

Linking teaching and research in disciplines and departments

Alan Jenkins
Mick Healey
Roger Zetter

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Executive summary

This paper seeks to support the effective links between teaching and discipline-based research in disciplinary communities and in academic departments.

It is aimed in particular at discipline-based staff who wish to connect their teaching and research roles; those with leadership roles for teaching and for research in departments and institutions; and educational developers, researchers and support staff within institutions, in disciplinary communities and in academic departments.

The central arguments are that:

- the ‘teaching-research nexus’ is central to higher education
- student intellectual development and staff identity can and should be developed by departments focusing on the ‘nexus’
- effective teaching research links are not automatic and have to be constructed
- there are important disciplinary variations in teaching-research relations that need to be valued
- academic departments are central to developing the links between research in the discipline and student learning
- a central way to develop effective practice is to share case studies of discipline-based practice and department policies.

Suggestions are offered as to how disciplinary communities and departments can strengthen the good practice that already exists.

The arguments are evidenced and illustrated by research and case studies drawn largely from Australasia, Europe and North America. In turn we hope that it will be of interest to, and be used by, university staff particularly in these regions. Where possible links are given to appropriate websites; all the links were working in March 2007. The quickest way to access the sites is to use the online version of this paper at www.heacademy.ac.uk/rtnexus.htm.

This paper is published by the Higher Education Academy in the UK. Dr Nick Hammond, Senior Adviser at the Academy, outlines its role in supporting the teaching-research nexus in the Preface. Details of current research projects on the nexus funded by the Academy are listed in Appendix I.

The authors gratefully acknowledge the comments made on an earlier version of this paper by Professor Roger Brown (Southampton Solent), Dr Nick Hammond (Higher Education Academy) and Professor Kerri-Lee Krause (Griffith).

Preface: Plutarch's fire

While Wilhelm von Humboldt is credited with the founding principle of the university as a collaboration between learning and research (see section 7 of this paper), the underlying goal of education as developing the enquiring mind is very much older: “the mind is not a vessel to be filled, but a fire to be kindled” (Plutarch, c46–127 AD). Never has the educational philosophy behind this belief been more important: the changing world to be faced by today's students will demand unprecedented skills of intellectual flexibility, analysis and enquiry. Teaching students to be enquiring or research-based in their approach is not just a throwback to quaint notions of enlightenment or liberal education but central to the hard-nosed skills required of the future graduate workforce.

This paper has the potential to provide, as it were, a well-directed blast from the bellows feeding Plutarch's fire. Issues concerning the links between research, in its widest sense, student learning and graduate outcomes have been rising up the agenda in recent years in higher education, whether in terms of national strategy, institutional policies, disciplinary practices or individual endeavour. For instance, one of the Scottish HE sector's enhancement themes starting this year focuses on research-teaching links and graduate outcomes, with a programme of activities particularly at institutional and disciplinary levels.

An earlier Academy publication focused on institutional strategies for linking research and teaching (Jenkins and Healey, 2005); the current paper turns the spotlight to the links between teaching and discipline-based research in disciplinary and academic communities, and how these links might benefit students' experiences and learning outcomes. Why this focus? Perhaps the most obvious reason is that discipline is at the root of differences between areas of knowledge and the scholarly processes by which that knowledge is discovered, organised and applied. Disciplinary differences colour not only both research and teaching, but also their relationship, in quite distinctive ways. Furthermore, departments are where both research and teaching are formulated, carried out and discussed, and are therefore the seedbeds for nurturing research-teaching relationships. There is therefore much to be gained by exploring and addressing these relationships at a disciplinary level within the context of departments, schools and faculties.

There is a strong belief within higher education that relationships between research and teaching – whether in terms of content or approach – can be highly beneficial for the student. However, productive links have to

be designed rather than left to chance: the evidence shows little direct relationship between an individual's teaching effectiveness and research productivity, although recent work has shown the importance of mediating factors (see section 3). The focus of the work of the Higher Education Academy is therefore to stimulate and encourage the design of, and research into, effective links at all levels. For example, the Academy organises an annual one-day conference focusing on policy issues; it works with related initiatives, such as the Scottish enhancement theme, the Support for New Academic Staff (SNAS) programme on linking teaching and disciplinary research and the Research-Teaching Forum; it funds small projects in the area; and, not least, the Academy's Subject Centres foster and support a wide range of discipline-level work. A special section of the Academy's website provides details on a wide range of international initiatives www.heacademy.ac.uk/rtnexus.htm.

This paper represents an important part of the jigsaw.

Nick Hammond

Senior Adviser

The Higher Education Academy

I. Scope, origins and purpose

“I believe that the main hope for realising a genuinely student-centred undergraduate education lies in re-engineering the teaching-research nexus.”

Ramsden (2001, 4)

“... we are all researchers now, ... teaching and research are becoming even more intimately related. ... In a ‘knowledge society’ all students – certainly all graduates – have to be researchers. Not only are they engaged in the production of knowledge; they must also be educated to cope with the risks and uncertainties generated by the advance of science.”

Scott (2002, 13)

“A meaningful science education involves transforming the way in which students think by promoting a progression from ‘novice’ to ‘expert’ in both their attitudes and their approaches to the discipline and problem solving in that discipline. Today’s educator should aim not simply to produce more scientists, but rather to get *all* students to learn to think about science like a scientist. Similarly, the goal of education in general is to get students to think like experts more broadly.”

Wieman (2004)

“Research-led teaching refers to initiatives to bring the research and teaching functions of the university closer together. The aim is to enhance students’ learning experiences by progressing the ways in which coursework teaching is informed by disciplinary-based research at all levels.”

University of Sydney (2004) cited by Brew (2006, 43)

This paper is particularly aimed at four audiences:

- Discipline-based staff, both those who wish to ensure that students are better inducted into the nature of knowledge or research in their discipline and those who wish to make stronger connections between their own research or professional practice and their teaching roles
- Heads of academic units and departments and others with managerial

and policy responsibilities for research and teaching (e.g. course directors/tutors; convenors of research groups), who share our view that a central feature of higher education is the effective linkage between teaching and research

- Staff in the Academy's Subject Centres and in educational development units inside higher education institutions who work with departments and individual academics to improve their practice
- Senior staff in policy and managerial roles in institutions and national bodies who are in positions to shape departmental, institutional and national policies to bring teaching and research together.

The link we are seeking to enhance is the connection between research in the discipline (e.g. History) or interdisciplinary subjects (e.g. Environmental Studies) and student learning in and through those disciplines. This link is what Neumann (1994, 323) has called the 'teaching-research nexus'. While much of what we suggest is relevant to the growing number of taught postgraduate courses, our central concern is with the undergraduate level. For the undergraduate curriculum is central to most institutions and departments, and is also where evidence clearly shows that the relationship is most problematic. Our focus here is not on linking teaching with research on teaching and learning in higher education, including research on discipline-based pedagogy (Yorke, 2000). Our concern is rather with the long-standing and central issue of the relationship between staff involvement in research in their discipline and their role as teachers of that discipline, or where appropriate in interdisciplinary or multidisciplinary contexts.

This paper represents a significant rewriting of an earlier publication, *Linking teaching and research in departments* (Jenkins and Zetter, 2002), a publication of the then Learning and Teaching Support Network Generic Centre which supported a national project to bring teaching and research together. This re-written paper draws on the wider international knowledge of teaching-research relations developed since then, particularly on conceptions of teaching-research links in the disciplines. It also draws significantly on the knowledge developed through a project in which we are working with the Academy's Subject Centres to examine the particular nature of teaching-research relations in disciplinary communities and to gather examples of 'interesting practices' in the disciplines which seek to bring teaching and research together. A key part of the publication is the boxed case studies in each section which are drawn from a wide range of disciplines and departments in a range of countries.

This publication draws on current practice in the way that departments can be organised to ensure effective links between their teaching and research roles and provides a range of international case studies of departmental

policies that seek to bring teaching and research together. We assume that readers will be particularly interested in case studies from their own disciplinary type and from departments and institutions similar to their own, ranging from teaching- to research-focused. However, we also think that there is much to learn through considering how case studies from contexts different from one's own can be adapted to one's discipline or type of department and institution.

While this paper is focused on improving practice and policy it is firmly based on the growing international research evidence on teaching-research relations, including how departments and disciplines shape those relationships. In Sections 3–6 we review that research, but first we explain why we, and many others, consider the teaching-research nexus should be central to higher education.

Case studies I: Natural Sciences

Asking questions in Plant Biology at Australian National University

A practical exercise designed for a Level 2 course inducts students in the process of inquiry characteristic of the discipline. Students make observations in a botanical garden; each formulates 10 questions (e.g. “Why do eucalypt leaves dangle?”); shares one of these questions with a group of other students; as a group develop hypotheses based on the question (e.g. “Eucalypt trees in arid environments have leaves that dangle at steeper angles than those in wet environments”); think of ways of testing the hypotheses; and write up individually their 10 questions and one hypothesis as a 750 word mini-proposal for a research project.

