

Enhancing practice

# Research-Teaching Linkages: enhancing graduate attributes

Sector-Wide Discussions  
Volume 2: Vignettes of practice

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# Research-Teaching Linkages: enhancing graduate attributes

Sector-Wide Discussions

Volume 2: Vignettes of practice

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# I Introduction

This volume concludes the sector-wide report for the QAA Scotland Enhancement Theme Research-Teaching Linkages: enhancing graduate attributes. It complements *Sector-Wide Discussions Volume 1* and distils some highlights from the 20 institutional reports. These reports provide a rich source of views, issues, approaches and successes, though it should be noted that the institutional reports were never intended to provide a comprehensive account of research-teaching linkages. Indeed, as the respective authors grappled with their task they were encouraged both to be selective and provide specific illustrations of approaches or challenges.

In this section the material is interrogated by reference to primary locus of action, that is, at institutional level, at the level of colleges/faculties/schools or at the level of courses/programmes. Of course, in every case actions happen at more than one level. Even in highly devolved situations there is a measure of strategic steering and monitoring at the institutional and/or meso (college/faculty/schools) level. Likewise, in instances where the primary driver is an institutional strategy there is typically scope for some customisation by specific courses/programmes or colleges/faculties/schools.

One vital reminder is necessary before proceeding to the analysis of the Scottish scene. The material summarised below was collected during the period from January to June 2008 and, it should be emphasised, is based on work in progress. Indeed, there was a span of more than three months between the submission of the first institutional report and the final one. This summary was written immediately after that submission was received but further time will have elapsed during the publication of this sector-wide report.

## 2 Institutional level

Generally, institutional contacts sought both to raise awareness about the theme and to gather information about practice and challenges which could be shared to promote good practice and reported to relevant senior committees and groups for strategic reflections and action. The precise nature and shaping of those processes differed in detail as the following material illustrates.

### 2.1 University of Aberdeen

The University of Aberdeen elected to investigate seven communities of interest (school leavers, undergraduates, postgraduates, academic teaching staff, careers advisors, employers, graduate school). That work is ongoing. The views of academic teaching staff were accessed via the director of teaching in each school plus two colleagues from each school. That information led the institutional contact to comment that, at the institutional level, the data suggested some lack of clarity and awareness of key institutional policies with regard to research-teaching linkages. However, there was familiarity with several initiatives including the model of the learner, the scheme for teaching awards, the learning and teaching enhancement programme and the Postgraduate Certificate in Higher Education Learning and Teaching.

Discussions at the University suggested welcome synergies with the action agenda which was set in relation to the First-Year Experience Enhancement Theme. It was also expected that there could be substantial implications for research-teaching linkages from the current exploratory curriculum reform project at the University.

### 2.2 University of Edinburgh

The University of Edinburgh's strategic plan (2004-2008) stresses excellence in research and teaching and refers to the production of graduates equipped for high personal and professional achievement. Those goals are enabled at various levels.

The three colleges play a significant role in the University's devolved academic structure. From 2006-07 each college has been developing a teaching and learning strategy. There is also central support through procedures (for example, teaching programme reviews), structures (such as an employability steering group which is defining generic graduate attributes at various levels) and units/aspects of provision such as the postgraduate transferable skills unit or the postgraduate certificate led by the teaching, learning and assessment centre.

### 2.3 University of St Andrews

At the University of St Andrews the institutional contact sought responses from the schools on the integration and implementation of research-teaching linkages. The detailed responses were used by the relevant academic senior officer to promote cross-institutional reflection.

Three main points featured prominently in the replies:

- there was a growing use of student summer internships as a means of developing research-teaching linkages
- respondents generally referred to intellectual and scholarly activities rather than transferable skill development
- the linkages between research and teaching strengthened in the later (third and fourth) years of undergraduate programmes.

## 2.4 University of Glasgow

The Institutional Contact at the University of Glasgow described the role as cascading messages about the Enhancement Theme to the local level (departments/programme) and informing the centre about the activities at the local level. That two-way exchange of information was framed by institutional agendas such as continuing work in student personal development planning and the projects in History, Mathematics, Business and Management, and Business and the Biosciences associated with the Aiming University Learning (AUL@WORK) initiative.

Among the issues identified for strategic institutional attention were addressing reward, recognising cumulative progression of student attribute development and ways of beneficially linking themes/external initiatives.

## 2.5 University of the West of Scotland

Two themes which featured prominently in a number of institutional responses were the opportunities presented by organisational change and the alignment with institutional strategy, mission and vision.

The University of the West of Scotland used an extensive programme validation cycle in 2007-08 to require that revised module descriptors mentioned research in learning outcomes. Additionally, the annual reports from each course of the quality of student experience refer to research-teaching linkages.

Inspired by the findings of the Boyer Commission (1998), sustained institutional engagement with employability and commitment to the studio model of learning, Edinburgh College of Art is implementing a re-description of all undergraduate programmes. From 2008-09 all programmes in Art and Design will have named research modules.

## 2.6 Napier University

In a similar vein, as Napier University moves to the adoption of 20 credit modules for 2008-09, its revised module descriptors are expected to address research-teaching linkages. Additionally, through a sustained and coordinated programme of consultations and activities, the approach at the University sought to raise awareness and practical engagement at strategic and operational levels. Strategic actions included a review of the institutional learning, teaching and assessment strategy. Wider engagement came through the invitation to produce case studies which were disseminated at a conference in January 2008 and placed on a website alongside reports from seven conference working groups.



## 2.7 Heriot-Watt University

Heriot-Watt University is progressing the restructuring of the academic year. A coincidence of timing meant that work was well advanced before the results of a survey of practice in 1994 Group institutions, and the views from 12 interviews were reported to the relevant senior academic officer and university committees. Nevertheless, the view was expressed that moving to a semester structure might provide an opportunity to consider curriculum change to emphasise the development of research and scholarship skills.

## 2.8 University of Stirling

The University of Stirling has recently abandoned a faculty structure and formalised the post of director of teaching and learning (DTL) in each department. Consultation with those postholders allowed the institutional contact to identify three strands which may feature in the next phase of research-teaching linkages related work, namely: exploring research-teaching links as a possible research topic, using postgraduates as intermediaries in developing the research-oriented skills of undergraduates, and finding ways of comprehending student engagement with departmental research cultures.

The department-based directors of teaching and learning are now central to the process of driving Enhancement Themes. The transfer of roles previously associated with associate deans in the former faculty system is now well advanced but is still developing. Engagement with Enhancement Themes became a developing role of DTLs during 2007.

