality benefits.

Professor David Boud is the most influential writer and researcher in the world on innovative approaches to assessment and work-based, experiential and autonomous learning. He is already a consultant to the Faculty of Education at Strathclyde. He will provide advice and input to this project.

WebCT and Blackboard have expressed keen interest to be involved in relation to the development of their products. They also wish to explore the interoperability of these VLEs with other tools that might be used to promote the kinds of learning discussed in this proposal.

Description of the project

8. State the aims and objectives of the project.

Assessment is one of the most important drivers for transformational change in higher education; it determines how and what students study. Yet research shows that prevailing models of assessment are costly, they promote increases in teacher work rather than effective student learning. There is a need to rethink institutional assessment systems – away from a model where teachers transmit marks, to one where students develop, over the course of an undergraduate degree, their own ability to self-assess and self-correct their own work. This is essential if students are to be prepared for lifelong learning. Assessment is a lever not only for changes in student learning and in teaching practices but also for changes in organisational, cultural and business processes within higher education.

The aims of this project are to reengineer the processes and practices of assessment within three Higher Education Institutions in Scotland and to disseminate improved models of assessment supported by e-learning technologies across the Scottish HE sector. Re-engineering will extend beyond assessment practices within the participating academic departments. It will necessitate changes in processes that support assessment – in organisational structures and procedures in institutions (in registry, estates, IT and support

services), in management processes (e.g. quality assurance, external examinations, course evaluation and in the ways in which student achievements are evidenced and recorded) and in individual roles and responsibilities (e.g. time spent on assessment tasks, types of support staff, collaborative work patterns).

This project will show how electronic environments and tools can be used to strengthen and support the transformation of assessment practices at departmental, faculty and institutional level. The focus of these tools will be on supporting assessment, the management and administration of assessment processes and associated student support services. The scope will be broad, going well beyond online tests and simulations to include classroom communication systems, virtual learning environments, e-portfolios, administrative and management systems, and the integration of online and offline assessment procedures.

The educational purpose of the project is to develop students' capacity to self-regulate their learning over the course of the undergraduate degree. This will be achieved through the enhancement of teaching and learning practices that support reflection, self and peer assessment and through devising higher quality, and more strategically aligned, teacher assessment and feedback (i.e. aligned to the development of self-regulation). The practical goal will be to demonstrate ways of reducing teacher workload while increasing learning and assessment quality. In the first year of this project the target will be first year undergraduate classes as this is where resource constraints have especially reduced assessment and feedback opportunities. The transformations brought about through this project will be embedded and sustainable. They will be led by academic staff located within faculties and departments with collaborative support from those with e-learning and technical expertise.

The specific **objectives** of the project are that, in selected departments across three higher education institutions, academic staff will work together to:

- re-engineer assessment and feedback processes based on current literature on good practice and on available e-learning tools;
- integrate new assessment practices with each other and with other teaching and learning processes;
- develop exemplary models of formative assessment, feedback and summative assessment in relation to large first year undergraduate classes across three different cultural contexts (a post-1992, a redbrick and an ancient university)
- reduce costs and improve the quality of assessment practices across the participating academic disciplines;
- devise workload models for in relation to assessment practices and performance indicators to monitor cost reductions and learning quality enhancements;
- improve the management and efficiency of assessment by restructuring related support and administrative systems and by harnessing appropriate technologies;
- develop new institutional policies and procedures to ensure quality and support in relation to new assessment practices
- share the findings (processes, tools, models) within the three partner institutions and across the HE sector in Scotland and elsewhere (e.g. through the network to be established by SFC and through JISC and other bodies)

9. What problems is this project aiming to solve?

This project will use e-learning technologies to address two inter-related assessment problems (i) workload and resource issues created by current assessment practices in HE and (ii) the need for assessment systems to provide quality feedback and help prepare students for learning throughout life.

Workload and resource issues

Increased class sizes, reduced resources, a more diverse student population and changed curricula involving new kinds of learning outcomes (e.g. skills) have all put teachers and institutional resources under considerable strain.

- As class sizes have increased there have been some economies of scale (e.g. larger lectures) but there have been no economies of scale in assessment. Assessment costs have gone up in direct proportion to the number of students with the result that teachers spend more time marking and giving feedback than they do interacting with students in classes.

- Students now entering HE have diverse backgrounds and experiences. They require more varied types of assessment support and guidance (e.g. feedback on progress, guidance on appropriate study methods). However, in recent years support has been reduced while traditional end of semester/year examinations have increased. This has resulted in declines in progression and retention with institutions losing substantial funds because students do not complete their courses.

- The QAA specification of subject benchmarks in disciplines and the move to specifying curricula in terms of learning outcomes has led to new kinds of assessment designed to assess skills rather than knowledge. Such assessments place more emphasis on feedback (as skills require cycles of practice and feedback) and are inherently more expensive and time consuming than conventional exams.

- Feedback is known to have more impact on learning than anything else teachers do. Yet resource problems make it difficult to provide students with sufficient, prompt or personalised feedback or to provide opportunities to discuss feedback. Also, research shows that feedback that is provided is often not understood or acted upon. Hence staff effort in providing feedback is often wasted.

- Assessment has cost implications not only for staff time but also for other institutional resources. As student numbers rise and assessment increases, demands on real estate (room bookings), administrative backup (e.g. in registry) and on communication facilities rise correspondingly. New technologies can help address some of these wider resource issues.

Lifelong learning and quality feedback

As well as resource constraints there is concern in HE that assessment practices are not fully preparing students for learning throughout life. Over the past two decades there has been a gradual shift in the way teachers think about student learning in HE. Instead of conceptualising learning as a simple acquisition process based on teacher transmission, learning is now commonly viewed as a process whereby students 'actively construct' their own understanding. Students interact with subject content, transforming and discussing it with others in order to internalise meaning and make connections with what is already known.

Despite this shift in conceptions of learning, assessment in HE is still largely controlled by, and seen as the responsibility of, the teacher; and feedback is still conceptualised as a transmission process. Teachers transmit marks and feedback information to students about what is right or wrong, about strengths and weaknesses in academic work and students are expected to use this information to make improvements. This transmission view of assessment is problematic in HE for a number of reasons.

- If assessment and feedback are primarily in the hands of teachers, then it is difficult to see how students can become empowered and develop the *self-regulation skills* needed to prepare them for learning throughout life.

- Lifelong assessment is a necessary feature of lifelong learning for a learning society. Students must be prepared to undertake assessment of the learning tasks they face throughout their lives. Developing this ability requires increased opportunities for self and peer assessment in higher education. Such assessment opportunities not only improve learning quality and prepare students for professional practice but they are also inherently motivational.

- There is evidence that many students who receive little or poor quality teacher feedback in HE still make learning and performance improvements. This occurs because they are *already generating their own feedback* (at some level) as they engage in assessment tasks. [Indeed it could be argued that we all do this as part of task engagement]. This finding has led researchers to propose that, instead of just providing feedback, teachers should expend more effort supporting and developing the students' own abilities to self-assess and self-correct during the undergraduate degree.

- Summative assessment or marking (intended to judge student achievements) has taken up a high proportion of staff time and institutional resources at the expense of formative assessment with feedback (intended to help students learn) in HE. Lifelong learning warrants a renewed focus on formative assessment and a search for ways of reducing the burden of summative assessment.

- Recent research has identified numerous ways in which the quality of teacher feedback can be improved. It has also identified ways in which students can be encouraged to seek out and apply the valuable, but often underused, feedback that is already provided.

- Many students now have to balance study with employment and other commitments with the result that they are not able to take full advantage of campus based feedback and assessment opportunities. These students need alternative modes of assessment, feedback and guidance. A flexible mix of campus based and online assessments will be increasingly necessary to meet such diverse needs.

- Institutional processes must change to support new models of assessment more consistent with lifelong learning. This will entail changes in the organisation, culture and business practices in institutions.

Benefits for the lead institution, partners and its learners

10. State how aspects of learning and teaching will be conducted in a new way.

The benefits of this project will be common to all three participating institutions. The project will harness both new approaches to assessment and new technologies in order to make step changes in teaching and learning processes and procedures. The benefits will be reduced costs and/or increased quality of learning. Each institution will embed e-learning technologies and processes to support new and re-engineered assessment practices. The initial focus will be on large enrolment first year classes. The total number of students participating in the first year of implementation will be around 3000. While each institution will demonstrate cost and quality benefits, it is expected that many models will emerge and that the reengineered assessment practices and business processes that result will vary according to the needs of different disciplines and institutional contexts.

Re-engineering Assessment

Educationally, re-engineering in the partner institutions will involve staff in departments, and the supporting services, working together to rethink assessment and to put in place improved practices. Utilising appropriate technologies such practices will involve:

(i) devising more efficient assessment programmes that balance summative assessments with formative assessments;
(ii) developing students' self-assessment and peer assessment skills systematically from first year onwards (logically essential to effective lifelong learning);
(iii) balancing assessment demands across the timeline of a course (with smaller assessment tasks) so that students work consistently and with purpose, in and out of class;
(iv) realigning how teachers deliver feedback by integrating feedback into teaching and learning processes;
(v) improving the economies of feedback using technology (devising ways of matching teacher supply to user demand so that there is a better return on investment from teacher feedback);
(vi) developing better guidance processes in the disciplines on how to deliver quality feedback;
(vii) creating conditions whereby feedback is attended to and acted upon by students.

Appendix 1 (Nicol and Macfarlane-Dick, 2004) provides some principles for re-engineering assessment practices as does the paper by Gibbs (2004) entitled 'Does your assessment support your students' learning (see answer to question 14).

Technologies and methods to support re-engineering

To support assessment re-engineering, the project will make use of e-learning technologies, and their integration, to address the two problems identified earlier – resource issues and learning quality. Table 1 gives examples of types of technologies and methods available to support the re-engineering of assessment.

- *Classroom communication technologies:* refers to technologies that facilitate interaction in large lecture classes. Tests are presented in class and student respond using electronic

handsets. These technologies have great potential to provide immediate feedback and they support self and peer assessment and small group discussion in large classes.

- *E-portfolios*: electronic portfolios support personal development planning and self-regulated learning by students (they reflect on and select learning outputs to record) and monitoring of work by staff.
- *Simulations and games*: provide intrinsic/dynamic feedback to students often embedded in real life examples (e.g. problem solving, decision-making in business). Simulations help integrate knowledge from different disciplines and invariably enhance motivation.
- *Online exemplars and models* of written work (essays, reports) with feedback and/or level statements. Students can use these to help understand the task and what counts as 'good performance'. They might be asked to compare their work with exemplars to encourage self-assessment and self-correction.
- *Frequently Asked Questions:* a form of self-assessment with feedback. Students select questions that they wish answers to and receive feedback results.
- *Answer Gardens:* a way of building up answers to questions previously asked by students and formulating these into online reusable resources.
- *Discussion boards:* can be used to create peer discussion around online submissions and are used to assess the quality of student discussion
- *Online questions posted by students*. If done before lectures or tutorials this form of feedback helps staff to tailor the teaching to students needs.
- *Online diagnostic tests*: short tests used to gauge classroom understanding at key points during the course. There is a great deal of research on this form of innovative assessment in the USA but little work on how this might be translated into online contexts.
- *Online tests*: provide immediate feedback, repetition and reinforcement. Useful in skills learning where practice is essential (e.g. problem solving) and as a self-assessment task to help develop learner responsibility.
- *Databanks of feedback comments:* can be used by teachers to respond to students written work more efficiently.
- *Peer marking and assignment distribution management software:* helps teachers manage peer-marking processes. It supports anonymous sharing of students' work amongst peers and the collation and distribution of peer feedback
- *Plagiarism detection software.* Such software can automate some of the work required by staff to ensure that assignments submitted by students are actually produced by them.
- Virtual learning environments*: support the management of assignments and when integrated with student records systems also help teachers monitor students' progress and identify those in difficulty. In this project the VLE is the environment that will help link together the component technologies and learning and assessment methods.*

University of Strathclyde

At the University of Strathclyde, each Faculty (deans, vice-deans) has agreed to support this re-engineering project. Five different disciplines, with one academic department in each faculty, have signed up to engage in course re-design using technology during the two years of implementation and beyond. These departments have class sizes ranging between 150 – 600 students. The total number of students involved would be around 2000 representing a significant proportion of the total undergraduate cohort (14.3%). Throughout the two years, however, there will be collaboration and sharing of the developing outcomes of this project across other departments in the faculties. This will be co-ordinated by the project team with support from the faculty teaching and learning committees and their respective faculty officers (see below and Project Plan at end of questionnaire for more detail).

Meetings have been held with each department (heads of department and relevant staff) and initial plans have been drawn up for re-engineering of practices using technologies. Below, a brief summary of the project plans for each department is presented with more detail available as a matrix per department in Appendix 1. These plans point towards

different models for transformational change based on differences in discipline, in assessment regimes used and in areas of concern that the department wish to address. The plans also highlight some of the technologies being considered and the quality improvements and cost savings that are expected. However, it should be noted that bringing staff together with appropriate expertise – disciplinary, technological, pedagogical, organisational – to plan, discuss, share and to coordinate activities is essential to successful transformational change. Hence, these plans are very likely to go through a number of iterations, refinements and changes as understandings are shared and as research is carried out, electronic tools are evaluated and good practice elsewhere is drawn upon.