Source

www.anu.edu.au/cedam/ilearn/inquiry/posing_questions.pdf

At University College London, UK, Science undergraduates build on research of previous students

Students on a course on the history of science at UCL are involved in a pilot project aimed at a full integration of teaching and research at the undergraduate level. The chief innovation is the mechanism of inheritance: each year students receive a body of work produced by the previous group of students and make improvements and additions to it; this process can be repeated until publishable materials are produced. This is part of a system of learning that enables students to function as a real and evolving community of researchers.

Source

Chang (2005)

Undergraduate and postgraduate student Conservation Science conferences at Cambridge (UK) and Duke (US) Universities

An annual student research conference has been held since 2001 at Cambridge and since 2005 at Duke. The series aims to build links among young conservation scientists from biological, environmental and geography departments of universities as well as conservation and resource management agencies. Delegates include students from around the world, as well as conservation practitioners from leading international conservation bodies.

Sources

www.sccs-cam.org

www.env.duke.edu/sccs

At Cornell University, US, all first-year biologists have research experiences

The 'Explorations Program' introduces first-year Biology undergraduates to research by Cornell staff, in the context of a course of 700-900 students. Large-scale funding has created 100-120 'experiences', each of approximately 3-4 hours, for groups of 6-8 students. Most are designed to introduce students to the kinds of research problems on which the academic staff member works. Programmes take place both in research labs on campus and at field sites near the campus. The programme is structured so that each student is required to participate in one 'Exploration' per semester.

Sources

ws.cc.stonybrook.edu/reinventioncenter/spotlight.html

biog-101-104.bio.cornell.edu/biog101_104/explorations/explorations.html

At Leicester University, UK, first-year Biochemistry undergraduates are helped to read research articles

The expectation that students in the latter stages of an Honours degree will be keeping abreast of developments in a particular field of knowledge requires them to become conversant with research articles. Yet the content of such papers is frequently jargon-rich and impenetrable. Key components of the first-year programme are explicitly structured to introduce them to reading and to writing as researchers. In particular, as part of a year-long scientific skills module (c.70 students), a set of exercises has students first consider the structure of a scientific report and read and evaluate a given research paper. Subsequently, students are asked to imagine themselves as scientific investigators interested in a specific problem. In tutor-led group discussion they design an experiment to investigate the problem and then individually write a report based on provided data.

Sources

Willmott *et al.* (2003)

<ftp://www.bioscience.heacademy.ac.uk/events/york05/willmott.pdf>

2. Valuing the teaching-research nexus

“The element of partnership between teacher and taught in a common pursuit of knowledge and understanding, present to some extent in all education, should become the dominant element as the pupil matures and as the intellectual level of work done rises.”
Committee on Higher Education (1963, para. 555)

“... we want all students to access the benefits exposure to teaching informed by research can bring. ... This will take many forms including pure and applied research that feeds curriculum development; but also research and development that tackle the challenging questions facing professional business, regional and local employers now and in the future. We’re doing this because we believe an understanding of the research process – asking the right questions in the right way; conducting experiments; and collating and evaluating information – must be a key part of any undergraduate curriculum.”
Bill Rammell MP, Minister of State for Lifelong Learning, Further and Higher Education (2006, 3)

The first quotation, from the Robbins Report of 1963 on the future of UK higher education, expressed the strong cultural value of what many would now term the ‘teaching-research nexus’ as the central nature and purpose of higher education. In the UK, this value was reinforced in the 1997 Dearing Report, albeit in a context where research was seen as central to economic prosperity, and needed to be selectively concentrated. Partly through a visit to the USA, Dearing was “persuaded ... of the important role of research and scholarship in informing and enhancing teaching” (NCIHE, 1997, para. 8.7); and he recognised that “there is a near universal rejection of the idea that some institutions of higher education should be teaching-only institutions” (para. 11.60). In the UK, the critical response to the Government’s proposals in the 2003 White Paper (DFES, 2003) to create ‘teaching-only universities’ led the Government to establish the Research Forum to re-examine teaching-research links in the context of growing research selectivity. That Forum argued, in part through considering the growing research evidence in this area (see section 3) that:

“research and teaching are essential and intertwined characteristics of a university which can be advanced from two perspectives:

- that of the students acquiring a ‘higher education’, and
- that of the work of academic staff employed in higher education ...

International experience suggests that there are various ways in which the students’ learning experience can be effectively enhanced – ranging from vicarious exposure to the current research of their teachers through to the immediate impact of being researchers (broadly defined) in their own right ...

It is becoming clearer that those students who are not learning in an HE environment that is informed by research, and in which it is not possible to access research-related resources, are at a disadvantage compared to those who are.”

Research Forum (2004, 1 and 3)

The UK Government’s response to the Forum was to recognise the complexity of teaching-research relations, to affirm the importance of teaching-research links, and to create a special fund, for three years in the first instance, to support ‘research-informed teaching’ outside the research élite. Those receiving high research income through the Research Assessment Exercise (RAE) were assumed to be already delivering, or to have the means to deliver, research-based or research-led teaching (HEFCE, 2006).

The importance of students being able to understand and to an extent do research is now arguably of greater importance than it was at the time of the Robbins Report. Thus Barnett (2000, 163) has argued that universities need to be reformulated to help students and society deal with ‘supercomplexity’. Students’ understanding of knowledge generation through research and, arguably, their ability to ‘do’ research, is vital to that objective. Many contend that the new ‘knowledge economy’ requires that students graduate with an ability to analyse and contribute to research (Garrick and Rhodes, 2000; Zetter, 2002a; see section 8). In a knowledge society, how knowledge is developed (i.e. researched to create understanding) and transmitted (i.e. taught and learned) is critical. Indeed it is these arguments from a knowledge-economy perspective that have probably been most important in moving the UK Government away from a ‘teaching-only’ perspective.

For academic staff, forging productive links between teaching and research helps them to manage better what otherwise can be conflicting demands on their limited time; while for department managers, focusing on the link can help in ensuring productive links between staff roles across the department and more 'efficiency' in delivering a range of departmental activities. For those departments with limited access to external research funds, developing the teaching-research nexus can help a department to support a research profile. For strong research departments, ensuring the link can help students appreciate the value to them of this departmental research focus.

In summary, the value of the link can be expressed in terms of three perspectives:

- Experientially – as a process which benefits students and staff
- Conceptually – in terms of societal needs and the development and communication of knowledge
- Operationally – in terms of the potential reciprocity of teaching and research as learning activities (Zetter, 2002a).

In discussing these issues we need to recognise the complexity and the varied meanings that we individually and collectively understand by the term 'research' whether from the perspectives of academic staff, students or the wider society. Those of us in the UK are well aware of the particular definition of 'research' in the Research Assessment Exercise (RAE): "original investigation undertaken in order to gain knowledge and understanding" (RAE2008, 2005, 34). This focus on research as 'original' knowledge is also reflected in the definition of 'undergraduate research' by the US Council on Undergraduate Research: "An inquiry or investigation conducted by an undergraduate student that makes an original, intellectual, or creative contribution to the discipline" (CUR, undated).

Others see this focus on research as original knowledge as both problematic and disproportionately reflecting the cultures and practices of research in the natural sciences (Brew, 2001; Pope, 2005). Boyer (1990, 16) would prefer to use the term 'scholarship' and "move beyond the tired old teaching versus research debate". In wishing to value all the activities in which academics are engaged he distinguished between the scholarships of discovery, application, integration and teaching (see also section 5). These terms are reasonably well known in North America, and some terms, particularly the scholarship of teaching, have entered the vocabulary in Australasia and the UK. At Southampton Solent University they have proposed the term 'advanced scholarship' which they define as "the creation of new knowledge, or the critical reinterpretation and

transfer of existing knowledge” (Brown, 2003, 17). They have come up with an indicative list of the ways staff may engage with it, all of which result in a visible output in the public domain; carry peer esteem; and contain an aspect of innovation or originality (www.solent.ac.uk/externalup/318/indicative_list_of_advanced_scholarship_activities.doc).

As authors we are drawn to these wider views of what is research. We will return to this issue in section 6 when we discuss disciplinary perspectives on what is ‘research’. Generally the wider the definition of what counts as research, the easier it is to develop a link with teaching.

While recognising the political contexts in which teaching and research are organised in national systems, and the complexity of what constitutes research and teaching (Scott, 2004), in seeking to build links we need to be aware of the research in this area which warns us that the links are not automatic and indeed are problematic. These challenges are considered in the next section.