While addressing the Research-Teaching Linkages Enhancement Theme has followed a timescale dictated by adjustment to new organisational circumstances, the DTL system considerably intensifies the University's ability to sustain and grow its involvement with earlier themes, and is also starting to prove of benefit to institutional engagement with the research-teaching linkages initiative. In essence, where the old University structure engaged groups of departments collectively through an associate dean function addressing teaching/learning and research matters, the University now has 20 directors dealing with teaching/learning matters at departmental level, Enhancement Themes to departments on an individual basis. The research director function is also thereby localised. As well as embedding Enhancement Themes more thoroughly across the University, the present structure also allows, in the context of research-teaching linkages developments, wider scope for a range of responses.

## 2.9 Royal Scottish Academy of Music and Drama

Structural change also featured in the response from the Royal Scottish Academy of Music and Drama (RSAMD). The specific development here is to unify research and teaching provision within the two macro programmatic structures (drama and music). In common with the School/College of Art, RSAMD attaches great importance to providing rich professional and proto-professional experiences at the core of its programmes.

## 2.10 Glasgow School of Art

At the Glasgow School of Art an eight-month exploratory study sought to make the links between research and teaching visible for student learning. A major output was the Images of Research Teaching materials. Research-teaching linkages within the curriculum were explored, as was the contribution of enquiry-led pedagogy (the studio project).

## 2.11 The Robert Gordon University

The Robert Gordon University has adopted a new strategic document, A Clear Future, which emphasises professional subjects and applied research. DELTA, a central development support function, is coordinating an integrated project in which schools have been asked to identify local champions to take forward projects guided by a generic template intended to promote the identification and dissemination of good practice.

## 2.12 University of Strathclyde

In 2006-07 the University of Strathclyde agreed a revised strategic plan, *Investing in Excellence*. Among the key objectives are excellence in research and education, the integration of research and academic scholarship into learning and teaching, and the provision, where appropriate, of learning opportunities through placement or internships.

The Institutional Contact at the University revised a tool to audit institutional readiness to explore preparedness at faculty and course level. Information from that source is discussed later in this volume. The conversations demonstrated a willingness to progress developments and suggested some areas which needed to be considered at the strategic level, for example, the place of teaching and how it is rewarded; consideration of what could be done to ensure that research is not separate from teaching, despite the potential for the Research Assessment Exercise (RAE) to produce that perspective.

## 2.13 Glasgow Caledonian University

At Glasgow Caledonian University interviews with the heads of learning, teaching and quality (HLTQ) revealed various approaches and perspectives (research-led, research-oriented, research-informed, research-based) depending on the nature of provision and the prominence of professional practice and associated programme requirements. The Caledonian Academy within the University acts as a research and development resource and interacts closely with the HLTQs and their respective schools. Projects being coordinated by the Caledonian Academy include i-learn and Moving Forward.

## 2.14 Queen Margaret University

At Queen Margaret University (QMU) the strategic plan (2007-2012) emphasises the importance of graduate attributes, while the matching research development strategy encourages greater linkages between research, knowledge transfers, professional development and learning, teaching and assessment.

An audit was undertaken at the University of strategies and structures which support this Enhancement Theme. The outcomes were encouragingly positive and some areas for continuing development were identified, such as possible updating of graduate attributes in the light of the outcomes of the Enhancement Theme, and identifying ways of further encouraging staff to draw on their research as a teaching resource. Reference will be made later in this volume to some of the case studies which QMU assembled and disseminated internally.

## 2.15 University of Dundee

The University of Dundee focused on four strands:

- communication, information and discussion
- embedding within disciplines
- working with students
- utilising existing activities to maximise engagement.

Illustrations of those activities include the publication of *Highlighter*, a development-based newsletter for staff; dedication of the 2008 Academic Professional Development Conference to the research-teaching linkages and graduate attributes; collaboration with the Dundee University Student Association; and the incorporation of research-teaching links in college learning and teaching development plans.

## 2.16 UHIMI

UHIMI comprises a partnership of institutions, two of which have well-established records in research. The institutional learning, teaching and assessment strategy (2007-12) seeks to increase understanding and support development of the links between teaching and research and scholarship. A research into teaching working group has been established to consider ways of progressing the strategic goals.

## 2.17 Scottish Agricultural College

In the Scottish Agricultural College an important challenge and opportunity is to find effective ways of using the resources in the three divisions of the College (Teaching, Research and Development, Consulting Services).

At a workshop in September 2007 attendees suggested that:

- greater use be made of visits to institutes/organisations/businesses
- better use be made of staff in the Research and Development and Consultancy Services divisions
- consideration be given to internal publications of student research
- consideration be given to increasing the amount of enquiry-based learning across courses.

## 2.18 Open University

The design and structure of the curriculum rests with the Open University (OU) as a whole rather than the Open University in Scotland as such. Undergraduate research is part of OU project modules. Enquiry and project-based approaches feature at third and postgraduate level, while research methods may be covered from level 2 onwards.

## 2.19 University of Abertay Dundee

The University of Abertay Dundee has implemented an institution-wide initiative, the White Space project, and is progressing the development of a coherent set of graduate attributes.

As in the case of the University of Edinburgh, the institutional contact at Abertay submitted a substantial report with detailed sample information drawn from the work of the Teaching and Learning Committee in each of the four schools, specification of how graduate attributes are progressively developed, and associated case studies illustrating the linkages between research and teaching. There are also sections on the work of the Quality Office, which is charged with monitoring that the programme approval process ensures that graduate attributes are developed in line with targets. The Quality Office is also now responsible for the curriculum and delivery of the PG Certificate in HE Teaching.

The 25 graduate attributes are clustered under four headings:

- confident thinkers
- determined creators
- flexible collaborators
- challenging complexity, driving change.

The White Space project commenced in autumn 2005. It has resulted in a new teaching and learning plan, a revised estates strategy and ideas for the development of a learning hub. White Space is both a pedagogical concept and a physical area. The latter is designed to facilitate casual and non-casual student interaction and promote team working and networking. The physical space opened in February 2007. It showcases creative teaching and is associated with a number of doctoral research projects designed to serve as catalysts for cross-discipline interactions among staff.

In the strategic plan (2007-2011) targets are set, for example, for assessment of achievement of the graduate attributes and for 60 per cent of learner contact time being spent on active enquiry or project work.

## 2.20 Edinburgh College of Art

The creative visual disciplines of art and design and architecture present unique challenges and opportunities to institutions seeking to strengthen the links between research and teaching. At Edinburgh College of Art (ECA), the studio environment of creative visual education is well established as a means of achieving such linkages. The studio approach is a pedagogic model in some respects not unlike the science or engineering research laboratory. Traditionally, in art colleges, respected 'heads' of discipline had their studios near the students. They engaged in the same form of creative practice and taught, in part, by the example of their high level practice.

In the visual arts there is a closer relationship between student work and staff output than in other areas. Indeed, the case can be made that staff and student are co-investigators by way of being engaged in parallel enterprises. The RAE (2005) definition of research is useful in this context, which includes 'original investigation undertaken in order to gain knowledge and understanding. It includes...the invention and generation of ideas; images, performances, artefacts including design, where these lead to new or substantially improved insights'<sup>1</sup>.