Psychology (600 students)
This large first year class involves 48 lectures, 10 hours of practicals (20 repeat sessions) and 220 tutorials each year (55 groups with 4 sessions per group). Assessment involves 4 mini essays (2400 submissions), 2 end of semester multiple choice question examinations and a final 'write 5 essay' examination. Academics are concerned about the complete absence of feedback to students, about a failure by some students to reflect on learning and to participate actively in tutorials, and about the overwhelming administrative and marking burden. Various solutions will be investigated including – larger tutorial groups supported by electronic voting systems, online MCQs for self-testing, simulations to deliver practicals, peer distribution software to support dialogical feedback and WebCT to ease the administrative burden. Quality improvements sought include improved feedback, increased peer interaction and reflection on learning and early identification of those experiencing learning difficulties. Efficiency gains are potentially large including significant reductions in tutorial delivery, administrative and marking time.

Mechanical Engineering (250 students)
This first year cohort enrol in a variety of classes including engineering sciences involving interactive lectures, design classes that use problem based learning and maths, computing and engineering classes that entail studio teaching. Assessment involves homework every two weeks and a two-hour class exam. Students receive comprehensive feedback on homework but this results in an excessive workload and students are still too focused on passing the test rather than using the feedback to make improvements. The proposal is to develop electronic voting software for large in-class assessment and to develop an intelligent online homework system for self-assessment of problem solving based on systems currently in use in the US (e.g. Harvard, MyCyber Tutor and MasteringPhysics). The quality aims are to motivate students towards more in-class and self-assessment (formative and continuous) and to enhance collaborative and reflective learning, Efficiency gains are expected specifically in use of intelligent homework systems which would reduce marking time by 75%.

School of Pharmacy (500 students)
The School of Pharmacy is currently phasing in a 610 credit Integrated Masters in Pharmacy for 500 students. This comprises 36 classes in which the course work assessments comprise 11 essays, 19 laboratory reports/case studies, 6 oral presentations and 22 class tests. This project will address two main issues (i) students are not sufficiently active in taking responsibility for their own personal development during the undergraduate years (ii) feedback provision on written work is limited and its delivery is time-consuming for staff. The plan is to develop the functionality of the School's existing e-PDP, electronic portfolio system (currently supporting student personal development planning), as the core component of its Virtual Learning Environment (SPIDER). The e-PDP system will become the student's electronic workplace, providing storage for work in progress as well as

final records, in addition to personal material. This would involve electronic submission and storage of all key coursework within the student's e-PDP along with structured feedback provided by the student's counsellor and course markers. The role of the student counsellor (who has access to the students' e-PDP) would be developed to encourage students to take responsibility for personal development and learning. A side-benefit of this development is the possibility to automate plagiarism detection. The VLE would also be developed to incorporate tools to store, reuse and provide structured feedback on student coursework.

Marketing (560 students)
This class involves 48 lectures, 368 tutorial sessions with assessment comprising 2 assignments (a case-based report and a project-based report). A few years ago there were 5 assignments and much more feedback. The reduction in written assignments has meant that students entering 2nd year are less well prepared than in the past. Also although feedback is systematically organised using a paper based proforma system the provision of written feedback is still repetitive and inefficient. The technologies being considered include electronic voting systems in lectures and tutorials, the introduction of online objective tests, online databanks of feedback comments and plagiarism detection software. Quality improvements include better diagnostic testing, better feedback support and online self-testing opportunities to monitor progress. Efficiency gains expected include savings in delivering feedback, reduced numbers of tutorials and reduced administrative burden.

B Ed in Primary Education (180 students)
The four-year B Ed course comprises some 600 students. The degree programme was reviewed and revalidated in 2003-04. This is the first cohort on this revised programme where the compulsory classes are Curricular Studies, Educational Studies, Teaching and Learning, Skills for Effective Learning and Placement Learning (100 credit points in total). Assessment involves two examinations, two reflective essays, a portfolio of coursework tasks and a number of independent study tasks. The programme develops study skills and reflection. Feedback is quantitative, qualitative and forward-looking. Staff are concerned that the increased number of small, independent tasks is increasing workload for both students and staff and that the quality of learning might be compromised. Technologies being investigated include online delivery and assessment of a science unit, online audit of literacy and mathematics knowledge (to determine needs), online case studies of classroom practice for review/discussion and the use of WebCT for Personal Development Planning. Quality improvements might derive from PDP as a way of integrating learning from the independent study tasks and from more flexible case study materials. Efficiency gains are sought through reduced contact time (literacy audit online, science online) and reduced administrative burden (WebCT).

Glasgow Caledonian University Business School

At the Caledonian Business School, six divisions will participate in the first year of implementation (Accounting and Finance; Business Information Systems; Economics and Enterprise; Human Resources Management and Development; Management; and Marketing;). These divisions are responsible for all of the undergraduate core modules. In 2004-5, there are 900 students taking each of the level-one modules and 700 students taking the level-two module and 700 taking the level-three module. This means that the total number of students participating in this project from year one will be about 2,300 (i.e. all students taking core modules in levels 1-3 in the undergraduate framework). This represents 23% of the intake to Glasgow Caledonian University but 80% of CBS intake. Using e-champions as divisional change agents will allow sharing of outcomes across other modules in the Business School from second year onwards (see below, and

Appendix 2 for more detail). GCU uses a Blackboard as its virtual learning environment and all modules in CBS are Blackboard supported. Some background to the Caledonian Business School plans is provided in Appendix 4.

Discussions have been held with the divisions and initial plans have been drawn up for re-engineering assessment related practices using e-technologies. Below, a brief summary of the project plans for each division is presented. More detail is available as a matrix per division in Appendix 2. These plans demonstrate different models for transformational change based on differences in discipline, in assessment regimes, and in areas of concern that each division wishes to address. The plans highlight the e-technologies currently used, other technologies being considered, and the quality improvements and cost savings that are expected. It should be noted that as this project unfolds and the e-champions and learning specialists begin working together in CBS, and with project partners at Strathclyde and Glasgow Universities, these plans are likely to undergo significant development. They will also be influenced by the research that is carried out to evaluate best practice in the use of e-assessment technologies in these, and other, disciplines across the UK and abroad.

Division of Business and Information Management (BIM)
Information and Data Analysis is a level-one core skills-based module taught jointly by a team of eight full-time staff from BIM and the Division of Economics. There are around 22 computer laboratory sessions of 20 students each semester. Student contact time per semester is 50 hours of which 6 hours are used for lectures and 44 hours are spent in computer labs. The module is assessed entirely by coursework comprising two practical computing assessments (40% each) and two items of Portfolio Work (10% each). Concerns identified include staff workload in managing and in marking assessments, student attendance and participation, and effective use of Blackboard by all members of the teaching team. One of the computing assessments, based on Excel spreadsheets, uses automated marking with immediate feedback to students. Excel is not appropriate for other aspects of assessment but staff would like to adopt other technologies to reduce the administrative burden associated with a large module and to provide timely and useful student feedback. Integration of e-assessment into the University administrative systems and interactive business games are being investigated.

Division of Business Economics and Enterprise
Economics, Markets and Enterprise is the level-one core module taught by the Division. Teaching is undertaken by a team of 11 full time staff in the pattern of 2 one-hour lectures and 2 one-hour seminars for 22 sections each week. Summative assessment comprises a group project (25%), an individual essay (25%) and a two-hour final examination (50%). Formative assessment comprises a 'mock' exam and online objective testing released on a weekly basis. Concerns identified include the inability to turnaround coursework marking and to provide feedback on performance in sufficient time to inform subsequent summative assessments. In terms of quality improvements, enhancing students' abilities to construct an argument and develop analytical rather than descriptive responses are desired. E-technologies used include mind-mapping software and publisher supplied MCQs. Use of electronic voting systems in lectures and an online business game requiring problem-solving and written justification are being considered to address these issues.

Division of Marketing
Marketing Fundamentals is another level-one core module taught by a team of 17 staff on the basis of 2 one-hour lectures and 1 one-hour seminar (22 sections) per week. Summative assessment comprises a group project presentation (30%), a

group written report (30%) and a paper-based MCQ exam (40%). Students are provided with publisher-supplied resources accompanying the key textbook via Blackboard. They are encouraged to undertake self-assessment using publishers' MCQs on a weekly basis but uptake is low. Concerns include staff workload in managing and marking a paper based MCQ exam and a desire to offer this online to enable automated marking, instant feedback, and electronic transfer of results from the VLE into the university's academic administration systems. Qualitatively, more staff and student engagement with the VLE is desired. Using an interactive marketing game and better quality MCQs are seen as solutions. Integrating online assessment software with the VLE and embedding e-assessment as a mainstream activity in the university would reduce the organisational and administrative workload associated with the module.

Division of Accounting
Managerial Finance is a level-one core foundation module for students who have an accounting component in their course. The emphasis of the module is to promote an understanding of accounting rather than on the preparation of sets of accounts. By the end of the module students should be able to understand accounting data and interpret its meaning and its significance for management information. A team of eight full time staff undertake the teaching. Assessment comprises a group project, two computer based coursework tests and an end of module unseen exam. The marking load in this subject could be reduced substantially with increased use of online assessment. Providing concurrent access to the end of module exam online under exam conditions is being considered in this regard. An effective business game and business simulations would provide enhanced self and peer assessment opportunities.

Division of Management
This division is responsible for three core modules, one at each level, all of which are delivered in single semester. The division therefore relies on a high proportion (c85%) of seminar classes to be undertaken by part-time staff. The Strategic Management module detailed in Appendix 2 is the level-three core module. The module makes significant use of Blackboard for student/staff discussion as well as providing subject resources. This has generated workload concerns about managing online discussions efficiently. These discussions do enable some formative feedback but there are no other opportunities for individual self-assessment and feedback. There is a high administrative, staff management and marking burden associated with this module. Designing lectures and seminars to make use of electronic voting systems (drawing from the expertise at Strathclyde and Glasgow Universities) is seen as a means of providing immediate diagnostic feedback to tutors and students on an economic basis.

Division of Human Resource Management & Development
Perspectives on People at Work is a level-two core module taught by a team of 12/13 full time and 7/6 part-time staff. Part-time staff must be used given the module is delivered in one semester only. Two one-hour lectures are repeated each week and there are 35 one-hour seminar sections each week. Summative assessment comprises an essay (2,500 words) and a two-hour written exam. Concerns include high marking workload coupled with a commitment to provide useful written feedback and consistency across all tutors within a 10 day turnaround timescale. In addition, while formative assessment opportunities via online MCQs are provided, student participation is very low. Given the essay style of assessment in the module a further concern is a perceived increase in plagiarism. Solutions being considered are a business simulation such as 'Clydetown' (drawn from some work at Strathclyde but contextualised for this discipline), the introduction of a plagiarism

detection service and better administrative support by embedding e-assessment into Glasgow Caledonian systems.

The University of Glasgow

The role of the University of Glasgow in this project will be to develop the software functionality and pedagogical methods of classroom communication systems (sometimes called electronic voting systems, EVS) for assessment and feedback purposes and to support the dissemination and use of these systems across the partner institutions. Most of the uses of EVS to date have been to transform lectures into occasions where more interaction and by implication more learning takes place. The idea here is to develop the use of EVS to transform some of what used to be done in tutorial and revision classes. The focus is formative assessment both in terms of producing information for both learners and teachers on how well each learner understands the material and in terms of passing this feedback to students to help them correct their current partial understanding. (see, Appendix 5 for more detail). The examples above, from Glasgow Caledonian and Strathclyde show that the integration of EVS will play a significant role within a number of the planned departmental projects. There is also the potential to use EVS within this project for purposes other than assessment, e.g. to collate learner and evaluate learner views of the benefits or otherwise of changes in assessment practices, support systems or institutional procedures. In addition, cost-benefit analysis of EVS has not so far been undertaken and this will be explored through this project.

The University of Glasgow will also serve as a test-bed for sharing and dissemination of new assessment practices from the partner institutions Glasgow Caledonian and Strathclyde. It will redesign the formative assessment aspects of the level-two psychology course (300 students) using EVS but supported by the other e-assessment methods being explored by the partner institutions. This will allow the robustness of systems to be tested and synergies and comparisons to be made.

Collaborative curriculum redesign

The initiative will involve members of academic staff in participating departments re-examining their assessment practices in the light of current research and in the context of available e-learning systems and tools. Institutional embedding will be ensured through the realignment of existing assessment regulations, of quality assurance procedures and through links to each institution's e-learning strategy developments.

At the University of Strathclyde a central Project Team with appropriate skills (in evaluation, pedagogy, learning technologies) will work with the implementers (the first 5 departments) engaged in re-engineering and will coordinate sharing across other departments planning similar changes. In addition, a cross-functional task force drawn from across the support services (e.g. Centre for Academic Practice, Learning Services, VLE implementation service, IT services) will support the work of the Project Team and the participating departments. Each department will be given resources to make available academic time (e.g. through staff release) to support this curriculum reengineering.

At the Caledonian Business School (CBS) a staff release scheme will be implemented whereby 'e-learning champions' drawn from the 6 disciplinary divisions are appointed, and supported by e-learning specialists, to work with core module teaching teams to review and re-engineer assessment practices.

This project will thus allow us to examine different models to support transformational change across a variety of disciplines and across a single Faculty and across a variety of institutional types.

11. Describe how these new processes will yield measurable benefits to the institution and its learners.

Evaluation is critical to the implementation of this project. Evidence of cost savings and/or learning quality improvements will be essential to gain and sustain commitment within the three participating institutions and to ensure the uptake of these new educational models across the HE sector. Evaluation will be carried out in three areas to show:

- The benefits of the re-engineered assessment practices on learning quality and learning outcomes.
- The costs and benefits of assessment changes in relation to workload and resources across academic and service departments
- The institutional changes needed to support new models of assessment practice supported by technology.