Case studies 2: Social Sciences

Inquiry-based learning introductory course for social sciences had a significant impact on students' subsequent performance at McMaster University, Canada

McMaster University has been running a first-year course for social sciences based on inquiry since the late 1990s. Detailed research has been undertaken on the first five years' experience. It was typically taught in groups of no more than 25 students which met for 12 three-hour sessions. Much of the time involved groups of four or five students assisting each other. All students investigated aspects of a broad social science theme, such as 'self identity', and addressed a common inquiry question, such as: "Why do images of ethnicity, race, gender, sexuality, age, class, or abilities help to create aspects of personal and community identity?" The groups would test hypotheses using secondary data. The course emphasised the development of skills, including critical reading and thinking, independent and collaborative learning, information searching and evaluation, analysis and synthesis, oral and written communication, and self and peer evaluation.

Analysis of five years of data comparing students who took the Inquiry course with comparable students who did not shows that it has had a significant impact on how well students perform during their academic careers. The findings allow for initial differences between the two samples. Taking the Inquiry course is associated with statistically significant positive differences in obtaining passing grades, achieving Honours, staying on the Dean's honour list, and remaining in university.

Sources

Justice *et al.* (2002, 2007, in press)

socserv2.mcmaster.ca/Inquiry/courseoutline.htm

www.socsci.mcmaster.ca/socsci_inquiry.cfm

Psychology students research students' quality of life at York St John University, UK

First-year, non-specialist Psychology students undertake an eight-week project in which they collect data from themselves and three other students using four short inventories and a biographical questionnaire in order to research topics related to students' quality of life. This project provides students with the opportunity to collect 'live' data, contribute to a developing database, select data for analysis, and write up findings. The topics available for selection by students are linked to the research interests of the lecturer, making the project mutually beneficial.

Source

www.psychology.heacademy.ac.uk/html/call_for_case_studies.asp

A guide for undergraduate dissertations in Sociology, Anthropology, Politics, Social Policy, Social Work and Criminology at Sheffield Hallam University, UK

This web resource was prepared to provide support and guidance for students writing dissertations in the social sciences, but it offers useful guidance for any students carrying out research. It deals with some of the common questions, concerns and practical issues that undergraduate students face when planning a piece of social research, such as research design, ethics, access, and writing styles. The resource also provides some useful information for academic staff who are supervising undergraduate dissertations. It provides case studies of dissertation supervision issues and examples of the students' experiences of completing a project. The 'student voice' may be especially valuable for the new supervisor.

Source

www.socscidiss.bham.ac.uk/sl.html

3. The research evidence summarised

“The issues are layered and complex. Relatedly, there is not a single teaching-research relationship, there are many relationships. Indeed, perhaps we overstate or distort these relationships by referring to ‘a’ or ‘the’ teaching-research nexus. There are also issues we don’t know, or have as yet to research.”
(Jenkins, 2004, 30)

If we turn to the large discovery research literature on teaching-research relations much of it questions the assumed connections (Jenkins, 2004).

There is an extensive research literature which has examined, particularly at the level of the individual, but also at course team, departmental, institutional and national levels, the complex relationships between teaching and research. Much of the early research analysed statistical relations between research output or quality and teaching quality (e.g. Pascarella and Terenzini, 1991). In a meta-analysis of this research, Hattie and Marsh (1996, 529) argued that “the common belief that teaching and research were inextricably intertwined is an enduring myth”. They concluded, as do we, that “Universities need to set as a mission goal the improvement of the nexus between research and teaching. ... *The aim is to increase the circumstances in which teaching and research have occasion to meet*” (p.533) [our emphasis].

More recent research by Marsh and Hattie (2002, 614) “at a large urban university in Australia that has both teaching and research orientations”, has further confirmed their view that “teaching effectiveness and research productivity are nearly uncorrelated, thus supporting the hypothesis that they are independent constructs” (p.635). The main policy implication they draw from this rigorous study confirms the approach of this publication.

“Perhaps the major implication of this study is that it may be of most value to ask institutions how they could re-weight research and teaching *within* institutions and departments. A major aim would be to increase the relations between teaching and research and devise strategies to achieve this mission.”
(Marsh and Hattie, 2002, 634)

“Examples of strategies to increase the relationship between teaching and research include the following: Increase the skills of staff to teach, emphasising the construction of knowledge by students rather than the imparting of knowledge by instructors ... develop strategies across all disciplines that emphasise the uncertainty of the task and strategies within the disciplines ... ensure that students experience the process of artistic and scientific productivity.”
(Hattie and Marsh, 1996, 529, 533 and 544)

Current research at the level of the individual has focused more on academics' conceptions of 'teaching' and 'research'. In particular the work of Prosser *et al.* (2004, 2005) points to how the way academics conceive knowledge of their subject and teaching shapes the extent to which their courses are likely to bring students to an understanding of research. In summary this research indicates that staff who see their research as tentative and as part of a wider debate in the discipline, and see their teaching as supporting student conceptual change, are more likely to bring their teaching and research together. By contrast staff who see their research as atomistic investigations and their teaching as concentrated on teacher-focused transmission of information are less likely to experience strong connections between teaching and research. Prosser *et al.* (2004, 6) conclude:

“All this suggests that it is not the quantity of research that is associated with quality of teaching, but how scholarship in the discipline or profession is maintained and developed that is important. This may apply equally to non-research active as well as to research active academic staff.”

One conclusion we draw from that research is the importance of the discipline- and department-based approach; for it seems clear that progressing the link is in part helping staff to have more sophisticated or wider conceptions of knowledge in their discipline and also to have an understanding of the complexity of introducing undergraduate students to research in that discipline.

Some of the more recent research has focused on the student experience of research. This has presented a potentially far more positive perspective – for those of us who believe in the potential importance of the links – than the previous statistical, correlative studies at the level of the individual academic. There is “clear evidence from a range of studies in different types of institutions of students valuing learning in a research-based environment”

(Jenkins 2004, 29; see also Pascarella and Terenzini, 2005; Hunter *et al.*, 2007). For example, Neumann (1994), in a large Australian research-oriented institution, undertook in-depth interviews with students in a range of disciplines, and from first-year undergraduate to doctoral students, on their experiences of teaching and research. Her conclusions were that staff research brought tangible benefits to students, mainly because students perceived that their courses were up-to-date and that staff demonstrated interest in what they were studying. Also, staff research interests gave students “the opportunity to see their teachers as real people and to be able to glimpse what they do, how and why” (Neumann, 1994, 335). Related research at Oxford Brookes, the University of Gloucestershire and the University of East Anglia has revealed similar positive student perspectives on the benefits of staff research to them (Healey, *et al.*, in submission; Jenkins *et al.*, 1998; Zamorski, 2002). However, these studies also had harder messages. Students who perceived staff members’ involvement in research as being incorporated into their teaching tended to see their courses as current and as stimulating intellectual excitement. Many students did not see themselves as stakeholders in research; research was seen as quite separate from them, or in Brew’s (2006, 52) powerful phrase, “at arm’s length” from their experience of their studies. In addition many students wanted staff research to be managed better so that the negative impacts, in particular, of staff not being available to students, were minimised.

Zamorski (2000), at the University of East Anglia (UEA), supervised students who were employed to research their own and their peers’ learning experiences in relation to staff research. She concluded:

“students value highly the experience of studying in a research-rich environment but clearly there is a policy gap between policy intention and student perceptions at UEA. Whilst students value being close to research, and to the idea of the University as a research community in which they are included, there are many ways in which in practice they feel excluded” (p1).

These student perceptions show the importance of course teams and departments carefully structuring or managing the student experience to ensure the potential gains of a department and institutional research culture are maximised – a theme that resonates with related research on issues of departmental organisation, discussed in the next section.

A recently completed international comparison of the student experience of research in three institutions, two in the UK and one in Canada, suggests that the teaching-research nexus does not simply reflect whether they are

studying in a more or less research-intensive institution (Wuetherick *et al.*, in submission).

“Whilst, unsurprisingly, students at more research-intensive institutions reported a higher awareness of research activity on campus and amongst those who taught them ... [a] clear pattern of research *experience* failed to emerge based on the nature of institution and no significant difference in reporting development of research skills emerged between the institutions. ... students across all three institutions reported learning best through involvement in their own or their instructors’ research projects” [our emphasis].