In the Art and Design programme, students routinely engage in 'the invention of images' and classic definitions of research can be seen to apply to undergraduate outputs in a way not possible in other academic disciplines. It is not unknown for even undergraduate student work to receive recognition that would be RAE-admissible if the same recognition were to be given to staff. Fairly recently, at the British Animation Awards, an ECA final-year undergraduate student won a prestigious award in a category where a fellow nominee was a professor at a RAE 5-rated institution.

The majority of studio teaching at ECA is project-based and informed by primary research. The final degree classification is based on a dissertation and large final year creative project/exhibition, both of which are effectively research conducted at SCQF level 10. This is in keeping with the 'synergistic system' advocated by the Boyer Commission Report, which recommended that:

Students should enter a world of discovery in which they are active participants, not passive receivers. The skills of analysis, evaluation, and synthesis will become the hallmarks of a good education, just as absorption of a body of knowledge once was (Boyer 1998, p 11)<sup>2</sup>.

Creative visual education as practised in art colleges has never been 'just absorption of a body of knowledge'. Students in the studio have always been active participants, acquiring both high level knowledge and a variety of technical skills. Traditional art college studio pedagogy has always had parallel tasks:

- the development of tangible hand, craft and technical skills
- the development of considerably less tangible high level creative concepts such as the formation of taste, the development of aesthetic judgment, 'having a good eye', colour sense, working with light, and developing a sense of pace.

For example, sculpture students in the same project brief will be asked to learn a craft task (say the mixing of plaster and the use of moulds) alongside a much higher level creative outcome such as 'understanding negative space'. By way of elaborating this different pedagogy, it is worth noting a second quotation from Boyer:

Generations of experienced scholars have known and acted upon the knowledge that the intellectual development of their graduate students is most effectively guided in one-to-one relationships. Essentially the same techniques of tutorship have been practiced at the undergraduate level in areas like art and music, where individual performance is watched, corrected, assisted, and encouraged. In the process, an undergraduate student and instructor can develop a supportive

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<sup>1</sup> Guidance on submissions (June 2005), Research Assessment Exercise Team, Bristol (ref RAE 03/2005)

<sup>2</sup> The Boyer Commission on Educating Undergraduates in the Research University (1998) *Reinventing Undergraduate Education: A Blueprint for America's Research Universities*, New York: State University of New York. Available at: [www.sunysb.edu/boyerreport](http://www.sunysb.edu/boyerreport)

relationship not unlike that found between doctoral candidate and advisor. This kind of mentoring needs to be emulated throughout universities (Boyer 1998 p 17).

These insights from the Boyer Commission Report are highly apposite when setting the creative visual disciplines in the context of research-teaching links. This unique traditional synergy between research and teaching should not be the basis for complacency however. It is all too easy for studio staff to reply to suggestions that research-teaching links need to be examined and strengthened with the response: 'But we do it already'.

Moreover the mentorship model suggested in the quotation from Boyer is a costly one. Staff/student contact hours in studio teaching are high and this form of traditional contact can actually encourage dependency. The sector-wide move to outline student effort hours helps in this regard by clearly defining the time students are asked to engage in independent learning.

Enhancement of this existing situation can come about in a number of ways. There is clearly a need to make things more explicit. This can be done by the clear articulation of the learning outcomes of individual course modules, of programme levels and of entire programmes. Increasingly, there is a need to be more holistic in defining these aims.

For example, ECA has a learning and teaching strategy, a research strategy and a quality enhancement strategy. When ECA came to develop an employability strategy, they realised that greater integration was needed. As a result, the new College strategic plan now outlines a need for an integrated academic strategy. This is now in process, with completion planned for January 2009.

## 3 College/faculty/school level

### 3.1 University of St Andrews, School of Mathematics and Statistics: vacation scholarship programme

In the School of Mathematics and Statistics at the University of St Andrews, a vacation scholarship programme has been organised for some years now. The programme has expanded considerably in recent years with a typical number of 15-20 attendees per year. Students generally attend for six weeks, preferably all or most at the same time. Their programme begins with lectures on specialised topics, together with discussions and group problem-solving sessions. It then progresses to the students tackling individual research questions and writing up the results. At this stage the regular interaction between the student and an academic supervisor provides a foretaste of the student-supervisor relation at postgraduate level.

This programme, aimed at good students going into their final year (and not necessarily restricted to St Andrews' students), has been a valuable tool in enthusing potential research students and encouraging them to carry out their postgraduate studies in St Andrews. It depends crucially on the support of staff willing to devote part of the summer to this activity. Funding has come from external sources, such as the Carnegie Trust and the Nuffield Foundation, as well as from the School. Typically the School would allocate around £4,000 per annum to this activity.

### 3.2 University of St Andrews, Psychology: summer research placements

Similarly, in psychology at the University of St Andrews, students regularly participate in summer research placements. These have been funded by a variety of sources (for example, the Wellcome Trust and the Experimental Psychology Society). The placement students participate in experiments. The majority of research in psychology depends on volunteers who are willing to act as participants in experiments. By volunteering in this way, students gain a unique insight from the position of the participant. The School is currently in the process of drafting guidelines for research internships that take place during semester time, and considering the introduction of a participant pool in which participation in experiments would be expected as part of the students' research training. In both cases, there are important ethical considerations. In the first case, it is important to ensure that students do not over-commit to internships, at the expense of neglecting their studies. In the second case, it is important that any such scheme provides a useful learning experience, and that students do not feel compelled to participate in experiments. Students will be offered the alternative of preparing a piece of work that allows them to engage with the research of members of the school.

### 3.3 University of Aberdeen: college-level staff survey

The University of Aberdeen adopted a college-level staff survey to establish with greater certainty the extent to which research-teaching linkages are currently being supported or embedded across the colleges. Significant findings were that research into teaching is



not widely supported, teaching and learning courses are not generally integrated into doctoral programmes, and there are no clear incentives for engaging with research-teaching linkages. It also emerged clearly that there are no mechanisms for the monitoring of research-teaching linkages, and there is uncertainty as to whether innovative activities are reported widely within the University. While it appears from the survey that personal development planning (PDP) is not yet widely adopted, except at postgraduate level, this may change with the recent introduction of the e-Portfolio tool for all undergraduates.

While the results of the survey provided a simple snapshot, the conversations that took place around the questions during the interviews showed a generally positive attitude to the role of research into teaching. While there was not a great desire to specifically carry out such research by academics in disciplines outside of education and some of the social sciences, there appeared to be a willingness on the part of some to be the subjects of research. Staff involved in teaching were generally aware of and interested in Higher Education Academy (HEA) publications on teaching practice and, where available, specific journals on teaching in their own disciplines.