Learning quality and outcomes

Baseline data will be collected before the project begins documenting assessment practices using a variety of instruments. These will include some new instruments developed through the Formative Assessment in Science Project funded by HEFCE such as the teachers' assessment review checklist, the student assessment experience questionnaire, the distribution of student effort instrument (Brown, Gibbs, Glover, 2003). Other instruments will be developed to evidence the balance across self, peer and teacher assessment and the relative balance of formative assessments (feedback) and summative assessments (marking) in courses. Some specific measurable benefits sought might include:

- A more even distribution of effort by students over their course of study (in and outside class)
- Enhanced participation by students in assessment tasks
- Increased use of formative assessments with opportunities for feedback
- Increased use of self and peer assessment
- Proof of better quality feedback provided by teachers to students (i.e. that helps them self-correct rather than tells them where they are wrong)
- Evidence that feedback is used by students
- Evidence of contingent teaching – teaching shaped by learning performance
- Evidence of integration of formative assessment within other teaching and learning processes
- Improved retention (through early identification of students in difficulty)
- Improved performance in assignments and examinations
- Student perceptions of the effects of changes in assessment practices and support systems.

Workload and resource issues

The PREDICT unit and Centre for Academic Practice at Strathclyde have developed methodologies to examine whole institutional changes brought about by e-learning developments and to carry out cost-benefit analyses in relation to these changes. This

project will also draw on cost-quality models devised by the Centre for Academic Transformation, Rensselaer Polytechnic in the US (see 14 below).

As well as applying these cost benefit processes, workload models will be developed and implemented to help identify the time currently spent by departmental staff and support staff on teaching and assessment activities, both formative (to provide feedback) and summative (to mark). This will help produce initial baseline data in order to demonstrate changes in time spent on assessment tasks during the transformational period and the relative balance of time spent on self, peer and teacher assessments. Some specific measurable benefits might include:

- Reduced time spent by staff on marking of students' work
- Increased use of online technologies to provide formative assessments
- Changes in balance of time spent on developing online materials versus time spent marking
- Capital (technology) for labour substitution (faculty teaching):
- Cost savings due to changes in the balance of academic and support staff input to assessment (e.g. Graduate Teaching Assistants)
- Better understanding of the indirect costs (network infrastructure, IT support) associated with different assessment models.
- The costs of transition to new assessment models

Institutional changes in support of transformation

An analysis will be carried out to ascertain changes (actual and desired) required to support changed assessment and institutional processes. This will include consideration of the cultural, organisational, pedagogical and technical issues that need to be addressed at departmental and institutional level. Areas of focus would include the following

Policy, culture and support

- Institutional and faculty policies and strategies that might support curriculum re-engineering.
- Staff development models and approaches (provided centrally and within departments) necessary for effective curriculum reengineering and strategic change.
- Changes in the roles and practices of academic and support staff
- Workload reward mechanisms better suited to technology supported teaching (e.g. possible replacements for credit-for-contact models).
- Approaches and models for the preparation of students for technology-supported assessment.

Strategy and Pedagogy

- Educational strategies for embedded e-learning
- Pedagogical models that best support online and blended learning.
- Quality procedures for blended and online courses.

Administrative and Technical

- An evaluation of the network infrastructure in relation to e-supported assessment,
- Integration and interoperability issues across institutional and departmental systems (student record systems, VLEs and assessment engines) and the sharing of content between these systems
- IT support requirements for enhanced disciplinary assessment practices.
- Impact of re-engineering on administrative systems (e.g. registry systems and procedures).

- An analysis of scenarios relevant to improved estates management for learning and assessment using technology.

Benefits for the sector(s)

12. Describe the way in which the project will benefit the Scottish further and/or higher education sector(s), including your plans for dissemination of the project outcomes.

This project will examine the processes of transformation and embedding of technology supported assessment across a range of disciplines in one institution (the University of Strathclyde) and within a single faculty in two other institutions (Caledonian Business School, the University of Glasgow). It will also support the detailed development of a robust technology (electronic voting systems) from its proven benefits in large class to its application to formative assessment and to the reengineering of tutorials and revision classes (that perform that formative function) Developing assessment practices in a range of departmental, faculty and institutional contexts (a new, a red brick and an ancient university) and cultures, and sharing these practices across these contexts, will enable synergies and comparisons to be achieved. For these reasons, the project outcomes should be robust and have wide relevance to the whole HE sector.

The outcomes of this project for the sector will include:

- Case study models will be produced to evidence changes in assessment practices in five disciplines (in 5 departments) spanning business, science, engineering, education and psychology at first year level where there are large students numbers (150-600 students) and within one large Faculty (with 1000 students). These case studies will include descriptions of these new assessment models, their underlying rationale and, importantly, evidence of the benefits in learning quality and learning outcomes.
- Workload models showing how costs can be reduced and/or quality of learning improved through these re-engineered practices.
- Software will be developed to improve the effectiveness of Electronic Voting Systems for assessment and feedback processes in self-paced learning situations (see Glasgow contribution in Appendix 3).
- Models of how 5 departments and 1 faculty carried out change management in their own assessment practices
- Tools to support other institutions wishing to engage in curriculum re-engineering processes.
- Documentation and analysis of the changes required (within different HE institutions) at the organisational, management, human resources and infrastructural processes in order to sustain more efficient models of learning and assessment supported by technology.
- Analysis of impact of using multiple technologies within institutions.

This project will also place Scotland at the forefront in pioneering meaningful 'student-centred assessment' supported by new technologies in the UK. It will help address the missing, but vitally important, link required to enable authentic 'student-centred learning'.

Plans for dissemination include;

- The development of a project website where all outputs are located and made available to the wider HE and FE community. The Scottish Funding Council web site would provide links to these.
- Dissemination in collaboration with the Higher Education Academy through the subject centres (see Appendix – letter of support from Senior Advisor for E-learning)
- Case studies of changes, toolkits (e.g. workload models, cost-benefit frameworks) and other documentation would be located on the website for use by other institutions.
- Dissemination through the Universities Scotland: Educational Development sub-committee network. Through this network at least 6 workshops would be delivered, over the second year of implementation, spread geographically across Scotland to disseminate the findings of the project.
- In all three partner institutions, the initial cohort of participating departments have agreed to share their experiences with other cognate departments within and, where appropriate, outside their institutions. It has been agreed that the Higher Education Academy, Subject Centres would support some external dissemination. JISC have also agreed to this.
- Publications would be produced for refereed educational journals
- A book on technology-supported assessment will be produced alongside this project.

- The University of Strathclyde has also agreed to help establish a network of practitioners to disseminate the project outcomes and to draw on related work across the Scottish HE sector. The Scottish Funding Council has proposed that there would be separate pump-priming funds (around £50k) to support the establishment and continuation of this network.

13. Set out separately the potential benefits for:
    - partner institutions directly involved in the project

    - other institutions and bodies not directly involved in the project

Benefits for Partner institutions

The benefits for the lead and partner institutions have been described above, under answers to questions 10 and 11. [See also Appendix 4 and 5 for details of the Caledonian Business School and the Glasgow University Plans]. Benefits will be similar across all three institutions although models of technology-supported assessment practices are likely to be different. There will also be a cross-fertilisation of ideas and practices amongst institutions as they share experiences during project implementation. For example, the University of Glasgow will focus on the development of a single assessment and feedback tool and support its implementation with large classes. Both Caledonian Business School and the University of Strathclyde will benefit from these developments. Similarly, the dissemination of assessment re-engineering carried out at Caledonian Business School and Strathclyde will be shared with the University of Glasgow. This will be a useful test-bed for the subsequent roll-out to other Scottish HEIs.

Benefits for Other institutions and bodies
[See answers to question 12]

Evidence of demand/feasibility

14. Give details of any research conducted to establish the feasibility of the new approach. (This might be a market analysis of the existing student base (in order to identify groups of students for whom re-engineering might be most appropriate). It could also involve an analysis of the business processes associated with educational programmes (in order to identify processes likely to yield achievable, cost-effective benefits through re-engineering). If the project will adopt a new model of learning, to what extent is this based on educational research?)

Educational basis of re-engineering

There is little systematic research in HE on the costs of assessment in the UK but even a cursory survey of academic staff perceptions reveals that assessment takes up a considerable proportion of staff time. In addition, an analysis of transformational projects funded in the US by the Pew Charitable Trust Programme (Center for Academic Transformation, Rensselaer Polytechnic) shows that assessment is the most important factor in staff time spent on teaching. However, the research is quite compelling when we look at the effectiveness of assessment rather than just its cost.

Black and Wiliam (1998) carried out a meta-analyses of published research, over the previous 10 years, on formative assessment, across the schools and HE sectors. They showed that where assessments focused on generating feedback and encouraging its use the gains were 'among the largest ever reported for educational interventions'. In another meta-analysis focused on HE, Hattie (1987) reports the single most important influence on student achievement is feedback. However, despite the potential benefits from well-structured assessments with feedback, most researchers are seriously concerned that assessment is not fulfilling its purpose in HE (e.g. Yorke, 2003; Boud, 2000). Boud (2000), one of the most influential researchers on assessment internationally, believes that 'existing assessment practices are perhaps the greatest influence inhibiting moves to a learning society'. He analyses what the requirements are for sustainable assessment for lifelong learning and argues that we must design assessments to serve both immediate learning and lifelong learning. For lifelong learning assessment must move from being a teacher-conducted activity to a process of supported self-assessment.

Two recent papers have related the findings from this research literature to actual assessment practices (Nicol and Macfarlane-Dick, 2004; Gibbs, 2004). These papers highlight from different perspectives the conditions necessary for effective formative assessment in higher education. Nicol and Macfarlane-Dick (2005, in press) identified 7 principles of good feedback practice. The key behind these principles is the need to re-conceptualise assessment, replacing practices in which teachers do all the work with practices designed to develop the students' capacity to self-regulate their own learning. These seven principles provide a useful guide in relation to this transformational project both for initiating redesign and for designing the project evaluation. Research in an LTSN-funded project has already demonstrated that where these principles are embedded in assessment practices, learning and feedback quality are enhanced. These principles are valid whether we are talking about computer-supported assessment or more traditional assessment practices.

Gibbs and Simpson (2004) from work on a large HEFCE, Fund for the Development of Teaching and Learning (FDTL) project on Formative Assessment in Science Teaching (FAST) have independently identified 11 conditions under which assessment supports student learning. The starting point for the FAST project is the assumption that

assessment has a profound impact on much effort students put into learning, which topics they learn and the quality of the engagement of the learning tasks they are set. The project also found that feedback to students is a vitally important but under-emphasized component of teaching. These 11 conditions have provided a conceptual framework for the review of assessment in science courses.

Both the LTSN-funded and the HEFC-funded projects, and the findings from recent literature reviews, will provide ideas, principles and practices that will be used to inform the proposal for re-engineering of assessment described in this paper.

Feasibility of Transformation using technologies

The Centre for Academic Transformation (http://www.center.rpi.edu/) based at Rensselaer Polytechnic in the US has already demonstrated the feasibility of transformational change supported by technologies in the HE sector. Their group has evidenced cost-benefit and/or learning quality gains through transformation in different 30 disciplines across a range of HE institutions. The proposal described in this paper will draw on the methodologies devised at Rensselaer but with adaptations and developments to fit the UK context and the assessment focus of this project. The project will also draw on experience at Rensselaer and at other US institutions that have applied the transformational methods. The recent **Memorandum of Agreement** signed by the University of Strathclyde with Rensselaer Polytechnic will help facilitate this collaboration.

References

Black, P. & Wiliam, D. (1998). Assessment and classroom learning. *Assessment in Education*. 5 (1), 7-74

Boud, D. (2000). Sustainable assessment: rethinking assessment for the learning society. *Studies in Continuing Education*. **22** (2), 151-167

Brown, E. Gibbs, G., & Glover, C, (2003) Evaluation tools for investigating the impact of assessment regimes on student learning. BBB-j, Volume 2.

Gibbs, G and Simpson, C. (2004) Does your assessment support your students' learning? *Journal of Teaching and Learning in Higher Education* http://www.open.ac.uk/science/fdtl/documents/lit-review.pdf

Nicol, D.J. and Macfarlane-Dick, D. (2004), Rethinking formative assessment and feedback in Higher Education: a theoretical model and seven principles of good practice. http://www.qaa.ac.uk/scottishenhancement/presentations/Assess_workshop7/Nicol Macfarlane-Dick paper.pdf

Nicol, D.J. and Macfarlane-Dick (in press). Formative assessment and self-regulated learning: a model and seven principles of good practice. *Studies in Higher Education, 2005.*

Nicol, D.J. and Milligan, C (in press). Conceptualising technology supported assessment in terms of the seven principles of good feedback practice. In G.Gibbs, K Clegg and C. Bryan (Eds) Innovating in Assessment, Taylor and Francis. [to be published June 2005]

Twigg, C (2002). *Improving quality and reducing costs: Designs for effective learning using information technology*, The Observatory for Borderless Education, September.

Yorke, M. (2003). Formative assessment in higher education: Moves towards theory and the enhancement of pedagogic practice. *Higher Education*, **45** (4), 477-501.

Evidence of commitment

15. Describe the extent to which the institution is committed to engaging in this transformational process as part of its strategic development.

As described in our response to the next question (question 16), Strathclyde has a long-term commitment to innovation in teaching and learning and to being a technologically advanced institution. Indeed it has a reputation in this area among the Scottish universities and its commitment is embedded in its strategic plans. Over the past 10 years Strathclyde has invested in a number of innovative projects based on the early adoption of learning technologies to enrich the student experience. Recent examples include:

The Laptop Initiative: This was originally a Business School project to pilot the value of supporting learning by providing students with portable laptops with wireless connections. This project offered business school students the opportunity to develop key skills in the context of a realistic working environment. It also allowed Strathclyde to explore how changes in the nature and use of ICT in learning would impact on infrastructure and support services and to examine the costs and benefits of a wireless approach. The laptop initiative has grown significantly since the Business School project. It has been extended across all departments in the Engineering Faculty to support group working and is currently being supported by the SEED in Primary Education.