An area of current research is the impact of different research environments on students’ learning experiences (for example, Seymour *et al.*, 2004; Trigwell, in press). Such research is at an early stage of development and any conclusions as to the impact of different research environments have to be tentative. A study by Trigwell (in press) on 306 students in eight UK English and Physics courses with a range of RAE ratings revealed that there was no significant difference in the proportion of students saying they experienced the benefits of a research-stimulated teaching environment. Moreover, he found a strong positive relationship with adopting a deep approach to learning which was independent of discipline and RAE rating. Trigwell’s central recommendation endorses the practical focus of this paper:

“Based on the results from this study alone, increasing the number or proportions of research-active teaching staff in lower RAE-rated contexts is unlikely to affect the quality of student learning. *However, the results do suggest that more could be done to help more students to experience the benefits of research-stimulated teaching environments, not between different types of research context, but within each context*” [our emphasis].

But before we turn to our practical focus, we also need to consider the research on departments, for that is perhaps the central context in which academics teach and research and students learn, and in some cases do research.

Case studies 3: Business, Law and Tourism

Involving students in organisational consultancy, Middlesex University, UK

The module 'Consulting to Organisations' aims to engage students directly as consultants with organisations on issues that those organisations have identified as significant. On organisational premises, and in collaboration with the internal personnel there, a small team of students clarify the issue with their client. Information is then collected, using a variety of research methods, and analysed in the light of both academic theory and the specific organisational context. Recommendations for action, both orally and in writing, are made to the client. As well as experiencing the reality of the organisation, students also experience working with a team of diverse peers to produce credible outcomes.

Sources

Correspondence with Philip Frame, 2006
Frame and O'Connor (2003)

Students participate in a research project on Criminal Justice linked to staff interests at Australian National University

Students at ANU have the opportunity to participate in a research project based on current research being conducted by members of the Faculty of Law, the Australian Institute of Criminology and Research School of Social Science. 'Criminal Justice' is an advanced law elective which critically examines the principal institutions, processes and legal rules relating to the administration of criminal justice. The iLearning project is an assessable option that allows students to devise research projects which have both academic value and practical outcomes.

Source

www.anu.edu.au/cedam/ilearn/research/crimjustice.html

Modelling the research experience: Tourism students' virtual conference at the University of Lincoln, UK

In May every year, final-year Tourism students at the University of Lincoln participate in a live virtual conference. This is part of their assessment for the semester-long unit 'Social and Political Perspectives on Tourism'. A conference is a useful vehicle for extending insight into the process and practice of knowledge creation and dissemination and for students to participate as research disseminators. Two qualified web designers built the site and have been on hand to deal with technical issues. Students submit a full conference paper, but only a summary appears on the conference website. Each student is also required to post a comment on another conference paper during the week-long conference. Staff monitor participation and contact students as appropriate.

Source

www.cometravel.lincoln.ac.uk

4. Research on departments

“We found little evidence to suggest that synergies between teaching and research were managed or promoted at departmental or institutional level ... There were some attempts to manage teaching and research workloads in departments, partly to allow more time for research. Some strategies may be having the unintended consequence of driving research and teaching apart for some staff.”
(J M Consulting, 2000, 36)

“Structural changes: research centres housed staff freed from teaching responsibilities; graduate schools became the arenas for research, leaving departments to organise undergraduate teaching. Each of these [developments] was particular and peculiar, but the trend was gradually of a separation, structurally of research from teaching.”
(McNay 1999, 196)

A central area of recent research has concerned issues of organisational culture and policies at department, institutional and national levels (Jenkins, 2004). With respect to this paper's concerns, this research concludes that at departmental level teaching and research are now often organised separately, and in many cases limited thought is given to, and few explicit policies determine, how they might be linked. Indeed in some cases it may well be that the pressures for research selectivity, such as those of the RAE, are causing increased fissures between teaching and research in both the student and the staff experience (McNay, 1999). Thus Lucas' (2006, 170) study of the impact of the (symbolic) value of research in departments of English and Biology in two contrasting UK universities (pre- and post-1992) revealed “a clear division in all departments between staff who were engaged in research and those involved in teaching activities, and a substantial perception that staff engaged in teaching and administration were undervalued.”

Heads of department at the University of Sheffield (UK), interviewed for a research study (Rowland, 1996), saw teaching-research connections as being particularly important in ensuring intellectual currency of courses, particularly, but not exclusively, at postgraduate level. They also perceived the connections as being stronger in those staff whose teaching demonstrated an interactive approach, and one open to interpretation. These findings are supported by Prosser *et al.*'s (2004, 2005) research discussed above.

However, such espoused views may not always be reflected in the policies delivered. Coate *et al.* (2001, 162), in a study of departmental organisation in the UK, showed that departmental managers found that “it is more convenient for teaching and research activities to be treated as separate activities. On an academic level, however, managers would rather perceive the two to be synergistic.” In a study of Built Environment departments in four UK post-1992 universities, Durning and Jenkins (2005) showed how issues of department organisation and culture – in particular the effective policy separation between teaching and research, and the failure to effectively ask how they can be linked – resulted in failure to support staff to achieve potential synergies between these activities. Teaching was organised, research was organised, but little thought or policies had been enacted to effectively link them in the staff or student experience. Colbeck’s (1998) research on academics’ lives in two contrasting US institutions, one a research-intensive and one a more ‘comprehensive’ university, showed the importance of what counts as ‘research’ as enabling or blocking faculty in linking teaching and research. In the research-intensive university, for research to really count in workload planning and for promotion, it had to be ‘discovery’ RAE-style research. Perhaps paradoxically, staff in the less well-resourced comprehensive university found it easier in one respect to link their teaching and research, for there faculty evaluation for ‘research’ included the writing of textbooks and creative works in the popular media.

In the next section we present a conceptual framework for supporting Trigwell’s (in press) conclusion that “more could be done to help more students [and we add staff] to experience the benefits of research-stimulated teaching environments, not between different types of research context, but within each context.”

Case studies 4: Geography and Environmental Studies

Geography students at Glasgow Caledonian University, UK, submit reviews for publication made available to the local community

'Practising Geography', the second-year undergraduate Human Geography module, offers individual students the option of submitting coursework in the form of a briefing paper based on a small-scale, fieldwork-based research project that they themselves have designed and executed. On completion of the module, students can then elect to have their paper refereed by an independent expert, generally a local resident from the field locality or a member of one of the Royal Scottish Geographical Society's Regional Centres. Publication on the project website is conditional on an acceptable referee's report.

Source

McKendrick *et al.* (2003)

www.gees.ac.uk/linktr/mckendrick1.htm

Students across all three years of an Environmental Studies degree course at Sunderland University, UK, work together on local sustainability projects

Students on an Environmental Studies degree at the University of Sunderland undertook local sustainability projects, which brought levels 1, 2 and 3 students together in small research groups to work in collaboration with Sunderland City Council's Local Agenda 21 personnel, and other local environment and development agencies.

Source

Hughes *et al.* (2001)

Students at University College London, and at Oxford Brookes University, UK, interview staff about their research and views on contemporary Geography

Year one Geography students at University College London (a research-intensive institution) do an assignment in term one, in which students interview a member of staff about their research.

- Each first-year tutorial group is allocated a member of staff who is not their tutor.
- Tutorial groups are given three representative pieces of writing by the member of staff along with a copy of their CV and arrange a date for the interview.
- Before the interview students read these materials and develop an interview schedule.
- On the basis of their reading and the interview, each student individually writes a 1,500 word report on (a) the objectives of the interviewee's research; (b) how that research relates to their earlier studies; (c) *how the interviewee's research relates to his or her teaching*, other interests and Geography as a whole.

This exercise was adapted from one developed for a third-year synoptic course on the Philosophy of Geography at the then Oxford Polytechnic (now Oxford Brookes), which at the time received little funding for research:

- Students were divided into groups and each group was allocated a member of staff, who gave them a copy of their CV.
- A student group then interviewed that member of staff (with the rest of the students attending) about their academic history and views on the nature of contemporary Geography.
- The student group then wrote up the interview and set that person's view of the discipline in the wider context of the contemporary discipline.
- The aim in this teaching-focused department was to develop students' understanding of recent research developments in the discipline.

Sources

Dwyer (2001)

Cosgrove (1981)

Giving students first-hand experience of research-based consultancy in environmental management at University of Queensland, Australia

Team-based problem-based learning is used in the final-year capstone course for the Environmental Management, Rural Management Environmental Tourism and Tropical Forestry degrees at the University of Queensland's Faculty of Natural Resources, Agriculture and Veterinary Science to give students experience of research-based consultancy. It is a year-long course, team taught by an interdisciplinary staff (in recent years, a social scientist and an ecologist for the internal students, a multi-skilled environmental manager taking the external students).

The staff solicit suitable 'problems' and clients among their contacts, for instance from government agencies, non-governmental organisations, or land care groups, or the private sector. The staff may help the client mould the topic to achieve appropriate degrees of difficulty, and equity in workload across the student groups. The students work like consultants to their client, coping if the client changes the brief during the year (as many do a couple of times).