### 3.4 Glasgow School of Art: use of exhibitions

As a small specialist institution in the creative visual disciplines the Glasgow School of Art has the capacity to offer specific circumstances within which the research-teaching nexus can be made visible. One of these is exhibitions in the public spaces of the Mackintosh, Newbery and Atrium Galleries, which offer a varied programme of creative output on display to the general public and student community alike. The exhibition has a long tradition as the public exposition of creative practice in fine art, design, architecture and cognate disciplines. It is an aspect of professional creative practice that is embedded in the culture of the Art School and in the learning experiences of the students. The exhibition can be conceptualised as a public dissemination of creative practice inviting peer review and critique, and builds on an established tradition and methodology for the development and exchange of knowledge through peer-reviewed practice-based research. Through such review and critique come analysis, evaluation and validation (or not) - akin to the intentions of a peer-reviewed published academic paper. In a certain sense, the content of an exhibition can be described as representations of a conclusion, or pause, in the process of visual and aesthetic enquiry, and hence is a visual and interactive example of the research-teaching nexus.

The exhibition content is frequently the culmination of practice-based enquiry. It can become, as well as a research output, a teaching resource, as the artefacts on display may contextualise, illustrate or inspire student studio experiences. Perhaps more importantly, the programme of exhibitions is a means of informing students of current developments in the contemporary research and scholarship of art, design and architecture.

### 3.5 Napier University, Faculty of Health, Life and Social Sciences: research project module

The Faculty of Health, Life and Social Sciences at Napier University provides a research project module to help develop student appreciation of research/knowledge transfer in the discipline. It also explicitly fosters the development of student research/knowledge transfer skills (in addition to other disciplinary and generic skills). The module employs



teaching and learning processes, which simulate research processes, such as project-based modules, dissertation modules, and enquiry-based learning. It also uses assignments which involve elements of research processes, such as literature reviews, bidding for grants, drafting bids or project outlines, analysing existing project data, and presenting at a 'conference'.

The research project module is offered for all biological sciences and is designed to develop the following graduate attributes:

- critical understanding informed by current developments in the subject
- an awareness of the provisional nature of knowledge, how knowledge is created, advanced and renewed, and the excitement of changing knowledge
- the ability to identify and analyse problems and issues, and to formulate, evaluate and apply evidence-based solutions and arguments
- an ability to apply a systematic and critical assessment of complex problems and issues
- an ability to deploy techniques of analysis and enquiry
- familiarity with advanced techniques and skills
- originality and creativity in formulating, evaluating and applying evidence-based solutions and arguments
- an understanding of the need for a high level of ethical, social, cultural, environmental and wider professional conduct.

The module is worth 60 credits, contributing one third of the honours degree marks, and runs for the whole of trimester 2 in the final year. The students can thus focus entirely on their research, without the distraction of other exams, and have sufficient time to conduct a significant piece of work. Students are offered a wide range of potential topics for research from which to choose. They are also encouraged to suggest their own research topics and ideas and to discuss these with appropriate potential supervisors. Because the project is such an important part of their degree, and students commit significant time and effort, the resulting research is often of a high standard. This is demonstrated by the frequency with which student projects are published in peer-reviewed journals.

### 3.6 University of the West of Scotland, Paisley Business School: grouped approvals process

At the University of the West of Scotland research-teaching linkages are embedded within course approval documentation in the grouped approvals process in some schools, such as the Paisley Business School. The documentation requires that 'All students who follow a programme of study to honours level will be able to execute a defined project of research, development or investigation'. As a result, all students across the School will develop the ability to 'systematically identify and address their own learning needs both in current and in new areas, making use of research, development and professional materials as appropriate, including those related to the forefront of developments'. They will, moreover, be required to 'Execute a defined project of research or investigation involving the evaluation and synthesis of data from a variety of sources, including academic literature in order to identify, define, conceptualise, and analyse complex problems and issues to define conclusions'.

## 4 Programme or course level

This final section points to a selection of interesting case studies drawn from the institutional reports of a range of Scottish higher education institutions.

### 4.1 University of Strathclyde, Department of Mechanical Engineering: first-year design through problem-based learning

Ten years ago the main course offerings of the Department of Mechanical Engineering at the University of Strathclyde underwent a substantial redesign in order to address problems associated with retention and class attendance. This involved introducing group-work and team-building into almost all classes (with the students staying in the same groups throughout) and active, collaborative learning, using various styles. As part of the course re-design, two major structural changes were made: firstly, Mechanical Engineering Design was introduced to the incoming students immediately in the first year, and secondly research skills became part of the curriculum throughout the student's studies. For the new first-year design, which represents one-third of first-year activities, a specific version of problem-based learning was adopted, known as mechanical dissection.

Students are aware that they will undertake a mechanical dissection of a car before enrolling at university: the exercise is highlighted in the degree prospectus and open days. At the beginning of the first year, the structure of this class is explained to the students so that they know when in the year they will be working on the car dissection. It is also emphasised that the tasks they must undertake are related to the development of research skills for later in their course. Each student group will spend a couple of hours selecting a part of the car (for example the front or rear suspension, or a part of the braking system) and removing that part. The following day each group meets with two lecturers to discuss the physical principles behind the component's function, and to select a couple of parts for further examination. These parts are examined under the microscope to ascertain the materials and processes involved in their manufacture. The students then have (in the style of problem-based learning) to research the functions, physics, manufacture and design of the components, and to produce a poster explaining these. They present their draft poster to two members of staff, who discuss the content with them and inform the students of any further work necessary to bring the poster to an acceptable standard. The students then have to produce a brief PowerPoint presentation covering the same material as the poster for a conference plenary session at which two students, chosen at random, from each group describe their component to the rest of the cohort. After their presentation, each group has to field a couple of questions from one of the other groups of students. In preparing the poster and presentation students will need to explain topics not covered elsewhere in their first-year course.

The overall aim in developing this class was to show the students how the rather theoretical academic work they cover in their lectures is relevant to the practical challenges of engineering. The tasks associated with producing the poster and presentation also build skills in team work, research skills and communication, as well as encouraging independent learning.

On the whole, although there were several difficulties associated with this exercise (associated with the time and effort required from the teaching staff and the demands of successfully integrating subjects and skills) the benefits have been many. The lecturer running this class feels that the benefits to students make the exercise worthwhile and the students agree with him. The students said this exercise 'is probably the only thing that everyone spends the whole first year waiting for'; 'expands on so many skills', and 'allows you to see how an engineer would think'.

## 4.2 University of Strathclyde, Department of Pure and Applied Chemistry: transferable skills development throughout a degree course

The Department of Pure and Applied Chemistry has had a series of classes dealing with transferable skills for some time, but was expanded in 1997, then again in 2002 in response to student personal development planning. It is a continuing theme throughout all of the department's courses from first year and covers a very wide range of activities including research skills and investigative (research) projects.