Classroom Communication Systems: Strathclyde has pioneered the use of classroom communication systems, also called Electronic Voting Systems (EVS), that can be used in classroom contexts to provide electronic feedback (correct/incorrect answers) to students on their understanding of concepts (data projection of bar chart of class responses). This electronic feedback, however, can also be used to trigger further dialogical feedback through small group and class-wide discussions. This innovation has proved a great success both at Strathclyde and elsewhere (notably Glasgow University) and is a key tool within any assessment re-engineering approach. To realise the potential there is a need to pilot new assessment uses for EVS and develop its integration with other online processes. Academics at the Universities of Strathclyde and Glasgow have published research on the use of classroom communication systems (Boyle and Nicol, 2003; Nicol and Boyle, 2003; Draper and Brown, 2004).

E-Portfolios and Key Skills developments at Strathclyde: In the School of Pharmacy, a custom-built virtual learning environment has been used to bring together three facilities: a skills rating tool, a personal development diary and a record of work. This e-portfolio, personal to the student but with elements visible to appropriate staff such as the personal counsellor, allows an integrative approach to course material, development planning and assessment and a structure for feedback and dialogue between staff and students. Other departments are adopting this approach while customising it to fit their own purposes and context. It is worth noting that although paper-based or electronic methods are feasible there is some evidence that the e-portfolio approach is more flexible, easier to manage and is well-received by students. The transformational project described in this paper would further this initiative and explore how e-portfolios can be linked to other assessment activities within departments. It would also explore how to meet the training needs that have emerged from an analysis of portfolio activities.

Distributed Innovative Design, Education and Teamwork (DIDET) In partnership with Stanford University, Strathclyde is developing a learning platform to improve the education of design students by giving them experience of participating in global team based projects. This project involves the use of digital libraries and shared workspaces as repositories for knowledge construction and resource sharing by project teams. All support services are involved and the project builds on early work in 1995 when Strathclyde created one of Europe's first virtual learning environments, Clyde Virtual University.

Technologies for Online Interoperable Assessment (TOIA): Learning Services at Strathclyde has considerable national involvement in developing e-assessment tools which can support assessments that can be carried out with minimum human intervention (multiple choice, problem based tests, simulations etc.) and in developing management systems for assessment (e.g. to support essay submissions). These tools can be linked to current VLE platforms so that emerging standards are implemented that promote reuse and interoperability. The JISC funded CETIS Assessment SIG (Special Interest Group) is also located in Learning Services and the Assistant Director of CETIS (the Centre for Educational Technology and Interoperability Standards) is located in the Centre for Academic Practice at Strathclyde.

The experience gained in the above projects has resulted in a readiness within Strathclyde for the development a more strategic, coherent and integrated approach to e-learning developments. Such an approach would align local developments with strategic objectives and help the institution realise economies of scale, integrated systems and avoid duplication.

16. Provide evidence that the process of change is consistent with, and embedded in, institutional strategies (i.e. it is not a peripheral process driven solely by the possibility of external funding.)

Four-Year Strategic Plan

The University of Strathclyde has a Four-Year Strategic Plan for 2003-2007. This plan is focused around three themes:

- The promotion of Innovative Learning,
- The provision of Personal and Professional Development
- Investment in Research Excellence.

This plan also provides a broad framework within which the faculties develop their own strategies and plans. Implementation of a Virtual Learning Environment is one of the targets underpinning the first themes: Innovative Learning. The stated aim is to develop an educational experience 'as good as any in the UK' and to 'build upon its [Strathclyde's] reputation for innovative learning' in order to increase the number of people seeking admission to Strathclyde and to help students at Strathclyde achieve greater success in their studies. More specific features within this Theme are to:

- Provide a ***novel interactive learning environment*** with innovative IT applications
- Revitalise the ***campus environment***
- Develop student's ***key skills***
- Offer a responsive and ***innovative curricul****um*
- Provide access to ***world-class IT facilities***

These developments are mainly aimed at campus-based students although the Plan also expects to expand programmes for international students and to facilitate flexible and distance learning, underpinned by the VLE. The other two Themes – Research Excellence and Personal and Professional Development – also have goals related to e-learning. One of the six areas of research that will be promoted is the development and application of 'effective learning techniques'. Also, in relation to CDP, the virtual learning environment will offer flexible and distance learning opportunities to those in employment and to international students as part of professional development and lifelong learning. The University also expects to develop its own staff through e-learning in support of the Strategic Plan.

Finally, there is some guidance on how the Strategic Plan will be delivered. Staff engagement is seen as fundamental and there is an aspiration to build a dynamic academic community of 'Strathclyders'. This is supported by the goal of providing pervasive access to the University's information resources by pursuing a '3 As' strategy for ubiquitous computing (any device; any network; any content). There is therefore a strong steer within the institutional strategy over the next few years not only to enhance student's learning but also to provide innovative features and a novel interactive learning environments.

Teaching, Learning and Assessment Strategy

In a similar way, the *2001 Academic Strategy,* which embraces the *Learning, Teaching and Assessment Strategy* aims 'to continue to encourage and support innovation, creativity and research informed practice'. In this strategy the following areas are highlighted for learning enhancement:

- *Flexible modes* for on campus and off campus delivery
- *Improving Assessment* techniques that enhance *formative feedback*
- *Curriculum design* to achieve *more effective staff-student interaction and learning*

The Learning, Teaching and Assessment Strategy (LTAS) is broadly based with departments and faculties developing more specific strategies to fit their own disciplinary contexts. The LTAS recognises the need for changes in academic practice brought about by advances in IT, it emphases lifelong learning and the need to respond to changes in the style and content of school education.

The Four Year plan and the LTAS are both consistent with the focus of this bid, on assessment: staff-student interaction will be enhanced as part of a new learning culture, there is an emphasis on appropriate assessments and flexible modes of delivery. It is recognised that these objectives can be achieved through curriculum/course re-design.

E-Learning Strategy

In order to coordinate e-learning developments institution-wide the University has recently set up a VLE Implementation Group (VLEIG). This group, which reports to the VP for Teaching and Learning, is chaired by a senior academic with a track record of successful innovation in teaching and learning (he brought classroom communication technologies to the UK). All faculties, and all support services, are represented on the VLEIG. This has proven an ideal forum for strategic planning and to engage staff in e-learning planning and developments. This group is currently facilitating the development of the institution's e-learning strategy, including criteria for evaluating e-learning strategically. The VLEIG has played a key role in the development of this assessment re-engineering proposal and will steer the project internally, if funded. In developing this project bid there has also been wide ranging consultation across the institution with IT services, with the Academic Office, with Registry, with Estates and with the Deans of Faculties and the participating departments.

17. State what resources the institution is committing to the project (in terms of funding, staff time and infrastructure).

[See answer to question 27 and attached excel spreadsheet 1]

18. Describe the strategy to ensure that the intended outcome is sustainable, and will result in long-term change in activities beyond the period of external funding. Describe any structural changes which the institution will make to fully embed the project outcomes.

Sustainability strategy

As identified in answer to question 16 there is a strategic commitment within the three institutions to high quality learning and organisational efficiencies supported by advanced technology. At Strathclyde, the strategy to ensure sustainability is five-fold. Firstly, the project will be integrated into the strategic planning processes for teaching and learning at institutional and faculty levels: through the VLE Implementation Group (representing all faculties and all support services) and through the Faculty teaching and learning committees. Secondly, each Faculty has made a commitment to support this project and the new staffing (employed through this project) will have a role in disseminating the outcomes and development work across the faculty even though in the first year a large part of their time will be focused on the departments engaged in implementation. Hence, the findings from these departmental pilots will have impact on other cognate departments. Thirdly, the review procedures that will be developed and documented through the first two years of this project will inform internal quality processes within the institution and will strengthen preparation for Quality Enhancement Led Institutional Review processes. Fourthly, after the first year of project implementation there will be a review of, and reports on, required changes in policy, budgeting and administration procedures, personnel systems and infrastructure. This will ensure that the elements of strategy beyond the academic departments will be evaluated and changed so that the processes remain sustainable over the longer term.

Finally, the portal for giving access to all assessment tools within the institution will be the VLE and its linkage to other administrative systems (especially PEGASUS, the student records system etc). This will ensure the systems integration necessary for sustainability. In addition, an ongoing programme of staff development linked to the VLE developments and associated technologies will ensure that all staff have the capacity to make the best use of these technologies to support teaching and learning.

Long-term changes beyond external funding

The money provided by SHEFC is intended to help pilot changes in assessment and organisational processes over a two-year period. However, beyond that time period, the 'cost to change and reengineer' will be absorbed and embedded within internal budgetary processes. New costing models will be developed and evidence will be provided of where cost savings are possible. Also, there will be a transfer of re-engineering skills from those employed by this project facilitate changes (during the two-year funding) to staff in the faculties, departments and support services. Hence, it will be possible for departments to learn from each other and support each other in internal review and re-engineering processes. Indeed, these review and reengineering processes will integrated into normal quality assurance cycles.

The course design changes already introduced within participating departments will reduce workload and costs and/or increase learning quality. It is therefore unlikely that staff in these departments will return to prior practices when funding ends unless the developments prove more costly. The cost benefit analyses carried out alongside the project should ensure that this does not happen.

Structural changes

This project will require that the institution explore the effects of associated changes in support services, infrastructure and the roles and responsibilities of staff etc. As computer supported assessment increases there will be knock on effects on the technical infrastructures and IT support services, on Estates, on student records and other registry services. Increased e-assessment will also affect institutional processes and procedures such as quality assurance procedures, staff development etc. As noted earlier, the project plan has built in review procedures to assess the necessary changes in these areas.

Providers of services

19. Where the institution is providing the service(s): have you explored the scope to provide the service more effectively by sub-contracting to specialist outside bodies?
    [Not applicable]

20. If subcontracting is involved, state how the contract(s) will be managed.
    [Not applicable]

21. Where the service involves 'home-grown' or open-source solutions: say how this approach will be more reliable and effective than using commercially available products.

    Glasgow University is developing Electronic Voting System software in order to explore features not yet provided by commercial suppliers. The Glasgow software will not provide a long-term solution but it will allow exploration of current needs and provide clear requirements to suppliers. There will be negotiations with suppliers about exit strategies for this development. JISC-funded developments in VLEs under their eLearning Framework promise to transform the VLE field within the next few years, making a blend of commercial, open source, and locally written software much easier to integrate.

Sustainability

22. Say how the new approach will be embedded and sustained.
    [see answer to question 18]

23. In what way will the new approach substitute for existing processes or methods of delivery?

    The approaches developed through this project will lead to a number of new teaching, learning and assessment models. In some departments (e.g. marketing) there will be substitution with the extensive paper based systems these departments employ to deliver feedback and marks (using proformas) and to record student progress being replaced by electronic systems. In other departments (e.g. Physiology and Pharmacology) it is envisaged that new procedures would be developed to manage and mark students' written work or to integrate electronic portfolio systems with other systems. In many departments flexible online testing with feedback will create additional resources for students to self-assess their progress at no extra cost.

    As indicated by work at the Centre for Academic Transformation, Renssaelaer Polytechnic (US) a number of different redesign models are likely to emerge. They identify five models:

    - replacement (blend face-to-face with online activities),

- emporium (move all classes to a larger setting – using classroom technologies)
- buffet (mix and match according to student preference)
- fully online (conduct all assessment tasks online)
- supplemental (add to current structure and/or change the content).

The key to economies and to better learning quality, however, depends on how online learning and face-to-face learning are integrated and on how staff in departments co-ordinate their efforts. This will be an essential focus for this reengineering project. The departmental plans produced in section 10 and in the Appendices provide more detail on the specific kinds of substitution that is envisaged in departments at each institution.

24. How will the new approach be maintained and updated within normal running costs beyond the period of central funding?

[see answer to question 18 above]

Financial information

25. Set out the budget for the project, in terms of:

- staff costs;
- infrastructure (equipment, office space, overheads) costs;
- service costs (where services are to be purchased from an external provider); and
- software licence costs.

[See attached excel spreadsheet 1]

26. State what level of Council funding is required for the project.

£1,000,000.

27. State which costs will be met by the institution(s).

The University of Strathclyde would fund the already employed internal staff and the cost of one new member of staff (a learning technologist/educational developer) over the two years plus overheads for all internal staff. The University will also have to meet a proportion of the costs of overheads of the Project Manager.

Glasgow Caledonian would meet the costs of overheads for internal staff and half the costs of managing the project internally.

The University of Glasgow will meet the costs of a member of staff to manage the project internally, the overheads for the extra staff employed and the existing staff time that will be required for the course redesign in pyschology.

28. Set out a projected profile of expenditure, based on the project plan.

[See attached excel spreadsheet 1]

Project plan

29. Please attach a full project plan, setting out key milestones, outcomes and delivery dates. This should be in the form of a Gantt chart, MS project plan or similar.

    [See Project Management Description on next 3 pages, attached excel spreadsheet 2 and attached gantt chart]

Re-engineering Assessment Practices in HE

Project Management and Phases of Implementation at the University of Strathclyde, Glasgow Caledonian and the University of Glasgow.

Project Management

Project Steering Group. This re-engineering project will be managed from the University of Strathclyde with co-ordinators in each partner institution. The Project Steering Group will include senior members of staff from all three of the partner institutions, a SHEFC funding council representative, external representatives from non-partner institutions, the Higher Education Academy and JISC.