They work in groups of about six students. The clients come to campus at least three times, for an initial briefing to their students, and presentations at the end of the first and second semesters. They liaise with the students all year, usually off campus at their offices, and by phone and email. The staff give a flexible programme of lectures in the first semester, to prepare the students with skills they need towards each forthcoming step of their tasks, and in group processes. At the end of the year their report is 'published' for the clients. Peer and self-assessment are used to distribute group marks among the contributors.

Source

Correspondence with Helen Ross, 2006

5. Conceptual ways forward

The conceptual challenge, as Boyer (1990) powerfully argued, lies not in focusing on the differences *between* teaching and research, with the traditional polarity that this implies, but in seeking the potential synergies between these two academic activities. Boyer (1990) and Glassick *et al.* (1996) offer a now widely respected typology of ‘scholarship’, for them a preferred term to the binary classification of ‘teaching’ and ‘research’.

They identify the scholarships of:

- Discovery (advancing knowledge)
- Integration (synthesising knowledge)
- Service or engagement (advancing and applying knowledge)
- Teaching (advancing and applying knowledge about how to teach and promote learning).

We have found the framework developed by Griffiths (2004) effective in supporting staff to examine both their current courses and institutional policies and practices and in adapting innovations from elsewhere.

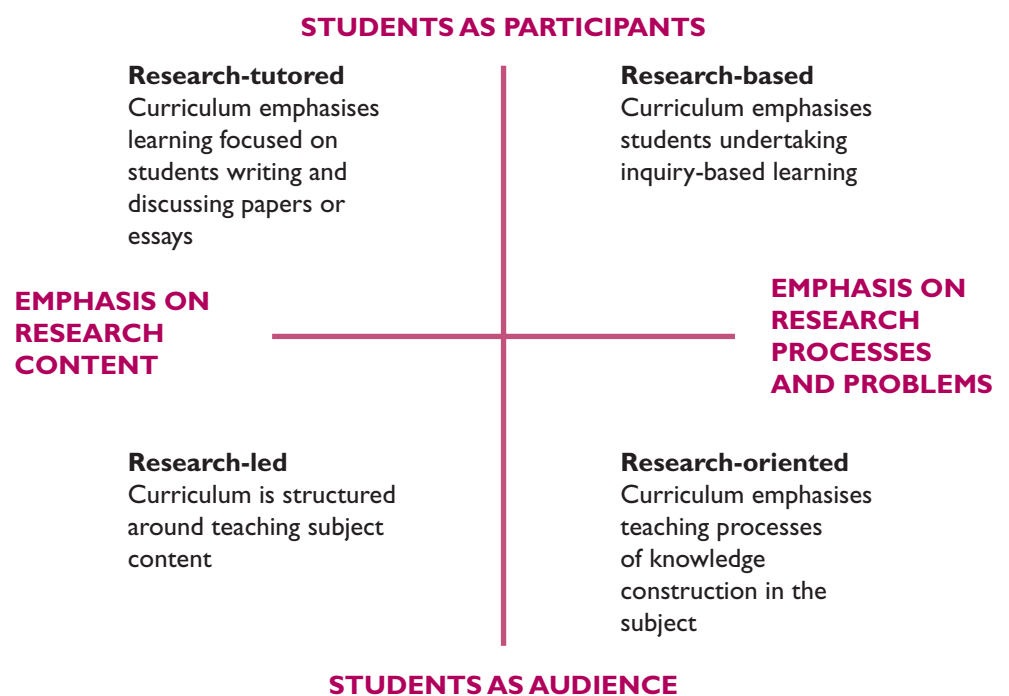
According to Griffiths teaching can be:

- **Research-led:** where students learn about research findings, the curriculum content is dominated by staff or current disciplinary research interests, and some or much of the teaching may emphasise information transmission
- **Research-oriented:** where students learn about research processes, the curriculum emphasises as much the processes by which knowledge is produced as knowledge that has been achieved, and staff try to engender a research ethos through their teaching; or
- **Research-based:** where students learn as researchers, the curriculum is largely designed around inquiry-based activities, and the division of roles between teacher and student is minimised.

Healey (2005a) has expressed these differences diagrammatically using two axes (Fig. 1). One classifies approaches to linking teaching and research according to the extent to which students are treated as the audience or as participants; while the second axis classifies the approach as emphasising research content or research processes and problems. Healey identifies a fourth category ‘**research-tutored**’ where students learn in small group discussions with a teacher about research findings.

These are presented as conceptual lenses or ‘ideal types’. In practice much teaching and course design may combine these different perspectives, as do the disciplinary case studies in this paper. Thus courses based around staff research interests could be taught and assessed in ways that have students learning as researchers. For example in the case study of the UCL Geography Department (Case Studies 4 p26) is clearly structured around staff research expertise/interests, but the ways students inquire into staff research has them learning as researchers, such as analysing semi-structured interviews. In our experience in giving workshops, these lenses provide a way in which staff can both develop an effective understanding of linking teaching and research, and use it to develop further their own practices. In workshops we sometimes use the lens as a means to analyse and promote discussion of the case studies. Colleagues at Leiden University in the Netherlands are exploring how the framework in Fig. 1 might be used as an audit tool to promote awareness and discussion and to help them implement the university policy to develop ‘research intensive education’ (Elsen *et al.*, 2007).

Fig. 1: Curriculum design and the research-teaching nexus



Source: Based on Healey (2005a, 70)

Case studies 5: Archaeology and Earth Sciences

Giving community college students in US their first experience of research in Archaeology

At Cuyahoga Community College, in Cleveland, Mark S. Lewine, a Professor of Anthropology, established a Center for Community Research 12 years ago. The Center has provided more than 2,000 students with their first experience of primary research in the field or laboratory. He encourages graduate students and community college students to work together on archaeological digs. In 2006 he was awarded US Professor of the Year in the community-colleges category.

“We’re digging on abandoned church property, abandoned hospital property, doing land-use history of the inner city. The ‘aha’ response is immediate. They say, Oh my god, this land that we’re living on actually has a rich history. They get very interested because it connects to them. They enjoy the subject while learning the process. Too many of our students, unfortunately, are working two or three jobs, have family responsibilities, and just don’t have the time. Often the participation begins with an hour in the lab or on the site. Then they’ll try to find time on a Saturday. What I tell my students is: If you like it, if you’re learning with it, if you’re reliable and consistent in your work, I will offer you internships. Plus I tell them: When you come from an urban high school that isn’t giving you what your potential really needs, and a graduate school looks at your record and sees primary research, that makes your record stand out.”

Sources

Bollag (2006a)

www.usprofessorsoftheyear.org/poy_display.cfm?contentitemid=6516&pid=pr_resources

Preparing and defending a consultancy report in Environmental Geology at Kingston University, UK

Each student in a final-year module is given an environmental geophysics problem and is asked to role play being a consultant recruited to address this problem for a client, either a local authority or a private land owner. They are required to design a solution, interpret field data and present their findings in a technical report and verbal format. Time is available within the module for consulting the tutor. However, students must have specific questions to ask, indicating that they have performed some preliminary research. “What techniques should I use?” or “How do I start this?” are not valid questions.

Students are required to prepare and deliver a solo presentation to an open public meeting (20 minute session, including 5 minutes for fielding questions) describing their problem outline, methodology, data interpretation and recommendations. The audience includes Councillors (soon up for re-election) and members of the lay public (staff members and other students) who have a vested interest in the environmental issues. A disruptive group of ‘eco-warriors’ (usually noisy postgraduate students) also make an appearance. During their presentations, students must show appropriate local and environmental considerations and effective handling of heckling from concerned local residents and the ‘eco-warrior’ group.

Source

Thomas (2003)

Student groupwork assignments based on analysis of current Geoscience discipline journal articles at the University of Adelaide, Australia

This Do-It-Yourself (DIY) Interactive Multimedia (IMM) project is an exercise in knowledge engineering that has been used in a final year undergraduate structural geology course continually since 1996. The exercise involves groups of 2 or 3 students working collaboratively on development of the multimedia assignment and on the seminar. Students are given an introductory and explanatory session describing the aims, objectives, tools and methods, together with a short hands-on practical class on how to use the available multimedia authoring system and how to access the array of digital resources which might be needed to carry out the assignment.

The exercise clearly provides a close link to the teaching of structural geology in this course and the most current research being carried out in the discipline. Students not only have to read and understand one international journal article, but they must also search through the bibliography of that article for a number of relevant papers. They must interrogate and summarise not only the text, but also become familiar with the figures, diagrams, plates, tables and these days often simulations and animations which may be available on the author's website.