Year 1 covers basic IT skills (network access, email, word processing, spreadsheets and web searches, including directed searches of research literature). There is also an introduction to personal development planning.

Year 2 provides an introduction to standard chemical drawing packages, scientific writing skills and team skills through problem solving. The problem solving case study provides a framework for a wide range of team-working and problem solving skills in a general chemistry-related context. Students are divided into groups for this exercise and given a case study. For example, this sets analytical chemistry within the 'real' context of a forensic investigation of a (fictitious) death. The case study operates by supplying information in the form of reports from various official agencies. The students request analysis of the various types of evidence collected in order to determine the cause of death and suggest the suspects. A range of scientific (reasoning) and transferable skills are then exercised: manipulation and evaluation of information and data to make realistic decisions on the evidence available, tackling unfamiliar problems, using judgement, evaluating information, formulating hypotheses, analytical and critical thinking - all skills well associated with research attributes.

Year 3 covers communication skills - oral and poster presentations - and quality systems workshops. The aim is to illustrate to the lay person some of the research areas in the department as well as providing students with the opportunity of team work, library work and presentational abilities. The class will be divided into teams who endeavour to demonstrate the research in the department with special reference to its applications. Each project is divided into at least six or seven sub-sections. Individual members of the team will be required to prepare one of these sections and then the whole team will collectively assemble a poster covering the various sub-sections. The contributions from each student are then incorporated with visually graphic material to make up a poster, which will go on 'public' display. The posters are assessed by each of the student teams and also by a panel of expert assessors. The winning poster will be selected as a result of the decisions of both sets of judges. Members of the winning team receive a prize.

Year 4 requires the student to undertake a research project which requires a full research presentation (and questions) and a video presentation. Fourth-year projects require the

use of a range of the advanced skills associated with a subject, skills which are at the forefront of a subject, the execution of a defined project of research and practise in a range of contexts which include a degree of specialism. Fifth-year projects add to this the demonstration of a significant range of the principal skills associated with a subject, use of specialised skills which are at the forefront of a subject, the application of a range of specialised research instruments, and the execution of a significant project of research, demonstrate originality and creativity, practise in a wide and often unpredictable variety of professional level contexts.

### 4.3 University of Strathclyde, Department of Psychology: online collaborative group work in Basic Psychology

The class was re-designed three years ago as part of the Scottish Funding Council funded project on e-learning, Re-Engineering Assessment Practices (REAP)<sup>3</sup>, for first-year students. It was designed to introduce all students to key findings, theories, and debates in general contemporary psychology. In addition the class provides continuing students with an introduction to a number of specific areas of study within psychology which are dealt with in depth in second, third and fourth year classes. The class runs in six modules: Learning Theory, Social, Biological, Cognitive, Personality and Developmental. The main learning outcomes place an emphasis on an introduction to research skills in psychology.

Students acquire a basic understanding of the breadth of study in psychology. They also begin to understand the importance of taking a critical approach to research findings and theory in the subject such that they become aware of the need to read around each piece of evidence with which they are presented, seeking alternative explanations of the significance of psychological phenomena. On completing the course students should appreciate the usefulness of presenting balanced arguments on a range of psychological research questions, arguments which are supported or questioned, as appropriate, by evidence from a variety of sources.

A specific feature of the REAP project was the use of online discussion groups. These are designed to allow students to develop answers to specific questions about the course material in online collaboration with other students. Students who have already used this system report that it improves their understanding of the course material, compared with what they experience on the basis of lectures alone. Each online group will normally have 6-7 members and group work and participation rates will be monitored and assessed, project by project, by a teaching assistant and also, from time to time, by the class leader.

The REAP redesign<sup>4</sup> aimed to improve reflective and sustainable learning with 50 per cent of the lectures being replaced by online tasks which involve peer discussions around progressively more complex formative assessments. This peer-scaffolded design where monitored peer feedback supports large student numbers resulted in a six per cent rise in average exam marks and reduction in the course failure rate from 12.1 per cent to 2.8 per cent without any workload increases.

In later years Psychology students take third year classes in Research Methods in Psychology and a fourth year essay of a student chosen research topic.

<sup>3</sup> For more information, see: [www.reap.ac.uk](http://www.reap.ac.uk)

<sup>4</sup> Baxter, J (2007) A Case Study of Online Collaborative Work in a Large First Year Psychology Class, from the REAP International Online Conference on Assessment Design for Learner Responsibility, 29-31 May 2007.

#### 4.4 University of Abertay Dundee, School of Computing and Creative Technologies: Programming Smart Software

Programming Smart Software is a sequence of modules in software development that exploits the increasing connectivity and sophistication of current hardware technologies. Students learn to develop software in a number of different languages to interconnect devices and exploit novel hardware architectures.

At all stages of study, learners undertake activities to develop collaborative skills, functioning as a member of a team to complete a designated task in which they work with others to identify requirements, determine roles within the team, contribute individual knowledge to the progress of the team, and reflect on the effectiveness of the team and/or their own contribution to it. Sixty per cent of learner contact time is spent in active enquiry or project work, with learners at advanced undergraduate levels identifying and progressing directions for enquiry, and collecting, evaluating and synthesising complex knowledge sets, designing new applications of that knowledge, and/or resolving problems or challenges significant to contemporary and emerging challenges including those requiring a multidisciplinary approach.

For years 1 and 2 the subject group employ a problem-first and practice-led learning approach. New software development techniques and methodologies are introduced within the context of developing a solution to a problem. In years 3 and 4 material is presented concept-first and students are expected to explore and evaluate the contribution of each conceptual approach to the resolution of problems posed within the class context.

The learning model for years 3 and 4 requires that students work with substantial software frameworks to develop solutions. It is neither possible nor desirable to teach explicitly the total content of these frameworks. Rather, the learning model ensures that students are able to explore those frameworks and select the appropriate components for use generally and in particular to complete assessment exercises. Learners engage with technologies that support their development of enquiry-based and collaborative engagement with complex knowledge fields, and careful selection and deployment of learning technologies consistently supports the development of independent, reflective and creative approaches to knowledge and learning.

Programming Smart Software is inherently underpinned by creative technologies at all stages. These technologies allow stepwise development of solutions to problems with confirmation of the correct creation of an implementation at each stage enabling independent investigation and development of solutions in stages determined by the student. Many aspects of the software development process will require exploration of material beyond the core learning material provision and students must incorporate self-discovered knowledge into their development approach.