A Project Director, a senior member of staff within the University of Strathclyde, will have overall responsibility for project implementation and for reporting to the Project Steering Group. A Project Manager, reporting to the Project Director will be responsible for day-to-day implementation of the project. Reporting to the Project Manager will be three staff with a mix of skills (in learning technology, in educational development, in evaluation) and a half-time secretary. Two coordinators, one at Glasgow University and one at Glasgow Caledonian Business School will co-ordinate activities in these institutions. These coordinators will be responsible for delivery within these institutions and they will collaborate with the Project Manager and Project Director.

Given the transformational nature of this initiative for teaching and learning at the University of Strathclyde, the Project Director will also report internally to the Virtual Learning Environment Implementation Group (soon to be renamed the E-learning Strategy Group). This group comprises representatives from all faculties and all support services and reports directly to the Vice-Principal for Teaching and Learning. The close synergy of this project with the e-learning strategy and VLE developments will also necessitate that other staff at Strathclyde within the Information Resources Directorate and Learning Services including the VLE project director also form part of an internal management group.

Project Plan: Phases of Implementation

Phase 1: Research and Development. [April to Sept 2004]

This phase of the project will involve a number of research and development activities. These will enable the evaluation to be planned and evaluation instruments identified and, where necessary, developed. Cost-benefit methodologies applied by the Center for Academic Transformation, Rensselaer Polytechnic in HE in the US will be investigated and some HE institutions funded by the Pew Trust transformational programme will also be visited. In addition, assessment tools (e.g. assessment experience questionnaire) developed through the Formative Assessment in Science (FAST) project in England (HEFC) will be evaluated and other tools developed for the evaluation of e-supported assessment.

During this phase, a web site will be established for the project to facilitate sharing of resources across partner institutions and the publication of outputs as they become available. The Scottish Funding Council will also facilitate the setting up of an e-assessment network to facilitate the exchange of ideas and practice.

Glasgow University (GU) will also carry out a formal analysis of Electronic Voting Software (EVS) including its current and potential role in assessment, both formative and summative. The objective will be to draw up specifications for software enhancement.

Phase 2: Review assessment processes, plan implementation and collect baseline data [Oct to Dec 2005].

In this phase, the Project Team at Strathclyde University (SU), e-learning champions at Caledonian Business School (CBS) and the staff at University of Glasgow will review assessment processes with colleagues in academic departments and plan course redesign. At SU, five departments will participate in the first phase of re-engineering, one in each faculty, and in CBS re-engineering will apply to the core modules, one in each of eight disciplinary divisions. The focus will be large enrolment classes (between 160-600 students). During the same period, baseline data on costs and learning and assessment quality in these large enrolment classes will be collected.

An initial review will also be carried out within each institution (SU, CBS) of how the implementation of e-assessment might impact upon VLE usage, IT support services, security and authentication, system integration, space usage and students use of PCs. Also, during this phase, awareness will be raised across the institution (SU) about the reengineering initiative and project activities will be coordinated with ongoing VLE developments. Similar activities will be carried out within CBS.

Glasgow University (GU) will begin to develop the Electronic Voting software for assessment purposes and will work with departments at SU and GCU who wish to use EVS as part of their redesign plans.

Phase 3: Implement course redesign and begin dissemination. [January to June 2006]

During this phase, all institutions (SU, CBS, GU) will implement course redesign (in five departments at SU, in six divisions at GCU and in one department at GU) supported by the Project Team and the e-champions respectively. The redesign plans will be published on the website.

The new EVS software developed and piloted at GU will be rolled-out to selected departments at GCU and SU. Exit strategies to support the new software on an ongoing basis will be investigated with suppliers.

Phase 4: Review and preparation for second round of implementations. [July – Sept 2006]

During this phase both SU, CBS and GU will review experiences and outcomes of transformational design across the 5 departments, 6 divisions and one department respectively. Any difficulties that emerged in the first implementation will be addressed and strategies revised and refined where necessary.

Dissemination in this phase will take place internally across other departments in faculties (SU) and across those delivering other modules (CBS). The SFC facilitated network will be used to share experiences and outcomes. In addition, case studies of change management and reports of course redesign plans will be produced for the website as well as papers on redesign experiences. The documentation of relevant redesign processes and tools will begin.

Phase 5: Comparative evaluation and second round implementations. [Oct – Dec 2006]

This phase is marked by the collection of comparative cost-benefit data based on the implementation in October-December 2005. The original five academic departments (SU), 6 divisions (GCU) and 1 department (GU) will implement a second round of course re-design. Evaluation data on costs and assessment quality will be collected to allow a comparison of traditional learning (Oct-Dec 2005) with redesigned learning (this phase) supported by technology.

Dissemination across other departments in the faculties and coordination with VLE developments will continue. In addition, toolkits and other resources that have been developed will be posted on the website. These published toolkits will support others wishing to engage in redesign using technology.

The University of Glasgow will look for further departments interested in applying EVS and other e-technologies to redesign aspects of their assessment.

Phase 6: Constructing Outputs [Jan – May 2007]

Detailed case studies of traditional versus redesigned courses, including cost-benefit analyses, will be produced and disseminated through the website, and through the e-assessment network. The academics in departments involved in re-engineering have also agreed to share their findings, via workshops, conferences and publications and through their own disciplinary networks and the Higher Education Academy subject centres.

GU will produce an evaluation report on different implementations of electronic voting technologies for the website and will disseminate across the Scottish HE sector.

Other outputs that will be finalised include: (see, answer to question 12 for full account)

- Workload models showing how costs can be reduced and/or quality of learning improved through these re-engineered practices.
- Models of how 6 departments (5 at SU and 1 at GU) and 1 faculty carried out change management in their own assessment practices
- Toolkits to support other institutions wishing to engage in curriculum re-engineering processes.
- Documentation and analysis of the changes required within two different institutions (at organisational, management, human and infrastructural levels) to sustain more efficient models of learning and assessment supported by technology.
- Analysis of impact of using multiple technologies within institutions.
- Final reports for website and for each project component will be produced.

Department	Curriculum	Assessment	Areas of concern	Technologies considered	Quality improvements	Efficiency gains
Psychology 1st year = 600 students	48 lectures 10 hours supervised practicals (20 repeat sessions) 220 tutorials (55 groups x 4) 4 staff and 14 GTAs teach this class	4 mini essays = 2400 submissions (linked to tutorials) 2 MCQ end of semester tests Exam = 5 essays = 600 hours marking	No feedback on mini essay or on multiple choice tests or exams Variable levels of participation in tutorials Administrative burden of dealing with student questions about classes and tutoirals	Reduce no of lectures = put notes online Put practical simulation online Create multiple choice tests online for independent self-assessment by students. Make tutorials larger and use PRS to stimulate peer discussion Have students work together and create mini essays in groups and post online Use peer distribution software to encourage peer comments on essays Use bulletin board to handle FAQs etc and to create community amongst students. Use WebCT to reduce administrative burden Reduce number of essays in exam	Improved feedback in early phases of module and in later phases . Self-testing when and where students wish with feedback Increase peer interaction in tutorials (dialogical feedback) Encourage peer and self-reflection. Build community across 1st year students.	Lecturing time Time delivering practicals Time in marking MCQs Time delivering tutorials Reduced administrative burden Time marking essays

Department	Curriculum	Assessment	Areas of concern	Technologies considered	Quality improvements	Efficiency gains
Mechanical Engineering 1st year classes = 250 students (inc service teaching)	Basic engineering sciences use interactive lectures with PRS software and in-class group discussion (2 hours) Design classes use problem-based learning Maths, Computing and engineering analysis classes use studio teaching and interactive lectures	Homework every two weeks and two class tests (2 hour exam) and occasional in-class quizzes. These marked and students given comprehensive feedback	Students still too focused on passing the tests Homework assessment a major burden on staff	Develop PRS software for large in-class assessment through enhanced quiz capability (in collaboration with Glasgow University) Develop intelligent online homework system for self-assessment of problem-solving in engineering sciences. Systems already in use in US but content must be adapted for Scottish context.	Motivate students more towards in-class and self-assessment – continuous and formative. Much greater focus on reflective learning	Example from one basic engineering science class – tutorial contact time (96 hours) reduced by online tutorials. Marking of homework and class tests = 160 hours reduced to 40 hours.

Notes: need to explore US systems such as MyCyberTutor and MasteringPhysics. Overall assessment strategy to be discussed with course team during semester two.

Department	Curriculum	Assessment	Areas of concern	Technologies considered	Quality improvements	Efficiency gains
School of Pharmacy Years 1-4 500 students	36 classes, 610 credit Integrated Masters Degree	11 essays, 19 lab. reports, 5 presentations 22 Class tests 30 Degree Exams	Insufficiently detailed, structured and personalised feedback on student knowledgre and skills development. Students not sufficiently active or focused in taking responsibility for personal development. Overload on both students and staff of assessments.	Develop VLE-based electronic portfolio to become the student's electronic workplace, providing storage for work in progress as well as final records, in addition to personal development material. Electronic submission and storage of all key coursework within the student's e-PDP along with structured feedback provided by the student's counsellor and course markers. Develop the role of the student counsellor (who currently acts as a mentor for personal development purposes and has access to student e-portfolio) to encourage students to take responsibility for their personal development	Higher quality, more reliable, feedback to students on progress in knowledge and skills development. Improved understanding by students of how different course elements relate to each other within the degree programme. Increased emphasis on student involvement in all aspects of the teaching / learning process.	More reliable communication and storage of student feedback. Possibility to automate plagiarism detection. Reduced time spent on assessment by students.

Notes: The e-portfolio will be developed using the School of Pharmacy's SPIDER virtual learning environment.

Department	Curriculum	Assessment	Areas of concern	Technologies considered	Quality improvements	Efficiency gains
Marketing 1st year = 560 students	48 lectures (semesters 1& 2) 368 tutorials = 46 groups of 10/12 students x 8 A team of 5 lecturers, 1 senior tutor and 8 GTAs teach this class Feedback forms are standardised using proformas but providing written feedback still a significant burden on staff.	2 assignments – Case-based report Project/research based report Feedback is given using proforma and discussion during tutorial	No of assignments cut from 5 to 2 in recent years – students entering 2nd year less well prepared. Had to ditch multiple choice/ short essay test in 1st semester – result is students not revising and reading. Overall less feedback. Plagiarism a concern for written work. Administrative burden of managing groups and recording marks etc.	Introduction of e-voting system in lecture and/or tutorials Re-introduce online testing using objective tests with question mark software linked to webCT Develop databank of feedback comments and online proformas to replace paper system. Peer feedback software to enhance feedback and student reflection Examine plagiarism detection software.	Increased interaction and methods of self reflection Better diagnostic testing Increased tutor feedback Increased peer dialogue feedback	E-voting in tutorials would save over £15000 a year (e.g. 1 tutor less) Significant time savings in giving feedback when databank of comments developed and reduction in paperwork for feedback Reduced administrative burden (WebCT) – tutorial allocation, input of marks etc.

Notes: It would take time to build up a relevant databank of feedback comments. Also, need to explore whether there exists suitable objective questions.

Department	Curriculum	Assessment	Areas of concern	Technologies considered	Quality improvements	Efficiency gains
Education **Department of Childhood and Primary Studies** B Ed Degree Course in Primary Education Year One	Five core classes: Curricular Studies (including Language, Mathematics, Religious and Moral Education, Social Ed, Expressive Arts, Health Ed) Educational Studies (Learners and Learning) *Skills for Effective Learning* (with PDP) Teaching and Learning *Placement Learning*	Variety of coursework tasks. Extended reflective writing – how can this be assessed online? Audits of numeracy and literacy Reflective tasks built into PDP Independent study task for science Class exams in Mathematics and Educational Studies	Development of study skills and analytical and reflective skills Students not able to see and discuss teachers in practice Development of peer assessment Standards of numeracy, literacy and science knowledge Staff time for assessment and construction of feedback sheets Placement issues	On-line assessment tasks for numeracy, literacy and science On-line viewing and reflection of teaching skills (video matter) PDP already being planned to go on-line: reflective tasks should be built into this – possibility of sending some of these electronically to staff for comment? Other subject areas are considering possible tasks which could be available electronically Objective tests for mathematics, science and educational studies could be marked electronically	Motivate students to reflection and self – evaluation Greater focus on independent study Flexibility of contact with tutors	More effective use of tutor contact time for discussion of key issues Staff released from correction of numeracy, literacy, science and Ed Studies audits Students able to reflect on classroom skills from distance Staff able to discuss realistic placement situations with students in real time

Glasgow Caledonian University: Appendix 2a

CBS Division	Curriculum	Current Assessment	Areas of Concern	Technologies considered	Quality Improvements	Efficiency Gains/Cost savings
Business Information Management **Information and Data Analysis – level 1 module** Students = 900 FT staff: = 13 22 computing labs sections Lectures 6 x1 hour in first 6 weeks Labs 2 x 12wks x 2 hours Weekly additional clinics 3-5pm every Monday	2 parts with 2 hour weekly labs to develop: 1 - C&IT skills and 2 - numeracy and spreadsheet use	100% by CW Summative: 4 elements 2 computing assessments (40% each); undertaken week 9 and in exam period* (*Automated marking and feedback of excel spreadsheet assessment in exam period) 2 items of Portfolio of Work (10% each) submitted week 7 and 9 Formative drills and practice opportunities provided online	Progression & retention rates (compounded by poor attendance /participation issues) Skills development in computing labs is labour intensive. Workload associated with managing large module and lack of integration with GCU exams systems	Currently use Bb and excel. EVS to provide feedback in labs Enhanced interactive simulations and drills to provide more effective and efficient self assessment opportunities	Better alignment of teaching and assessment All staff making making more effective use of directed learning materials on BB. A continued serious attempt to encourage better attendance making better use of CBS Advisors and the Programmes Office to monitor and contact, within a timely interval, students at risk.	Seamless transference of students' assessment marks from source to exams office and students records ie requiring one input of data only. Staff lab supervision and tutorial – substitution by PT and PG students to be considered.