One very important key to the research-teaching link is when the students have to devise a question to the author(s) and to email that question. Receiving a reply (which does not always happen) is most exciting to the students and is a critical point in the realisation that the author is a real person and is carrying out their research usually at a university. Authors generally reply positively to the questions (it at least shows that someone is reading and interested in their own research), and occasionally a general dialogue occurs. The exercise has now been running continuously for eight years and has been carried out by about 400 students. This has left a legacy of about 150 IMM modules providing interesting summaries of much of the last eight years of cutting edge research in structural geology.

Source

James (2003)

6. Research on disciplines

“Differences between disciplines are profound and extensive. Their manifestations range from global characteristics such as disciplinary structural patterns to individual scholars’ research and teaching experiences.”

Braxton and Hargens (1996, 35)

“In constructing links between research and teaching the discipline is an important mediator.”

Healey (2005a, 67)

“Academic research is carried out according to conventions which define what counts as knowledge, what counts as an appropriate method for looking and what counts as evidence. So every research act is located in a tradition of coming to know.”

Brew (2001, 7)

Given that staff identify with their discipline, and given the power of national and international disciplinary communities, there are pragmatic reasons for departmental and institutional strategies which seek to develop good practice through staff commitment to their discipline (Healey and Jenkins, 2003). There is also growing research indicating that there are important disciplinary and interdisciplinary variations in teaching-research relations. These variations are shaped by how disciplinary communities conceive the nature of knowledge, research and teaching; the forms of pedagogy and curricula in different disciplines; the nature of research activity and its organisation; and, for some disciplines, the impact of professional organisations and student interests on the content and practices of the disciplines. This current focus on discipline-based, teaching-research perspectives builds on previous research on teaching-research relations and on academic disciplinary communities (e.g. Becher, 1989; Becher and Trowler, 2001; Braxton and Hargens, 1996; Donald, 2002; Neumann, *et al.*, 2002). Thus one widely recognised categorisation of research, and to an extent of curricula, is the work of Biglan (1973). Neumann *et al.* use this typology of research to explain disciplinary variations in curricula.

- Hard pure knowledge (of which physics and chemistry are exemplars) is typified as having a cumulative, atomistic structure, concerned with universals, simplification and a quantitative emphasis. Knowledge communities tend to be competitive but gregarious: joint or multiple-authorship is commonplace.
- Soft pure knowledge (of which history and anthropology offer cases in point) is in contrast reiterative, holistic, concerned with particulars and having a qualitative bias. There is no sense of superseded knowledge, as in hard pure fields. Scholarly enquiry is typically a solitary pursuit, manifesting only a limited overlap of interest between researchers.
- Hard applied knowledge (typified by engineering) derives its underpinning from hard pure enquiry, is concerned with mastery of the physical environment and geared towards products and techniques.
- Soft applied knowledge (such as education and management studies) is in its turn dependent on soft pure knowledge, being concerned with the enhancement of professional practice and aimed to yield protocols and procedures.

Neumann *et al.* (2002, 406)

However, it should also be emphasised that there is a research and scholarly literature that argues that issues of pedagogy and curricula (Gibbs, 2000), and to an extent of teaching-research relations, are not inherently or mainly discipline-based. Thus Brew's (2003) study of leading researchers at a major Australian research university showed considerable variations in conceptions of teaching, research and teaching-research relations across and within disciplines. For Brew (2003, 12) bringing teaching and research together centrally involves developing across the disciplines "a conception of teaching as being student-focused and concentrating on conceptual change"; and a view of research that is also contested, uncertain and enquiry-based.

With those caveats in mind there is a range of factors that according to research investigations shape the disciplinary nature of teaching-research relations, and which shape, limit or enhance the potential of bringing them, in part, together. Here we will focus on those factors that shape how staff and students experience teaching-research relations as varying in part through disciplinary 'forces':

- Research and teaching cultures
- Research organisation
- Research and scholarship connections
- The research frontiers in relation to the curriculum

- Hierarchical disciplinary knowledge structure
- Disciplinary concepts of knowledge and ontology
- Student perspectives
- The role of professional societies
- The role of practice in shaping knowledge and the curricula in professional disciplines
- The role of 'mode 2 knowledge' in professional disciplines.

Research and teaching cultures

Arguably, disciplinary communities differ in their attitudes to the roles of research in relationship to their teaching. Though these may also vary by institutional type, there is certainly in some disciplinary communities, in particular the natural sciences, a 'cultural' view of the central role of current primary research as shaping the curriculum and the informal messages students pick up as to what 'counts'. Thus a review of teaching-research relations in the biosciences stated: "Research is so inextricably embedded within the teaching in the bio-science disciplines that many of us do not question that there is linkage between teaching and research, we simply know that it is true as part of our discipline culture" (Sears and Wood, 2005). Relatedly one of the central conclusions of a study of final-year undergraduate Biology courses, based in part on student interviews, was: "Throughout the interviews a recurring theme in the students' comments was the importance of engagement with the primary literature and experimental data" (McCune and Hounsell, 2005, 264). Students also had to learn what counts as 'proof' in Biology. As one of them stated: "Nothing is ever clear cut. ... You have to back everything up with several experiments."

Research organisation

Colbeck's (1998) study of academics in Physics and English showed that in Physics, the links lay in the way that undergraduates and postgraduates could be involved in staff research. Much of the research was team-based and this could be adapted to the postgraduate and to an extent the undergraduate curriculum. Relatedly much of the US literature on undergraduate research, where students learn as researchers (Kinkead, 2003), sees the potential for involving undergraduate students as much greater in the sciences than in the humanities disciplines, such as English, where staff research is often individualistic. For in many of the sciences, much research is team and project based; and this creates opportunities for involving undergraduate and postgraduate students in (staff-led) research. This is possible in the Humanities – as is for example demonstrated in the Michigan Arts of Citizenship Program case study (p. 41–42), but this involves

a very conscious going against the disciplinary grain of individualistic research in the humanities.

Research and scholarship connections

In some disciplines, in particular the hard sciences, research and scholarship may be seen as very different in nature and in status (Becher, 1989). By contrast in the humanities, the boundaries between research and scholarship may either be limited or even disputed. Indeed some humanities staff emphasise that much research is re-search, where staff, and potentially students, re-visit and reflect upon previous investigations or materials, but asking different questions or from different perspectives (Pope, 2005). Thus in Colbeck's (1998) study she found that professors of English saw few if any distinctions between research and scholarship. This created the possibilities for close connections between faculty research and the content of the curriculum.

The research frontiers in relation to the curriculum

In some of the sciences, staff research may be so far ahead of the undergraduate curriculum that making strong connections between staff research and student learning is very difficult in the content and perhaps the learning of the curriculum. In some disciplines, such as Mathematics, this is also the case at postgraduate level (Ben David, 1977; Jensen, 1988).

Hierarchical disciplinary knowledge structure

The key role of the discipline in shaping the teaching-research relationship, and the linked issue of how staff perceive both teaching and research, was a strong feature of research by Robertson and Bond (2001, 11) in exploring the perceptions of staff at the University of Canterbury, New Zealand. Thus, for some of their interviewees:

“in disciplines with a very hierarchical [knowledge] structure, the relationship between teaching and research can only be activated effectively at postgraduate level. At undergraduate level students lack the disciplinary framework to engage in inquiry.”

Disciplinary concepts of knowledge and ontology

In a later more intensive study, Robertson and Bond (2005a, 2005b) explored through detailed interviews the metaphors and understanding by which staff explain their conceptions of knowledge, teaching and teaching-research relations. In part, they concur with Brew (2003) and Prosser *et al.* (2004, 2005) that how individuals see knowledge shapes the teaching-research relations they perceive and construct. But Robertson and Bond see these relations as also shaped by disciplinary cultures and conceptions of knowledge. They conclude:

“We suggest that it is our participants’ epistemological and ontological beliefs that shape their understandings of the research, teaching, learning experiential field and hence of the research/teaching relation. In particular, beliefs about the nature of knowledge – what it is, how we create it, how we share it – determine the spatial relationship of research to teaching. ... In high paradigm consensus or ‘hard’ disciplines, ... knowledge is generally understood to be cumulative, hierarchical, and concerned with universals, quantification and discovery. ... The prevailing disciplinary epistemology ... means that research and (undergraduate) teaching occur on different ‘planes’ in a hierarchical relation one to another and that teaching is conceptualised primarily in terms of transmission of research-informed knowledge down to the recipient. By contrast, in low paradigm consensus or ‘soft’ disciplines, scholars use new lenses to explore territory mapped by others and knowledge is concerned with particulars, qualities and understanding. The disciplinary community (teachers and students together) participate in the (de)construction of knowledge. The emphasis is on shared participation and engagement, even at undergraduate level.”