#### 4.5 University of Aberdeen, School of Divinity, History and Philosophy: Temporary Ordination in Second Life

This initiative in the School of Divinity, History and Philosophy at the University of Aberdeen is seeking to build up a simple 'virtual monastery'<sup>5</sup>, loosely modelled on a small

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<sup>5</sup> The monastery will be developed using the online virtual world Second Life. See: [www.secondlife.com](http://www.secondlife.com)

Soto Zen monastery, with appropriate clothing and avatars so that students in the Encountering Buddhism course can experience the challenges and responsibilities of being members of a religious order dependent on patrons for food, clothing and other resources. The outcome will be a research-informed teaching environment for second and fourth-year students that uses role-playing to convey the ritualisation, ethical constraints, internal cohesion and social separateness of Buddhist monastic life. This will allow them to understand the ritualisation of everyday life that is a part of monastic behaviour; experience the challenges and constraints of being dependent, as a mendicant community, on the charity of the surrounding community; and understand the distinction between the ethics of personal commitment, as taught in popular books on Buddhism or in discussions on religious and monastic experience, and the ethics of a vow of behaviour.

#### 4.6 University of Aberdeen, School of Geosciences: use of a portable citation tool for study and knowledge acquisition

The citation tool Zotero<sup>6</sup> is provided on a memory stick to each student in a level 3 geosciences class at the University of Aberdeen. The students are tutored and encouraged to use it as a means of collecting, annotating and cataloguing literature and other resources online, for their assignments. The tool (which closely integrates with the Firefox web-browser and MS Word) makes it very easy for them to bring together related material, organise their thoughts, then quote and cite sources correctly.

#### 4.7 University of Aberdeen, School of Geography and Environment: use of interactive maps for student-led research

This initiative in the School of Geography and Environment enables students to access location-specific research materials. They are provided with the tools to engage with unfamiliar contexts in a variety of ways, using text, sounds, images and video to record and display primary data. This exercise facilitates hands-on student engagement with real-world urban spaces, and allows students to manage the experience of this engagement. The students are able not only to develop techniques for generating material through research encounters in the field, but also to manage the interface between field and class. The exercise provides a link between teaching students methodologies, facts and intellectual traditions about real world spaces in Russia and allowing students to be both rigorous and innovative in developing their own accounts of attending to everyday urban life.

#### 4.8 University of Aberdeen, School of Language and Literature: student-led Literature and Science Exhibition at Marischal Museum<sup>7</sup>

This exhibition project is a natural extension of the process of exposure to different kinds of source material relating to the science and literature of the nineteenth century, which the students have already experienced during the course run by the School of Language

<sup>6</sup> Zotero is an easy-to-use yet powerful research tool that helps you gather, organise, and analyse sources (citations, full texts, web pages, images, and other objects), and lets you share the results of your research in a variety of ways. See: [www.zotero.org](http://www.zotero.org)

<sup>7</sup> Marischal Museum, one of University of Aberdeen's seven museums, is used for research and teaching. It is open to the public and specialises most notably in Egyptian and Classical antiquities, non-Western ethnography, Scottish prehistory and numismatics. Its collection ranks alongside the largest in Scotland.



and Literature. The students gain further awareness of how knowledge can be transmitted through the visual presentation of objects, print materials, pictures and text. They are involved in selecting and researching objects and writing appropriate text to accompany these in the exhibition. They also learn skills of visual presentation, organisation and administration.

#### 4.9 University of Edinburgh: digital media

Each year a course tutor at the University of Edinburgh runs a music festival called Dialogues<sup>8</sup>. This tutor is course organiser for the Digital Media Studio Project where, for assessment, students are asked to produce a documentary of the project in a number of different ways. This is a loose but useful way of merging teaching and research. On a more specific level, the festival provides opportunities for the staff to work with people they know about in the field and for students to encounter these experts. In this course staff seek to introduce students to the tools used in their own research. In recent years students on this course have worked on two Arts and Humanities Research Council funded projects (*Inflexing Space and Branded Spaces*) which have brought them into contact with a number of sensing systems and software that are used in the tutor's own work. In some cases the students have gone further than the tutor and introduced technologies not encountered before.

#### 4.10 University of Edinburgh: first-year Economics IA and Economics Principles and Applications

Students are given a country to investigate in groups and they are asked to pull together various economic performance indicators for their country and to present their findings in a poster session. This task is crucial to many researcher tasks - searching for and synthesising economic data. Students are encouraged to gather and manipulate the data and not simply to replicate charts, but produce their own to provide an insight into the country. The poster session is attended by staff and PhD students who walk around the posters and ask students questions. This exercise is important in introducing first-year students to the key skills of doing research, but at the same time enables them to meet a number of staff and research-active postgraduates in the School, making them feel a valued part of the research community.

#### 4.11 University of Edinburgh: Financial Services Marketing (Honours)

The student project on this course is sponsored by a local financial advisory firm that was on the point of being taken over by another firm as the project began. The future direction of the firm was uncertain at that point. The CEO of the firm came into the class to give a presentation about the company and its current situation and to assist in setting up the project. Students worked in groups to perform a situational analysis of the two companies and to recommend strategies for the continued growth of the company as part of a larger group. The company was very pleased with the outcome and commented that the recommendations made by the winning team have subsequently come to fruition.

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<sup>8</sup> See: [www.dialogues-festival.org](http://www.dialogues-festival.org)

#### 4.12 University of Edinburgh: Master of Architecture

One of the courses in the master's programme at the University of Edinburgh, Design Opening A, links research and teaching. The course consists of a five week long workshop project looking at innovative ways to cast concrete. The students work in groups and are asked to develop prototypes, at full scale, which take practical advantage of the new technology and demonstrate a care in design and architectural expression. Each group has to document their processes and prepare a report. The project has run for three years and each successive year uses the previous reports as both a technical resource and a vehicle for progressive development of the technique. The work has attracted great interest amongst the architectural profession and has been widely reported. It features in a forthcoming book, *Fabric Formwork*, published by The Royal Incorporation of British Architects (RIBA).

#### 4.13 University of Glasgow, Scottish History: student essay question-setting

The teaching of this level 1 Scottish History course at the University of Glasgow involves engaging the students in research-type processes. There is an overarching on the existence of multiple arguments within history (rather than dependence on a textbook). For the course assignment, students are required to undertake initial identification of possible essay questions within a theme by themselves. They attend a tutorial where they refine the question in dialogue with their tutor (who also helps identify appropriate references and sources) and then go on to answer the question independently.

#### 4.14 University of Glasgow, Medieval History: student publication

In this level 3 Medieval History course, the tutor, in addition to teaching the staples of medieval history (that is, honours courses drawn from his own research area and a special subject that focuses on primary source analysis), also implements a project that provides opportunities for students to undertake a piece of local history research as their dissertation. What is unusual in this project is not the focus on local history (rather than broader national or international historical themes) but that the tutor has established links with a local history publisher who also acts as a mentor for those students undertaking the projects, with the understanding that the best outcomes will be published as local histories.