Glasgow Caledonian University: Appendix 2b

CBS Division	Curriculum	Current Assessment	Areas of Concern	Technologies considered	Quality Improvements	Efficiency Gains/Cost savings
Business Economics & Enterprise **Economics, Markets & Enterprise – level 1 module** Lectures – 2x1 hr Seminars – 2x 1hr Number of students = 900 Semester A & B with c50% in each Number FT staff = 11 (No PT staff)	Introduces students to the operation of the major factors which together shape the economic environment within which all business enterprises function in a mixed market economy. The aim is to highlight the operation of the forces at local, national, and international level which influence, guide and often determine the economic aspects of the behaviour of both producers and consumers. The emphasis throughout the module is on the relevance and applicability of basic economic concepts to a range of contemporary issues	Summative; 3 elements: a) group project(25%) b) an individual essay (25%) c) 2 hour final examination (50%) Formative: 2 elements Mock exam wk 7 in seminar time; peer marked; tutor providing & discussing 'good answer' Weekly MCQs released every Monday	Student progression and retention rates Management of large module Marking load and inability to turnaround to provide more timely feedback eg essays and exam papers = 4/5 per hour x c40 per tutor coupled with reluctance to move away from essays and presentations	Technologies used: BB Mind Maps Own web site Others: Problem solving and decision making from business game /simulation EVS for lectures	Students thinking, ie analysis and problem solving. Business game/simulation is being considered here.	Reduction in marking workload is to be pursued (within desire to retain students' written assessment work)

CBS Division	Curriculum	Current Assessment	Areas of Concern	Technologies considered	Quality Improvements	Efficiency Gains/Cost savings
Marketing Marketing Fundamentals - level 1 core module Students = 900 overall; 450 semester A; 450 semester B 2 x 1hr lecture 1 x 1 hr seminar 22 seminar sections Number of staff teaching = c 17 3 FT share lectures 14 FT take seminars	Use core text with Bb resources including Publisher's material Text book case studies and in-house case studies used for seminars Student performance info CW pass rates 1st = 96% and 2nd diet = 98% Exam pass rates 1st = 93% and 2nd = 94% Module overall = 1st diet = 84% and 2nd = 87%. Main reason for pass rates not being higher is due to drop outs	Summative: 3 elements CW - Group project –Group presentation (30%) Group report (30%) Exam – (40%) 1_ hr MCQ exam (paper based -not online) Estimates of marking time/load for CW = 5mins per Group presentation =c 15 hours 20 mins per Group Report = 60 hours for exam = 2 mins per paper = 30 hours Total marking time per 900 students = c105hrs	MCQ exam not online – extra admin and marking load i.e. Moderation of reports with a large number of staff marking Managing large teaching team. Staff and student engagement with BB – little use of self assessment questions at the end of units, Little use of discussion boards Admin support for 'large' module re students Also the time involved in entering marks onto marks sheets – no admin support for this.	BB online assessment facility Publishers resources – provide test banks and also a CD with a different test bank and soft ware for constructing exam papers Questionmark Perception trial on line assessment mid semester and end of module self assessment.	More staff and student engagement with BB Better quality MCQs Enhanced student retention and progression	Reduction in marking time for exam. Reduction in admin work for staff eg entering marks

CBS Division	Curriculum	Current Assessment	Areas of Concern	Technologies considered	Quality Improvements	Efficiency Gains/Cost savings
Accounting & Finance **Managerial Finance – level 1 module** Lectures – 2 x 1 hr Seminars – 1 x 1 hr Clinics according to identified need - attendance optional Number of students = 900 ; Number of sections = 22 Semester A and B Number FT staff = 8	BB used to post lecture notes & seminar questions 1 week in advance of class. Directed reading after lecture Students to attempt seminar questions before seminars. Use a CAL package of publishers MCQs on weekly basis as formative assessment. Provide link to companion website for core textbook	3 elements: CW : group project submitted wk 9 (20%) 2 class tests – wk 9 and 12 each 10% (automated marking and feedback) 2 hr unseen exam (60%)	Workload associated with management of large module Marking load from group project and exam Repeat teaching workload arising from multiple sections and Semester A and B provision per academic session Student progression and retention Increasing % student participation in weekly formative assessments ie very high wk1 – very low thereafter.	Use of BB Online assessment software Use of EVS in lectures	Staff development to design better MCQs/online formative assessments and better feedback Also to achieve more regular and effective use of Bb by staff and students	Reduce module management - integrate online assessment with GCU admin assessment systems to provide GCU support and electronic transference of data Reduce marking repeat teaching workload or cost

Glasgow Caledonian University: Appendix 2e

CBS Division	Curriculum	Current Assessment	Areas of Concern	Technologies considered	Quality Improvements	Efficiency Gains/Cost savings
Management **Strategic Management – level 3 module** Number of students = 700 Lectures – 2 x 1 hour each week; (Both repeated each week) Seminars – 1 x 1 hour each week (35 sections) Online discussions – 1 x 1 hour each week Semester A only Number FT staff = 3 Number PT staff = 4 (for seminars only)	The module focuses on the evolution of strategic management and policy formulation as disciplines, and use of strategic management tools. Assumes students understand the foundations of management and the business environment. Therefore more emphasis on models and frameworks for generating and evaluating strategic options and key issues related to strategic choice, implementation, evaluation and control.	Group work presentations & online discussion = (20%) weeks 6,7,8 Feedback week 9 2,500-3000 word Individual report = (30%) submitted end week 10 Use standardised marking/feedback form 3 hour exam (3/7 essay Qs) = 50% No specific formative assessment though online discussion forum can be used for limited Q and As support	High reliance on PT staff with issues of consistency, high turnover, induction costs, risks of departure with short notice Marking workload and need for more timely and useful student feedback Managing and responding to online discussions eg some generating over 2 - 400 contributions High level of repetitive work	Integrates use of Bb EVS in lectures	Improved induction, support and retention of PT staff. Enhancing student feedback by introducing more efficient formative feedback opportunities	Reducing marking workloads Strategies to develop more efficient (as well as effective) use of online discussions

CBS Division	Curriculum	Current Assessment	Areas of Concern	Technologies considered	Quality Improvements	Efficiency Gains/Cost savings
Human Resource Management & Development **Perspectives on People at Work – Level 2 core module, now in 3rd iteration**. Semester A only* 700 FT students 13 FT staff + 6/7 PT staff (paid hourly rate) (*Offered in Semester B to 30/40 PT students who consistently achieve higher results.)	Use customised textbook. Publisher supplies web based exercises and MCQs in Bb accessible to student who buy book via PIN. Resulted in student resentment – loan book from library and buy from what is now significant 2nd hand market – do not get PIN! Therefore such resources have to be optional. Use has not been high. Need to develop own alternatives	Summative 1 x 2,500 word essay. Questions in handbook issued week 1. Submitted week 8. Returned week 12. i.e. before exams. Use standard feedback sheet + oral feedback & revision in week 12 classes. Good attendance in 1st year; now not so good. Students collect feedback sheets from CBS office. Therefore don't attend. 1 x 2hr exam in exam period. 1 essay and 2 short answer Qs Provide weekly MCQ opportunities online – but students uptake very poor	Management of 700 essay submissions estimated at 3 days. Staff expertise in e-learning and lack of engagement with module on Bb. Also 'fear and burden' factors Spoon feeding leading to greater student passivity Plagiarism - need for detection service Marking of essays: by FT staff estimated at 5 per hour; by PT staff at 2 per hour Moderation of essays = 60 per hour Turnaround in all marking =10 days	Uncertain Would love to use 'Clydetown' type simulation / game used by social workers in GCU contextualised for HRM&D Looking for info e.g. from professional bodies - CIPD	Need to keep responsibility as much as possible with students and teaching team members to achieve engagement ie at 'sharp end' Av essay mark = 56% Av Exam mark = 45% Overall module c85% Last year c120 exam re-sits of which c75 took re-sit of which c75% passed. Re Essay c20 resubmissions at second diet.	Reduce 'management' costs Reduce marking costs Reduce PT staff induction to marking costs

APPENDIX 4

Glasgow Caledonian University Business School Contribution

Caledonian Business School (CBS) of Glasgow Caledonian University (GCU) is committed to using e-learning technologies to achieve transformational change as detailed in this project proposal. The following initiatives show evidence of this commitment:

- **The adoption and implementation of a VLE** (Blackboard). Within GCU it was the CBS which in 2000-01 piloted, implemented, evaluated and recommended the adoption of a VLE. This subsequently led to university wide implementation.
- **The implementation of an explicit e-learning strategy in CBS.** All CBS modules at undergraduate and postgraduate level are supported by Blackboard, VLE. In 2003-04 the CBS school board agreed an e-learning strategy for the progressive development of staff conceptions of, and approaches to, using e-learning technologies.
- **Investment in continuous professional development in e-learning.** GCU/CBS offer extensive staff development opportunities in a range of modes from short workshops, to online courses where staff experience for themselves, online learning.
- **The creation of the Learning Café**. This innovative 'virtual space' has transformed students' receptiveness to using technology for learning.
- **Introduction of a commercial electronic portfolio** (Sentient). This is the most recent evidence of commitment to achieving transformation through use of e-technologies to support personal development planning in the university.

The project proposal is consistent with existing GCU and CBS strategies

'*Glasgow Caledonian will be:*
- *Entrepreneurial in approach*
- *Innovative in programmes, learning and knowledge transfer*
- *Inclusive of all sectors of society*
- *Responsive to the needs of individuals, employers and other stakeholders.*'

Glasgow Caledonian University Mission

The CBS e-learning strategy reflects the university's mission to achieve synergistic change through changes in roles and practices of staff (academic and administrative) and in the learning experiences of students. Utilising e-learning technologies to support the re-engineering of assessment in core modules will deliver significant transformation, as detailed in the project proposal, leading to changes in the ways academic staff work and inter-relate with students. Through this project, and a process of collaborative redesign, we intend to evidence both cost savings in teaching and improved learning.

Core modules in the undergraduate framework are attractive as the focus for assessment re-engineering, given the large numbers of students and the difficulty this poses for individualised feedback. CBS is committed to increasing the quality and effectiveness of the feedback it provides to students. Feedback processes should help identify students who were deemed to be 'at risk' so that they can be offered help as appropriate. Better ways of providing diagnostic, formative and summative assessment supported by new technologies will all be investigated through this project. How each method might improve student progression and retention rates will also be explored.

Using a digital simulation or business game

Different disciplinary areas have different needs from online assessment and this must be recognised if staff 'buy-in' is to be achieved. In CBS one component of the project would be the use of an interactive business simulation or game with first year students studying core modules. This kind of software can help develop problem solving and decision-making skills in students while providing enhanced feedback. It can also be used to encourage students to integrate knowledge across different subject domains. Role-playing and problem solving simulations or games also help address other problems such as student motivation. For example, when students work in small teams competing in an online business game motivation is enhanced. Using a game, with associated tracking and follow-up of 'at risk' students, can also facilitate a smoother FE/HE transition for students and so is instrumental in retention. The digital simulation or business games implemented at CBS will be embedded in the learning and teaching strategies of the core modules, contributing to summative assessment of students' year 1 learning experience. This is consistent with the project proposal to enhance quality and reduce staff workloads in assessment. Funding to licence business simulation software has been requested through this re-engineering project bid.

Linking with Personal Development Planning (PDP)

GCU is introducing and implementing a personal development planning process (PDP) with year 1 students in session 2004-05 utilising an electronic portfolio. A key aim of PDP is to enable students to take responsibility for their own learning by encouraging self monitoring of progress and future activity planning while undertaking their studies. It will also seek to prepare students for future membership of a professional graduate community undertaking regular Continuing Professional Development (CPD) throughout their careers i.e. preparing students to view learning as a lifetime activity. All of this is consistent with the goals of this re-engineering proposal.

Credibility to achieve transformational change through e-learning

Credibility to deliver on this project and actually achieve 'transformational change through e-learning' which will be sustainable beyond the two-year funding period is dependent on the ability to change behaviours and practices in HE. Our track record in CBS demonstrates we can do this. Access to SHEFC Funding will enable the identification and appointment of discipline-based 'e-learning champions' who will lead in the design, development, implementation and evaluation of online assessment instruments in core modules within their disciplines. The concept of divisionally-based e-learning champions is powerful model to achieve 'buy-in' from academic staff and to avoid the 'not invented here' syndrome. The focus on assessment will capture the attention of students and ensure their engagement. The project will also make an impact on academic staff – reviewing assessment practices will lead to changes in wider conceptions and approaches to teaching and learning.

CBS aims to, and can, deliver 'transformation' of practices in teaching, learning and assessment as detailed in the project proposal. Glasgow Caledonian University, and in particular Caledonian Business School, has the commitment and capability to achieve such transformational change.

Dr Gillian Roberts
Caledonian Business School,
January 2005

APPENDIX 5

University of Glasgow Contribution

The role of the University of Glasgow in the Assessment Re-engineering project is:

- to develop and help support the use of electronic voting systems (EVS) for assessment purposes (as opposed to their more established application in exposition) in large classes in its own and in the partner institutions.

- to apply these in re-engineering formative assessment in the level-two class in the Psychology Department.