In subsequent research Robertson and Blacker (2006) interviewed students in Physics, Geography and English, and, using a phenomenographic approach, explored how they saw research and teaching and how visible research was for them, where it is located and who engages in it (Table 1). Though an exploratory study it offers us in all disciplines a lens to consider our own particular disciplinary culture and practices, which shape teaching-research relations for students and staff.

Table 1: Students' experiences of learning in a research environment

	Physics	Geography	English
What is research?	Breaking new ground; moving forward; exploration and discovery	Gathering information in the world; answering a question	Looking into; gathering; putting it together; a focus of interest
How visible is it?	Laboratories and machinery (i.e. tools) but often behind closed doors	Most visible in the field	Not tangibly visible but apparent in the dialogue
Where is it located?	Out there; at a higher level	Out there in the field	In the library; in the head
Who does it?	Lecturers	Lecturers and (increasingly over time) students	Lecturers and students

Source: Drawn from Robertson and Blacker (2006). Based on interviews with 36 students (first-years to postgraduates) at Canterbury University, NZ

Student perspectives

Students vary in their attitudes to staff research. A questionnaire-based study at Oxford Brookes (Breen and Lindsay, 1999) analysed student views of staff research in the context of their motivations for study and for attending university. Students who were more intrinsically motivated in their study were more inclined to value a research culture, while those who were more extrinsically motivated regarded research activity as “an intrusive distraction” (p.90).

A study of staff perceptions of teaching-research relations in business

studies in the UK showed that staff who wished in their courses to emphasise the value of research, experienced problems with students and colleagues who wanted a much more applied practical curriculum, and who questioned the value of a research-based approach (Booth and Harrington, 2003). Murtonen's (2005) study of students taking research skills courses reported that about half of the students did not consider that they would need research skills in their working lives.

Now it does not follow that these student perceptions are 'hard wired', and indeed they may well vary by institutional type and discipline. But should we seek, as we do, to bring teaching and research together, then student perceptions need to be recognised and addressed through the curriculum and departmental organisation (see sections 3 and 7).

The role of professional societies

In some of the professional disciplines, professional requirements for accreditation may support or obstruct staff drawing connections between teaching and research. For example, Webster (2002) comments on the tendency in Built Environment professions for 'curriculum creep' to expand the areas professional societies say need to be covered, hence crowding out the time available for students to engage in forms of inquiry-based learning.

The role of practice in shaping knowledge and the curricula in professional disciplines

In Education, Nursing (White and Taylor, 2002) and Health Care (Bignold, 2003; McKee, 2002), as well as in Medicine (Leinster, 2004), Social Work (Taylor and Rafferty, 2003) and other 'professional' disciplines there are major discussions as to the nature of knowledge necessary to be an effective practitioner, and how such knowledge is best learned. For example, is teaching effectively an apprenticeship and is such knowledge effectively 'craft or practice-based', or does effective practice need to be clearly based on research? What type of research is most likely to have profound implications for practice, and how is that research best connected to practice? Put crudely, there are some who value small-scale practitioner research and others who value large-scale 'scientific' studies (Hammersley, 1997; Hargreaves, 1997; Slavin, 2002). Others value the development of professional knowledge of practice, forged through personal and group reflections. These issues are part of the arguments as to what is the professional knowledge and training one needs to be an effective teacher in higher education. Not all

academics see the value of learning how to be researchers in pedagogy and curricula. They too, like some undergraduates in some disciplines, can regard an emphasis on research as an intrusive distraction.

The role of 'mode 2 knowledge' in professional disciplines

Gibbons *et al.* (1994) argue that much knowledge and research is developed and used in application, and for the increased importance of what they term as 'mode 2 knowledge':

"In a knowledge society, research is context specific and multidisciplinary rather than pure and discipline based; it has social relevance rather than being hypothesis led; it uses fuzzy, rather than empirically based data; it is problem solving rather than deductive. In what might be termed the commodification of knowledge, how knowledge is managed, synthesised and adapted become as important as knowledge itself."

Jenkins and Zetter (2003, 11)

Thus research on employer and academic staff views for a curriculum development project in Built Environment disciplines concluded:

"In a knowledge-based society, research and consultancy skills are key attributes in vocational and professional fields. ... Graduate professionals increasingly need core skills in managing, synthesising and deploying subject-based knowledge to derive solutions to real-world problems; integrating teaching with research helps to embed these core skills. Graduates with the skills and ability to conduct research in operational settings are more likely to have the capacity to formulate problem-solving solutions based on an awareness of where to find or collect evidence, how to critically test the reliability of that evidence and how to present the conclusions and findings."

Link (2003)

Thus in these disciplines the curricula may need to draw clearer connections between staff consultancy-based research and student learning. They may have to give greater emphasis to research dissemination and application than in the humanities. This may also be important in demonstrating to students the 'vocational' relevance of such a 'research-based' curriculum.

Case studies 6: Arts and History

Arts of Citizenship Program at the University of Michigan (UM), US

In this program students combine learning and research with practical projects that enhance community life. Each year Arts of Citizenship directly sponsors 8-12 projects, and awards grants for another 8-12 projects. Projects in the arts, the humanities and design are wide-ranging and include:

- *Students on Site (SOS)* is a major collaboration with the Ann Arbor and Ypsilanti Public Schools. SOS staffers and UM students teach weekly class lessons over a three- to five-week period. Through field trips, hands-on classroom work, and an online archive, third- and fourth-graders learn to investigate the history of their communities (www.artsofcitizenship.umich.edu/sos).
- In the *Underground Railroad project*, Arts of Citizenship has collaborated with the African American Cultural and Historical Museum of Washtenaw County to research 19th-century anti-slavery activism and African American community life in the area. The youth-oriented historical exhibit, *Midnight Journey*, has been displayed to over 20,000 people at schools, libraries, and museums in Michigan and Ontario.
- The *Broadway Park Design project* (a collaboration with the Ann Arbor Department of Parks and Recreation) proposes designs for public art, public history, and cultural amenities in the historic park on the Huron riverfront (www.artsofcitizenship.umich.edu/broadway).
- In partnership with Detroit's Mosaic Youth Theatre, Arts of Citizenship teams used oral history and archival research to help create *2001 Hastings Street*, a nationally touring musical drama about coming of age in 1940s Detroit. The production and an accompanying exhibit were part of the celebration of Detroit's 300th anniversary in 2001.
- In partnership with UM's School of Art and Design, UM students in Arts of Citizenship's Detroit Connections serve as mentors for after school art workshops in Detroit elementary schools. By using art to reinforce maths and science concepts, this project aims to improve overall educational outcomes.

- Arts of Citizenship has collaborated with Michigan Radio on a series of student-created radio documentaries, including award-winning pieces on the 1967 Detroit riots and on Arab-American youth. The latter has a companion website at **www.artsofcitizenship.umich.edu/listen**. Plans are underway for additional documentaries on citizenship, youth and diversity.

Source

www.artsofcitizenship.umich.edu/about/program.html

David Scobey (2006), the key originator of this programme, has now led its adaptation to a whole institution initiative, and its adaption to other disciplines – The Harvard Center for Community Partnerships – at Bates College Maine.

Sources

www.artsofcitizenship.umich.edu/about/program.html
www.bates.edu/harward-center.xml

History students contribute research findings to a website at Victoria University, Canada

In 2002, John Lutz implemented History 481: Micro History and the Internet, a learner-centred and research-oriented course in which the main activity was primary archival research on various aspects of life in Victoria, British Columbia from 1843 to 1900. Students worked in small groups to conduct the research and eventually to publish their findings on a website called “*Victoria’s Victoria*”.

Sources

Anon (2003)
web.uvic.ca/vv/

Students taking a historical methodology course engage in original oral history research at Indiana State University, US

The 30 or so students taking the introductory historical methodology course are engaged in original research. Anne L. Foster, an assistant Professor of History, who teaches the course, was eager to find topics in which her students could “become experts” and make a real contribution to local knowledge. In 2004, the class produced a history of the black community of the Wabash Valley, including Lost Creek, a neighbourhood of Terre Haute, Indiana, the city that is home to the university. Lost Creek was established in the 1820s by freed and runaway slaves with the help of local Quakers. The course stresses oral histories, and that year’s project included a video interview with a 104-year-old woman whose grandparents were slaves. Another group of students, in the fall of 2005, interviewed three elderly local men with connections to the Holocaust: a concentration-camp survivor from Latvia, a Jew whose family managed to flee Germany, and a former US soldier who helped liberate a concentration camp in Germany. One student did an independent project that turned the class material into a permanent exhibit at Terre Haute’s Holocaust museum.