#### 4.15 University of Glasgow: Frontiers of Physics

As well as providing students with an essential grounding in the subject, this level 1 physics course also exposes students to the Frontiers of Physics research from the outset of their undergraduate careers. This course is designed to allow the students to experience an environment akin to a research seminar. Students are expected to be able to derive results, undertake numerical calculations from them, and discuss their importance in the wider world of physics.



#### 4.16 University of Glasgow: skills revolution workshop (junior honours year)

Underpinning this course (consisting of two half-days) are interactive workshops and role-playing sessions designed to develop students' creative thinking, teamwork, presentation design and delivery, problem solving and working to deadlines. It is stressed to students that as much as these skills are essential for employment outside the university they are also the ones required for becoming and being an effective researcher.

#### 4.17 Scottish Agriculture College, Environmental Sciences, Life Sciences and Social Sciences: Advanced Case Studies module

Live case studies have been used at Scottish Agriculture College (SAC) for some years. Essentially, the students are involved in solving problems and/or developing business ideas in relation to real-life businesses. Technical knowledge acquired during their studies is combined with their shared personal experiences and the skills needed to work with a live business, with the unique challenges this brings. The skills and knowledge acquired by the students completing live case studies have been acknowledged by the businesses with which they collaborate, by employers and by the students themselves, as extremely valuable and applicable to a wider range of students.

A range of staff have experience in setting up and running live case studies as well as incorporating feedback to the businesses involved and debriefing the students. Methods have been refined as a result of the recognition of good practice and in response to feedback and review. The businesses involved in the case studies are involved throughout the case study process, including the gathering of supporting information, the setting of the problem/business scenario, interaction with students on the day of the visit and the feedback process. Students generally make a written submission and may also present the outcome of their investigation to stakeholders.

The Advanced Case Studies module (SCQF level 9) develops investigative and problem-solving skills through the use of a number of integrative case studies. Each of the case studies focuses on specified aspects of a business and involves the integration of technical knowledge and management skills. In some cases it may be more appropriate to undertake a single large case study requiring more detailed research, usually across an industry sector.

This module is taken by a range of students across SAC on the following programmes: Agriculture; Rural Business Management; Rural Resource Management; Sustainable Environmental Management; Adventure Tourism and Outdoor Pursuits; Leisure Management (Sport and Recreation); Rural Recreation and Tourism Management; Rural Recreation and Tourism Management (Equine Studies); and Rural Recreation and Tourism Management (Heritage Studies).

The module was developed primarily to enable students completing year 3 of degree programmes to draw on the skills, knowledge and experience gained to date and apply these to real life situations. A number of the students opt not to progress to the honours year of their programmes (because of the availability of jobs) and so the module provides a clear conclusion to their programme of study and highlights their ability to apply their knowledge to the real world. The 'live' aspect of the case studies, looking at real businesses, generally results in more enthusiastic and motivated students and in some ways helps smooth the transition from student to employee (or employer) in the real world.

Issues and themes addressed recently included: the impact of the reform of the Common Agricultural Policy and the introduction of the Single Farm Payment; marketing and business development (cooperatives and a visitor centre) and rural diversification (leisure and recreation enterprises). It is intended that topical issues will direct the focus of the individual case studies each year.

Student feedback was formally obtained through the module evaluation forms. The relevance of the module to the programmes concerned, the mix of lectures, self-study and practicals, and the usefulness of visits were rated most highly. An informal measure of the success of the approach was also seen in the expressed willingness of the businesses to host visits in future.

#### 4.18 UHIMI, Marine Science: fieldwork aboard vessels

One example of good practice, which flourishes due to the low student numbers, is to be found within the BSc (Hons) Marine Science at UHIMI. Each year a maximum of 15 students embark on a four year programme at the Dunstaffnage Marine Laboratory, where they have unprecedented access to research vessels, a wide range of shore and coastal habitats, and state-of-the art laboratories supporting areas from physical oceanography to marine biology and marine resource exploitation to sedimentary biogeochemistry. Across all four years, students undertake fieldwork aboard the vessels and work in the specialist laboratories. Modules are led by experts in the field, so the students are exposed to the latest conceptual and technological developments.

A wide range of pedagogical activities are tied directly to the acquisition and development of higher level research skills, for example: technical report-writing development from level one; training in experimental design at level two; academic paper reviewing and abstract writing at level three; writing research proposals at levels three and four; undertaking research projects at levels three and four; deconstructing the certainty of science and communicating science, both at level four. Although not a systematic approach to embedding research-teaching linkages at the core of the curriculum, this occurs by the nature of the environment within which the students are located.

#### 4.19 Napier University, School of Accounting, Economics and Statistics: teaching consultation skills

This MSc Applied Statistics module at Napier University is taught in two parts. The first part is research methods from which students are assessed by constructing a bid for a research grant, while the second half goes through an attempt to develop consultation skills. Study is made of the consultation process, type of consulting, problem identification and resolution, project planning and costing, teamworking and negotiation and consultation skills. This is pursued over six weeks of highly interactive two-hour sessions. A considerable number of case study examples are given, many of which are based on the lecturer's own experience of consultation in both private and public enterprises. The role taken by the lecturer is to propose a problem and facilitate students to develop solutions and help them to understand the nature of clients, problem complexity and that multiple solutions are feasible.

Students are assessed via a group role-play exercise. Students in groups of no more than four are assigned clients. These clients are from either public or private organisations such as the Royal Bank of Scotland, Tesco Finance, Intelligent Finance, Solectron Ltd, Jabil Electronics, Seagate, General Register Office, Information Services Division of the NHS, Amy, Marketing Databasics, and Standard Life.

The idea is that students meet the client who has a fairly unstructured, ill-defined problem. The students then work out what the problem is and how to resolve it, before presenting a tender to the client to undertake the work. This tender specifies the cost and duration of the work as well as intended outputs. Each group of students has a different client and the tenders are presented in an afternoon at the end of the trimester to an audience of their peers, staff and all the clients. This presentation is videoed and put on a DVD for the external examiner to review.

A key aspect of the assessment is the client's impression at first meeting - this is marked by the client. The tender is marked by all clients and staff at the presentations. The feasibility of approach is marked by the client. The contract letter, specifying costs, durations, outputs and Intellectual Property Rights issues, is marked by the lecturer. A consultancy log - a diary of meetings, and so on, written in a style to facilitate reflective learning - is marked by the lecturer. This assessment and allocation of clients is deliberately left until late in the module to simulate the reality of short tender times and to promote effective teamworking. The problems posed by clients are real ones and comments by clients suggest that going through this exercise has improved their understanding of the problems.