EVS and Assessment

At the University of Glasgow the use of EVS for formative assessment and for preparing students for summative assessment will be developed and disseminated. The advantages of EVS are that students receive immediate visual feedback (normally a projected bar chart) about their answer to a test in class, often a multiple-choice question (MCQ). This feedback informs students about their individual response and how that relates to the class spread of responses (this enhances motivation). Moreover, the feedback provided is often used as a trigger to initiate peer discussion (e.g. 'convince your neighbour that you have the right answer') or teacher-led discussion in class, thus generating other levels of dialogical feedback. EVS not only provides feedback to the student but it also provides information to the teacher about students' understanding of concepts. This makes it possible for the teacher to adapt teaching in real time in relation to students' needs in class.

Most of the use of EVS to date has been to transform lectures into occasions where more interaction, more understanding, and more learning take place. The main idea here is to develop the use of EVS to transform some of what used to be done in tutorials and revision classes. Broadly speaking, this is formative assessment both in terms of producing information for both learners and teachers on how well each learner understands the material, and in passing feedback to learners to help them correct their current partial understandings.

Many variations will be considered, but for most of them this will involve:

a) A set of questions being developed to discriminate degrees of understanding (this is not quite the same design aim as questions used in class which more often are optimised to promote discussion).
b) The use of the aggregated results to focus discussion away from the teacher and towards the needs of the particular group in front of them: i.e. moving quickly onwards to where a group gets a question mostly correct. This will raise the value of discussion and feedback by making it more targeted to specific needs.
c) Higher quality feedback because it is oral and interactive, with students able to press the lecturer where a first explanation doesn't 'work' for them. This is potentially a fundamental increment in quality over one-way methods of feedback such as comments written on scripts.
d) Cost savings because (i) this is done once for a whole group, often a large group or the whole class, as opposed to repeating comments for many students; (ii) this is done orally, not in writing, which generally feels like less work to the staff concerned. Whether this mainly saves money by replacing some small group tutorials by large group occasions, or improves quality by reintroducing formative assessment squeezed out by the demands of summative assessment will depend on the course being redesigned.

Variations to be considered within this general approach include revision lectures, pre-selected small tutorial groups but with the agenda determined by that groups' results on a test, class tests with the marking and feedback done on the spot using EVS, or replacing some tutorials by a test done online (out of class) with students selected by these results attending one or more large group tutorials on different topics.

Development of EVS

While EVS systems are effective in simple assessment tasks there is a need to extend their functionality and to link their use to other online learning tools. With current EVS systems, when a MCQ is presented all students must answer within the same time-period i.e. all answer the same single question at the same time. However for more serious usage, particularly in science subjects, where thought and calculation are required to generate an answer, it is better to allow students to answer questions at their own pace. Also, self-pacing is more realistic as practice for exam conditions of testing. However, self-pacing requires an additional software feature that keeps track of each student (by handset ID) and of which question they are currently working on. Additional commands are also required to enable students to skip forward or return and change a previous answer. Under self-pacing conditions, students would receive separate feedback question by question in an end of class session.

One advantage of using EVS for more complex testing is that it has some of the advantages of an online test, but without the need to book a special room (a computer lab). Also EVS overcomes difficulties in controlling students' access to data, to other software, and to peer communication and the world wide web during an exam or test. It is therefore an attractive option to include in an assessment portfolio. Other software developments that will be explored to support assessment include programming the software to identify, early on, students in difficulty using the handset identification and to relay this to the teacher in meaningful ways. EVS methodologies must also be integrated with other teaching and learning processes and other technological systems. For example, there is a need, in later years of study, to have students themselves devise questions for EVS that other students answer rather than have all tests driven by the teacher. This would develop skills in students, enhance motivation and encourage the kinds of self-regulation that this re-engineering assessment project is focused on. Technological integration might involve using PRS with mobile devices. In this area there is some synergy with plans for further use of mobile technologies at both the University of Strathclyde and Glasgow Caledonian University.

There are currently two lecturers in Computing Science at Glasgow University committed to exploring the development of EVS software for assessment. Each has classes of over 100 students. The funding from this project would allow these developments to be expedited, with resources devoted to documenting the software and to sharing and disseminating its use to other departments and institutions across the sector. A programmer would be required to develop and implement the software and to visit users in all the partner institutions, to install the software and to prepare staff for its use. Discussions are underway with the manufacturers of EVS systems to work with them on an exit strategy to make new software developments available within commercial systems.

Dissemination and support

In the first year of implementation the new features of the EVS software will be developed and its application will be trialled by the two partner institutions – Strathclyde and Glasgow Caledonian. During this same period, Glasgow University is committed to disseminating and supporting the uses of EVS that they have already developed for assessment purposes, and to re-engineering at least one course to exploit them.

Collaboration across partner institutions

Glasgow University will also act as a test-bed for the initial dissemination of new technology-supported assessment methods and change management processes developed at the University of Strathclyde and at Glasgow Caledonian University initially within the department of psychology. (See, Project Plan and answer to Question 5 and 10)

Dr Steve Draper, Glasgow University, January 2005

Dr David Nicol

Dr David Nicol is an educational consultant within the Centre for Academic Practice, University of Strathclyde. He works collaboratively with academic departments/faculties on educational improvement projects in teaching, learning and assessment in both online and face-to-face environments. He also provides pedagogical support in relation to the implementation of Strathclyde's virtual learning environment. Other recent projects include:

- (2002-2005) Evaluator of the digital libraries for Distributed Innovative Design Education and Teamwork' (DIDET) project funded by JISC (UK) and the National Science Foundation (US)
- (2003-2004). Member of Scottish team that collated 50 case studies of good assessment and feedback practice across the Scottish HE sector. These were published on LTSN website along with a literature review by Nicol & MacFarlane-Dick (2004). Project funded by LTSN.
- (2002-2003). Developed instruments to evaluate institutional approaches to teaching and learning in the architectural design studio. Collaborators: Strathclyde, Cardiff and Portsmouth Universities. LTSN funded project.
- (2003-2004). Carried out research into the risks associated with investments in e-learning in higher education. Produced senior managers briefing paper and delivered workshops across the sector.
- (2000-2004) JISC funded-project to develop a 'Model for Evaluating the Institutional Costs and Benefits of ICT in Teaching and Learning in HE'. Joint developer with Michael Coen, PREDICT at Strathclyde University (see publications)
- (2000-01) External Evaluator of the European Union ADAPT LINC project (£2m). This project involved the development of online learning materials and the cultivation of networked learning communities across the Scottish Highlands and Islands. Contractor: UHI Millennium Institute.
- (2002-2004) Internal educational consultant and evaluator of project to use groupware and shared laptops to support learning in Engineering Faculty.
- (2000-01) Evaluation of New Approaches to Teaching and Learning in Engineering (NATALIE) project at Strathclyde University. NATALIE involves teaching large classes using interactive media in a wired classroom

The Management of e-Learning Investments in HE
David has also been involved in two projects on strategic management funded by JISC. The first involved devising, and piloting the use of, a model for evaluating the cost-benefits of e-learning at institutional level. The second project was an investigation of the risks associated with e-learning at institutional level across the 15 HE/FE institutions. Based on these projects, toolkits were developed and workshops delivered to FE and HE institutions.

Reports on the Management of e-Learning Investments
Nicol, D. (2004), The Risks Associated with E-Learning Investments in FE and HE: Senior management briefing paper. Available at
http://www.mis.strath.ac.uk/predict/projects/risk/submissions/may04/
Nicol, D. Kay, N., Gordon, G. & Coen, M. (2002) INSIGHT: a model for evaluatingthe costs and benefits of ICT in teaching and learning. Final Report to JISC pp1-27.
http://www.mis.strath.ac.uk/predict/projects/insight/

Selected Recent Publications
Nicol, D. J. & Milligan, C. (in press), Conceptualising technology-supported assessment in terms of the seven principles of good feedback practice. In G. Gibbs, K. Clegg and C. Bryan (Eds), Innovating in Assessment, RoutledgeFalmer, publication date 2005.

Nicol, D.J. & Macfarlane-Dick, (in press). Formative assessment and self-regulated learning: A model and seven principles of good feedback practice, *Studies in Higher Education* [accepted for publication, January 2005]
Nicol, D.J. & Macfarlane-Dick, D. (2004). Rethinking formative assessment in HE: a theoretical model and seven principles of good feedback practice. In C. Juwah, D. Macfarlane-Dick, B. Matthew, D. Nicol, D. & Smith, B. (2004) *Enhancing student learning though effective formative feedback*, York, The Higher Education Academy. http://www.ltsn.ac.uk/application.asp?app=resources.asp&process=full_record&section=generic&id=353
Nicol, D., Littlejohn, A. & Grierson, H. (2005). The importance of structuring information and resources within shared workspaces during collaborative design learning. *Open Learning, 20(1), 31-49*
Nicol, D.J. (2004) Digital Repositories Briefing Paper. Published by ALT-SURF in the Netherlands.
Nicol, D.J. & MacLeod, I, A. (2004). Using a Shared Workspace and Wireless Laptops to Improve Collaborative Project Learning in an Engineering Design Class, *Computers & Education*, 44(4) 559-575
Nicol, D.J. & Boyle, J.T. (2003), Peer Instruction versus Class-wide Discussion in large classes: a comparison of two interaction methods in the wired classroom, *Studies in Higher Education*, 28(4), 457-473
Nicol, D. J., Minty, I. & Sinclair, C. (2003), The social dimensions of online learning, *Innovations in Education and Teaching International,* 40(3), 270-280
Nicol, D.J. & Coen, M. (2003) A Model for Evaluating the Institutional Costs and Benefits of ICT Initiatives in Teaching and Learning in Higher Education, *Association for Learning Technology Journal,* 11(2), 46-60
Nicol, D.J. & Coen, M. (2003) The importance of cost-benefit analysis: a response, *Association for Learning Technology Journal,* 11(3), 122-124
Boyle, J.T. and Nicol, D. J. (2003). Using classroom communication systems to support interaction and discussion in large class settings, *Association for Learning Technology Journal*, 11(3), 43-57
Nicol, D.J. (2003). Conceptions of learning objects: social and educational issues. Commentary on Duncan, Granularisation, Chapter 2 of Reusing Online Resources, (Ed) Littlejohn, *Journal of Interactive Media in Education*, [http://www-jime.open.ac.uk/2003/1/

Professor Allison Littlejohn(now at Dundee University)

Dr Allison Littlejohn is an academic member of the Centre for Academic Practice (CAP) at Strathclyde University in Glasgow, Scotland, specialising in the use of information and communications technologies (ICT) in learning and teaching. Allison directs Strathclyde University's Continuing Professional Development Programme in ICT for Learning and Teaching and also convenes the Computer Enhanced Learning and Teaching research group (CELT). Recent projects include:

- Editing Reusing Online Resources: A Sustainable Approach to eLearning www.reusing.info
- Chairing the LTSN national forum on sustainable e-learning (SSeLF)
- Co-ordinating an ALT-SURF international exchange programme www.strath.ac.uk/Departments/CAP/surfscot/
- Directing the Strathclyde Initiative in Improving Personal Effectiveness with science and engineering students
- Quality Enhancement: reflective learning through online portfolios
- The Scottish Electronic Staff Development Library (SeSDL) www.sesdl.scotcit.ac.uk
- Enabling Large Scale Implementation of C&IT (ELICIT) www.elicit.scotcit.ac.uk

Allison has published over 30 research articles, conference papers and book chapters (publications list). She is one of 14 associates of the Learning and Teaching Support Network Generic Centre and is active within the Association of Learning Technology, as a member of the ALT-J Editorial Board and as co-editor of ALT-N. Allison is an educational consultant for a variety of organisations, regularly providing CPD for Glasgow Caledonian University, Heriot-Watt University, the University of the Highlands and Islands Millennium Institute, the Northern Ireland Museums Council.

Recent Publications:

Littlejohn, A.H., (2003) Encouraging the sharing and reuse of e-learning resources, Journal of Media and Technology for Human Resource Development 14.1 ISSN 0791-1848

Littlejohn, A.H., (2003) Issues in reusing online resources, Reusing Online Resources: A Sustainable Approach to eLearning, (Ed. Littlejohn, A.), Kogan Page, London, pp 1-8 ISBN 0749439491

Littlejohn, A.H., (2003) An incremental approach to staff development in the reuse of learning resources, Reusing Online Resources: A Sustainable Approach to eLearning, (Ed. Littlejohn, A.), Kogan Page, London, pp 221-233 ISBN 0749439491

Littlejohn, A.H., Campbell, L.M., Tizard, J. and Smith, A. (2003) From pilot project to strategic development: scaling up staff support in the use of ICT for teaching and learning, Journal of Further and Higher Education, 27 (1), pp47-52 ISBN 1469-9486 http://www.strath.ac.uk/Departments/CAP/allison/papers/jfhe/

Littlejohn, A.H., Jung, I. and Broumley, E.(2003) A comparison of issues in the reuse of resources in schools and colleges, Reusing Online Resources: A Sustainable Approach to eLearning, (Ed. Littlejohn, A.), Kogan Page, London, pp 212-220 ISBN 0749439491

Littlejohn, A.H., (2002) New lessons from past experiences: recommendations for improving continuing professional development in the use of ICT, Journal of Computer Aided Learning, 18.2, 168 http://www.strath.ac.uk/Departments/CAP/allison/papers/jcal/newlessons.html

Littlejohn, A.H., Suckling, C.J., Campbell, L.M. and McNicol, D. (2002), The Amazingly Patient Tutor: Students' Interactions with an Online Carbohydrate Chemistry Course, British Journal of Educational Technology (BJET) 33.3, 313-322 (June 2002)

Michael Coen

Michael Coen is a chartered management accountant who joined the University of Strathclyde in 1988 from the National Health Service. Following several years as a management accountant in the university's Finance Office, Michael became involved in the implementation of financial systems. He first developed the financial systems for the (then fledgling) Scottish Higher Education Funding Council and then, on returning from secondment, he lead lead the implementation of a new finance system within the university.

In 1995, Michael moved from the Finance Office to the university's IT Services department, taking up the post of Applications Development and Strategic Planning Manager. This role involved planning and managing the implementation of a number of administrative information systems within the university.

In recent years Michael's work has focussed on information strategy. While contributing to the development of the university's own information strategy, Michael has researched the structural, cultural and managerial issues that affect the effective management of ICT investment in education and has become involved, at a national level, in the development of best practice guidelines to assist universities and colleges.

In addition to working with numerous institutions in aspects of their ICT deployment, Michael has managed a number of JISC-funded projects including projects related to the evaluation of ICT investment in education, the management of risk in e-learning investments and the strategic issues related to software and systems selection.

Ms Catherine Durkin, VLE Project Leader

Ms Catherine Durkin is VLE Project Leader for the University of Strathclyde in Glasgow, Scotland. Reporting to the Vice Principal for Learning and Teaching, she works with three departments across the University (Centre for Academic Practice, Learning Services and IT Services) to co-ordinate the University's central VLE Initiative. Catherine has been responsible for in the introduction of the centrally-supported VLE, WebCT, from the early stages of the initiative, which has involved liaising with Senior Officers, IT infrastructure managers, senior University administrators, Faculty Deans, Student Union representatives, along with the community and supporting service departments.

Catherine sits on the University's Virtual Learning Environment Implementation Group, and has been actively involved in taking forward the development of the University's e-Learning Strategy.

Previous roles related to e-learning that Catherine has held include:

- Acting Director, Centre for the Development of New Technologies in Learning, University of Bath, January 2003 – October 2003. Leading a team of four, supporting the implementation of e-learning within the academic community and organisational structure.
- Learning Technology Officer, University of Bath, March 2001 – December 2002. Supporting the implementation of the University's e-learning initiative, supporting academics and staff in the use of the University VLE (Blackboard), the assessment tool Questionmark Perception, along with other bespoke learning technologies.
- Research Co-ordinator, Professional Associations Research Network, University of Bristol, November 1998 – March 2001. Completing research for the Department for Education and Skills on online Continuing Professional Development (CPD) communities, including the development of a generic online tool for CPD.

Publications:

Joiner, R., Durkin, C., Morrison, D. & Williams, L. (2003). Activating Boxmind: an evaluation of a Web based video lecture with synchronised communication activities. *ALT-J*, 11, 3.

Friedman A.; Watts D.; Croston J.; Durkin C. (2002) Evaluating online CPD using educational criteria derived from the experiential learning cycle *British Journal of Educational Technology* 33 4

Friedman A.; Durkin C.; Hurran N. (1999) Good Practice in CPD Among UK Professional Associations *Continuing Professional Development* 1 2

CURRICULUM VITAE

NAME ***Gillian Roberts***

EDUCATION

Lancaster University
PhD in Educational Research *(2001)*
Thesis title - Academic's conceptions of, and approaches to, teaching and learning using communication and information technologies.

University of Strathclyde, Glasgow
M.Sc. in Marketing *(1981)*

PRESENT EMPLOYMENT
CBS Fellow in C&IT in Learning and Teaching
Glasgow Caledonian University

CURRICULUM DEVELOPMENT
Certificate in Management- online E-Marketing – online
UG business research methods - online

RESEARCH

Recent Refereed Publications and Conferences

Roberts, G (2003) Tutor experiences of teaching & learning using the Web, Instructional Science: An International Journal of Learning and Cognition.
Roberts, G & Siddiqui, N (2003) The Loneliness of the Long Distance Learner, in Conference Proceedings for the International Conference on Networked e-learning for Europe, Granada, Spain, 23-25th November 2003.
Lennon & Roberts G (2003) Management Education Online, European Conference on e-Learning, Glasgow Caledonian University, 6-7th November 2003.
Salmon, G & Roberts, G (2003) The Carpe Diem methodology for e-learning, 3rd National Virtual Learning Environment Conference 14th July 2003, University of Bristol.
Roberts, G & Siddiqui, N (2003) From lecturer to e-tutor: Tales of transition CAPS4 in conference proceedings for the International Conference on Human-System Learning, Glasgow, Scotland, 2nd-4th July, 2003**.**
Roberts, G (2002) Teachers' conceptions of, and approaches to, teaching campus-based students using C&ITs, International Conference in Networked Learning, Sheffield University, Sheffield, March 25th – 27th 2002.

Book chapters
Roberts, G (2004) Teachers' conceptions of, and approaches to, teaching campus-based students using C&ITs, in Advances in Research on Networked Learning edited by P. Goodyear.
Roberts, G & Siddiqui, N (2004) Case study of e-learning strategy implementation in Caledonian Business School in E-moderating: A guide to online learning (second edition) by Gilly Salmon, Kogan Page.

Linda Creanor

Linda joined Glasgow Caledonian University in February 1997 as Learning Technology Adviser. She continues to fulfil the role of e-learning adviser within the Department of General, Academic and Professional Studies in Learning Services, and is also seconded part-time as senior lecturer to the Academic Practice Unit as a member of the team which is helping to implement the University's Learning, Teaching and Assessment Strategy. She co-ordinates a staff development programme in e-learning, and provides consultancy on pedagogical aspects of learning online. She is also responsible for developing, teaching and assessing masters level modules on e-learning. As part of her LTAS role, she advises programme development and review teams from across the University and supervises and assesses staff undertaking GCU's PG Certificate in Learning and Teaching in HE.
In the last few years Linda has been involved in two major European projects relating to online distance learning, and has recently developed a series of training materials for the ESF-funded Dialog On project which is promoting online learning and encouraging virtual communities of practice in the European Trade Union sector. These resources have now been translated into 13 languages and are being widely used across Europe. She is currently external evaluator for a further two e-learning projects in the trade union sector.
Linda's research interests include staff development for e-learning and through e-learning, online communities of practice and their impact on the learning process, and cultural aspects of online communication. She has presented conference papers and has several journal publications on these topics. In the last few months she has been an invited keynote speaker at conferences in Vienna and Bournemouth, and she received an outstanding research paper award at the recent ALT 2004 conference. She is GCU's institutional representative for the Association of Learning Technology and participates as an active member on the ALT Executive membership committee.

Selected Recent Publications

Creanor, L. (under review), Building Communities: Supporting online learning and social dialogue in European Trade Unions, in *Interacting with Computers*
Walker S. & Creanor L. (under review), Crossing Complex Boundaries: Transnational Trade Union Education, Journal for Computer Assisted Learning.
Creanor L. (2002) A Tale of Two Courses: a comparative study of tutoring online*, Open Learning* Vol 17, No 1, pp57-68, Taylor & Francis, London.
Walker S, Creanor L (2001) Potenzialita e problemi del progetto ETUDE, *Formazione Domani 39/40*, *pp67-72*, Instituto Addestramento Lavoratori, Rome
Creanor, L., & Walker, S. (2000) European Trade Union Distance Education, *Educational Media International*, 37 (4), pp. 263-9.
Creanor L., Littlejohn A., (2000), Preparing for Online Learning and Teaching: a cross institutional approach to staff development in internet communication, *Journal of Computer Assisted Learning*, vol16, no 3, pp271-279, Blackwell. Online abstract
http://www.lancs.ac.uk/users/ktru/jcalab00.htm#creanor

Conference presentations

Creanor L. (2004), *Flexible Learning and the Great Surrender Issue,* **invited keynote** at Bournemouth University's Learning & Teaching conference 'Flexible Learning: how far have we come?', 5-6th July. http://www.bournemouth.ac.uk/lds/l%26tconference04.html
Creanor, L. & Walker S. (2004), Learning architectures and negotiation of meaning in European Trade Unions, Proceedings of ALT-C, '*Blue Skies and Pragmatism: learning technologies for the next decade*.' Sep 13-16, Exeter. **Outstanding Research Paper Award**
Walker & Creanor (2004**)**, *Crossing Complex Boundaries: Transnational Trade Union Education*, in Banks S. Goodyear P., Hodgson V., Jones C., Lally V., McConnell D., Steeples C. (eds) Proceedings of Networked Learning Conference, Lancaster, 5-7 April, pp683-690.

Available online at:
http://www.shef.ac.uk/nlc2004/Proceedings/Individual_Papers/Walker_Creanor.htm
Armitage A., Bryson M., Creanor L., Higgison, C., Jenkins M., Ringan N., Newland B., Prescott D., Yip H. (2004), *Supporting Learning Technology: Relationships with Research and Theory*, in Banks S. Goodyear P., Hodgson V., Jones C., Lally V., McConnell D., Steeples C. (eds) Proceedings of Networked Learning Conference, Lancaster, 5-7 April, pp28-35. Available online at:
http://www.shef.ac.uk/nlc2004/Proceedings/Symposia/Symposium1/Armitage_et_al.htm
Creanor L. (2003), *Future developments in computer-mediated distance learning & networking*, **invited keynote** at the final conference of the Dialog On EU project, Vienna, 7-9 November. http://www.etuc.org/ETUCO/en/projects/Dialog_on/default.cfm
Creanor L. (2003) *Crossing Cultural Boundaries: Learning Communities in the European Workplace*, in proceedings of Learning Outside the Academy, Centre for Research in Lifelong Learning, GCU, 27-29 June, pp66-71
Creanor L. (2002), *Dialog On: Online learning and social dialogue in the European Trade Union sector*, in Williamson, Gunn, Young & Clear (eds) proceedings of ASCILITE 2002, , 8-11 Dec, Auckland New Zealand, vol 2, pp795-799.
Creanor L., Littlejohn A. (2000) Collaboration and Communication: staff development for teaching and learning online, International Conference on Computers in Education, ICCE2000, Taipei, Taiwan, Nov 21-24. Available online at:
http://www.strath.ac.uk/Departments/CAP/allison/papers/icce/icce2000.html
Walker S. and Creanor L. (2000), European Trade Union Distance Education: potential and problems, Proceedings of Networked Learning 2000, 17th-19th April, Lancaster, pp341-353.
Creanor L., Walker S., (2000), ETUDE: European Trade Union Distance Education, Proceedings of Euro-Education (available on CD-ROM), 8-10 Feb, Aalborg, Denmark.

Steve Draper

This CV is selective. I have also researched in the areas of artificial intelligence and human-computer interaction, but the relevant area here is that of the application of technology to (higher) education. My introduction to this area was directing the evaluation group within the TLTP-funded TILT project, from which some personally important papers stemmed.

Degrees

B.Sc. (1st class) in Physics.	University of Sussex	1973
M.Sc. in Computer Science.	University of Manchester	1975
D.Phil. in Artificial Intelligence.	University of Sussex	1980

Subsequent Posts

Nov. 1980 - March 1985: I held a series of posts at the University of California at San Diego (UCSD) in the Cognitive Science laboratory of the Psychology department: Research Fellow, Postdoctoral Fellow, Postgraduate Researcher, Assistant Research Cognitive Scientist.
May-July 1983 I also worked with Elliot Soloway in the Computer Science Department of Yale University as a visiting fellow.
April 1985 - March 1987 I held a SERC IT Advanced Fellowship in the laboratory of Experimental Psychology at Sussex University.
April 1987 onwards: I hold a lectureship at Glasgow University; originally jointly in the departments of Mechanical Engineering and Psychology, now solely in Psychology. Promoted to Senior Lecturer from October 1994.

Bibliography

User Centered System Design edited (D.A.Norman & S.W.Draper) (1986) (Erlbaum: London).

Anderson, A. & Draper, S.W. (1991) "An Introduction to measuring and understanding the learning process" Computers and Education, vol.17 no.1 pp.1-11.

Draper, S.W. & Anderson, A. (1991) "The significance of dialogue in learning and observing learning" Computers and Education, vol.17 no.1 pp.93-107.

Draper,S.W., Brown, M.I., Henderson,F.P. & McAteer,E. (1996) "Integrative evaluation: an emerging role for classroom studies of CAL" Computers and Education vol.26 no.1-3, pp.17-32 and Computer assisted learning: selected contributions from the CAL 95 symposium Kibby,M.R. & Hartley,J.R. (eds.) (Pergamon: Oxford) pp.17-32

Brown, M.I., Doughty,G.F., Draper, S.W., Henderson, F.P. and McAteer, E. (1996) "Measuring Learning Resource Use." Computers and Education vol.27, pp. 103-113.

Draper, S.W. (1998) "Niche-based success in CAL" Computers and Education vol.30, pp.5-8

Draper, S.W. & Brown,M.I. (1998) "Evaluating remote collaborative tutorial teaching in MANTCHI" in M.Oliver (ed.) Innovation in the evaluation of learning technology ch.4 pp.65-86 (London: University of North London).

Draper, S.W. & Foubister,S.P. (1998) "A cost-benefit analysis of remote collaborative tutorial teaching" in M.Oliver (ed.) Innovation in the evaluation of learning technology ch.12 pp.193-210 (London: University of North London).

Draper, S.W. D.R.Benyon, A.Crerar, P.D.Gray, A.C.Kilgour, J.C.Newman, J.T.Mayes (2000) "Remote reciprocal collaborative teaching in MANTCHI" in JCAL vol.16 no.11 p.376-377

Draper,S.W., Cargill,J., & Cutts,Q. (2002) "Electronically enhanced classroom interaction" Australian journal of educational technology vol.18 no.1 pp.13-23 ISSN 0814-673X

Draper,S.W. & Brown, M.I. (2004) "Increasing interactivity in lectures using an electronic voting system" Journal of Computer Assisted Learning vol.20 no.2, pp.81-94 ISSN 0266-4909