#### 4.20 Napier University, School of Health and Social Sciences: using research to teach qualitative research

The development of the Qualitative Research in Practice module in the School of Health and Social Sciences at Napier University arose from an identified gap in students' knowledge of, and practice in, qualitative research. Previously, qualitative research was taught through two research modules. In the year 2 module, methods of data collection in social science research were explored with a small amount of time given to qualitative interviewing. In year 3, students concentrated on social science data analysis, both quantitative and qualitative. However, it was apparent in this module that the students had not acquired a grounding in the basics of qualitative research, making qualitative data analysis very difficult for them to undertake. To address this situation, two new second year modules were created to replace the year 2 and 3 modules. One would focus on quantitative research and the other on qualitative research.

The new module, Qualitative Research in Practice, takes students through the stages of the research process: developing a research question, designing qualitative research, looking specifically at qualitative interviews; analysing qualitative data; evaluating qualitative research; writing convincing arguments from qualitative data. The aims of the module are to develop students' critical thinking on key issues in qualitative research, and to provide students with first-hand experience of qualitative research.

The module revolves around the module leader's research on parent/child negotiations around risk and safety, to guide students through the research process. The project serves two functions, outlined below.

- As a case study to illustrate and provide examples of the issues being discussed. The project allows abstract research theory to be grounded in real examples.
- 'Real' data from the project are used to give the students first-hand experience in data analysis.

In the first half of the module students attend six one-hour lectures (weeks 1-6) introducing them to key issues and approaches in qualitative research. Practical experience is gained in weekly two-hour workshops. In these classes students are expected to participate actively in small groups, learning from their peers' and tutor's experiences, and building their knowledge on a weekly basis.

This can be illustrated with reference to one of the topics studied - qualitative interview design. There is discussion in the lecture around the purpose of the interview and the impact this has on interview design; reference is made to relevant sections of their textbook outlining types of questioning and other techniques to be used within interviews. These issues are then grounded in examples from the module leader's own research and students are given the topic guide used in that project. In the workshop, students work in small groups through a step-by-step exercise to design a topic guide for a fictitious project on student retention. After the workshop, they prepare their own topic guide to be used in their first assessment. The following week they bring this to class, discuss with their peers and their tutor and reflect on the process.

This part of the module is assessed by a 2,500 word report reflecting on the design and conduct of a small qualitative interview project. Students develop a research question, design a topic guide, and carry out three interviews. The report requires them to reflect on this experience and to situate those experiences in the methodological literature on interviewing.

The second half of the module concentrates on qualitative data analysis. Using a transcript from the module leader's research, students are taken through the stages of interpretive thematic analysis. Each week students work together in small groups, analysing the transcript. By working with the same transcript, students are able to share ideas and simulate the experience of the workings of a real research team. This work builds each week and students can draw on these experiences in writing their second piece of assessment. Students present and discuss a reflexive account of the process of qualitative data analysis in their reports.

#### 4.21 Napier University, School of Computing: motivating honours students to engage with primary research literature

Final-year students often rely heavily on mediated module content such as lecture overheads rather than to study the research literature in the original. While this approach can give an overview of the current thinking in a domain of study, active engagement with the primary source material, especially at honours level, provides greater opportunities for critical evaluation of the work undertaken, as well as the development of theory in the domain.

In recognition of the difficulties in motivating final-year undergraduates to read the research literature in the original, changes were made in 2004-05 to the private study, tutorial and assessment tasks for the School of Computing's final year Knowledge Management module. The goal was tight integration of private study reading exercises

focused on a set of papers with advanced follow-up group activities in class, group assessment, individual assessment, and a panel session with industry experts in week 12. The intention was that this would encourage deep student engagement in the research literature of the domain. The new approach, as outlined in detail below, has proved to be very successful in meeting this aim.

The first task for module tutors who wish to adopt this approach is to put together the journal articles, conference papers and book chapters that comprise the reading set to match the subject content of the module. A range of material should be selected: from established domain 'classics', to recent conference contributions considered to be at the forefront of the discipline. It is also important to provide variety in the type of material presented so that students have the opportunity to appreciate that published research literature takes many forms, including, for example, conventional reports of the findings of empirical studies, literature reviews and detailed case studies of single organisations.

Experience over the past three years has shown that students prefer to study no more than two papers in depth per week. Therefore, the set of readings has recently been organised so that students are aware of which papers are **core** to the **module** programme and must be prepared in advance of the weekly tutorial, and those which are included for 'advanced study' purposes. Students who have a particular interest in the subject area, perhaps because the theme relates to their dissertation topic, are the most likely to follow up the 'advanced study' option. (The additional readings also give a choice of focus in the individual course work assessment, discussed in greater detail below.) For the module discussed here a minimum of eight articles is required for the eight 'regular' tutorials. In its most recent format, the students were actually required to engage with at least 10 papers.

The module programme is designed in tandem with paper selection to ensure that the weekly lecture themes, tutorial exercises and reading exercises tie together neatly (and, of course, match with the learning outcomes of the module). For most weeks that the module runs, the module team members are committed to designing two exercises - one for the individual private study task based around the reading, and a second, more advanced, group exercise to be completed in class - as well as writing and presenting a lecture. It should also be noted that running the class as a single three-hour block split between the lecture (1 hour) and the tutorial (2 hours) once a week has proved to be the most effective form of class delivery.

## 5 Conclusion

It is hoped that these vignettes of practice provide some indication of the rich variety of activity in Scottish higher education institutions in relation to research-teaching linkages, and of the variety of levels at which this is taking place. All of the Scottish higher education institutions contributed to this emerging picture. Each of the vignettes is strongly influenced by the context, history and diverse missions of its institution and it should be recognised that all the participating institutions were responding in their own particular ways to the various demands and signals currently emanating from within the higher education sector. This set of vignettes, of course, by no means offers an absolute picture, but is intended to be illustrative of current engagement around this Enhancement Theme.

We hope these vignettes may trigger interesting discussions within organisations as to the range of ways in which research-teaching linkages can be interpreted, and that they may be useful for institutions as they reflect periodically on their own approaches in this regard. The conceptual frameworks and discourses through which higher education pedagogy and the student learning experience come to be discussed have been changing significantly within the last decade. It is significant, for example, that within this study the language of 'graduate attributes' resonated well with the majority of respondents as opposed to that of 'employability'.

Of course the selection here is by no means exhaustive and colleagues are encouraged to consult the institutional reports provided by each of the participating Scottish institutions for further information and illustration of the variety of research-teaching linkages<sup>9</sup>.

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<sup>9</sup> Heriot-Watt University and Napier University have each published their own selection of case studies of research-teaching linkages drawn from current practice within their institutions. These are available as: Smith, K (2008) *Linking Research and Teaching: A Guide for Staff*, Educational Development Unit, Heriot-Watt University *Linking disciplinary research with teaching at Napier University: case studies of practice* (2008), Napier University. Available at: [www.ed.napier.ac.uk/staffconference/jan2008/download/RTLcompendium.pdf](http://www.ed.napier.ac.uk/staffconference/jan2008/download/RTLcompendium.pdf)

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