Source

Bollag (2006b)

7. Ways forward through discipline-based course design and the student experience of their discipline

“The issue is whether lecturers adopt teaching approaches that are likely to foster student experiences that mirror the lecturers’ experiences as researchers.”
(Barnett, 2000, 163)

“In these active learning situations, history teachers devote less class time to transmitting a synthesis of the products of historical scholarship and more to modeling the process by which historians come to make research-based knowledge claims and to critically appraise the contributions of other historians to a growing body of historical knowledge. Instead of lecturing extensively, these teachers work side by side with their students in a collaborative investigation of historical problems, much as masters and apprentices in a craft.”
(Roth, 2005, 3)

In a seminal article reviewing the then research literature on teaching-research relations, Brew and Boud (1995, 261) argued that “if there is a link between the two, it operates through that which teaching and research have in common; both are concerned with the act of learning”. They concluded that one way to achieve this link is to “exploit further the link between teaching and research in the design of courses” (p.272). As we showed in section 3, research in a range of departmental and institutional contexts provides evidence that many students perceive clear potential benefits from staff research. Paradoxically much of this research shifts the implications for policy and practice away from staff as researchers towards *students as learners*. Thus Elton (2001, 43) argues that “a positive research and teaching link primarily depends on the nature of the students’ learning experiences, resulting from appropriate teaching and learning processes”. Others would emphasise that the meta-task in course design is to structure the experience of students and staff, so that students are not “at arm’s length” (Brew, 2006, 52) from research, but are purposefully brought into the disciplinary and research communities of practice in which staff learn (Northedge and McArthur, in press). The aim, as Roth says in the

quotation above, is to create courses where “teachers work side by side with their students in a collaborative investigation ... much as masters and apprentices in a craft.”

Such a collaborative view of staff and students as co-researchers goes back to and reaffirms the views of von Humboldt in the context of the founding of the University of Berlin in 1810. But now staff work in mass higher education systems, where research is highly concentrated; and where the extent to which staff are supported to be both teachers and researchers will vary significantly between ‘research-intensive’ and ‘less research-intensive’ departments and institutions. We suggest the way forward is to hold on to von Humboldt’s view that “universities should treat learning as not yet wholly solved problems and hence always in research mode” (von Humboldt, 1970, quoted by Elton 2005, 110); but to focus on how the curriculum, department and university resources and the wider student experience support student intellectual development through and about research as learning and in ways that reflect the epistemology of the discipline(s) they are studying (Jenkins and Healey, in press).

The following list of strategies suggests how individuals and course teams can seek to design courses in the light of these perspectives. The disciplinary case studies interspersed through this paper provide particular approaches to these general principles.

Strategies for linking teaching and research within courses and programmes

Strategy 1: Develop students’ understanding of the role of research in their discipline

- Develop the curriculum to bring out current or previous research developments in the discipline
- Develop students’ awareness of the nature of research and knowledge creation in their discipline
- Develop students’ awareness of learning from staff involvement in discipline research
- Develop students’ understanding of how research is organised and funded in the discipline, institution and profession.

Strategy 2: Develop students' abilities to carry out research

- Students learn in ways that mirror research processes
- Assess students in ways that mirror research processes (e.g. requiring students to have their work assessed by peers according to the house-style of a journal before submitting it to you)
- Provide 'training' in relevant research skills and knowledge
- Ensure students experience courses that require them to do research projects; and that there is a progressive move to projects of greater scale, complexity and uncertainty (Strategy 3)
- Develop student involvement in research
- Develop abilities of students to communicate the results of their research in ways that are appropriate to the disciplinary community in which they are now participating.

Strategy 3: Progressively develop students' understanding

- Ensure that introductory courses induct students into the role of research in their discipline and present knowledge as created, uncertain and contested
- Ensure that advanced courses develop students' understanding of research, and progressively develop their capacities to do research
- Ensure that graduating year (capstone courses) require students to carry out a major research study and help them to integrate their understanding of the role of research in their discipline.

Strategy 4: Manage students' experience of research

- Limit the negative consequences for students of staff involvement in research; most important here is managing the student experience of the days (and sabbatical terms) when staff are 'away' doing research
- Evaluate students' experience of research and feed that back into the curriculum
- Support students in making clear to them the employability elements of research; this is particularly important for those students whose focus is on using a degree to get employment, and who may not otherwise appreciate the value of a research-based approach.

Based on: Jenkins et al. (2003, 63-4) and Healey and Jenkins (2006)

Case Studies 7: English

The MA in Shakespeare Studies: Text and Playhouse run jointly by the King's College, University of London and the Globe Theatre, UK

The aim of this initiative is to indicate the integral nature of the links between research and teaching through this very practical example. The MA concentrates on Shakespeare's dramatic texts, and the manner of their performance in the Globe Theatre. It is heavily informed by two forms of scholarly research, textual studies and performance practice. The students are encouraged to conduct their own primary research using the resources of the Globe. Similarly the lecturers at King's have taken the opportunity to test their own textual theories on the Globe stage.

Source

www.english.heacademy.ac.uk/explore/projects/archive/linking/linking1.php

Introducing enquiry-based teaching methods in Literary Studies at Manchester University, UK

The traditional form of Literary Studies teaching in HE is tutor-centred. In this case study a group of second-year students studying 18th Century Literature are introduced to enquiry-based learning in the first week of the first semester. The course consists of a weekly lecture and a weekly seminar. The latter consists of 15 students divided into three groups. During the seminars the tutor acts as a task-giver and thereafter as both an information resource, responding to student requests, and as a facilitator moving from sub-group to sub-group helping discussion to develop. For example, in week 1 the students were given a poem by Samuel Johnson, 'On the death of Dr Robert Levet'. The poem was issued to students without annotations or supporting detailed biographical information. Each sub-group was asked to address two questions: "What kind of language does the poem use?" and "What belief system, if any, does the poem imply?". Most groups responded to this task actively by exploring and considering the possibilities from a range of perspectives, establishing and pooling any existing knowledge and assessing its applicability to the task in hand. By emphasising the need to seek other sources to contextualise their answers the facilitator began to establish the research element crucial to moving from 'problem solving' to something more active.

Source

Hutchings and O'Rourke (2003)

Involving first-year students in the international research community, University of Gloucestershire, UK

Arran Stibbe allows his students to take on the identity of a researcher right from the start of their time at university. He encourages his students to think of themselves as contributors to the research community, actively exploring the texts which surround them and sharing insights with the community. In the 'EZ102 Language & Ecology' module the students have an opportunity to share their insights with the wider research community. The research community in turn has something to gain from student contributions because students can critically analyse aspects of their language and culture that others have yet to examine. The students are encouraged to take part in the international research community through working with the Language & Ecology Research Forum – the main international forum for research in ecolinguistics. The Forum links together a network of scholars, has an online journal, a range of resources, and a dedicated section for the module. The approach works best when students are becoming critically aware of texts that they are familiar with, rather than struggling to understand new genres understood better by the lecturer than students.

Sources

www.ecoling.net/courses.html

www.glos.ac.uk/ceal/resources/casestudiesactivelearning/index.cfm

8. Ways forward through adapting disciplinary case studies

As stated in the introduction, this publication in part grows out of a project with the Higher Education Academy's Subject Centres. This both builds on the importance of the research evidence on disciplinary variations in teaching-research relations; and pragmatically recognises that staff may more readily adapt an approach to course design from staff in their own disciplines. This project is gathering a range of discipline case studies in linking teaching and research, some of which are summarised in this paper. In many cases the ideas may be adapted for application in different disciplinary contexts.

We have chosen a range of disciplines in the sets of case studies, presented at the end of each of the first eight sections of the paper, to illustrate the distinctions Biglan (1973) makes between hard and soft, and pure and applied disciplinary types, and to represent the varied range of disciplines in the contemporary university. We have used these case studies in a wide range of workshops and find that staff can not only readily see the potential for their own practice in case studies from related disciplinary areas, but can also see the potential of transferring ideas and practices from contrasting disciplines. We are careful to describe them as examples of 'interesting practices' and eschew words such as 'excellence', and caution that many have not been researched as to their impact.

In part the case studies' usefulness lies in enabling staff to reflect on their own 'interesting practices' and suggesting that they might make the links they are already making between teaching and research more explicit both to themselves and their students. We hope that staff may also find it useful to discuss the case studies in disciplinary course teams, in cross-disciplinary groups and in departments.

Case Studies 8: Education and Philosophy

Students in pre-service teacher education for lecturers at University of Otago, New Zealand, undertake ‘authentic enquiry’ using portfolios

Students used portfolios to provide space for ‘authentic enquiry’ that focused on student self-determination and the process, rather than the outcomes, of learning. The rationale behind the private portfolio involved reflections on practice as the curriculum developed during the research cycle. Challenges for student teachers were associated with the novelty of the experience, the time taken for reflection to develop and the individualistic nature of the task. This presented challenges for the supervisor centred on new methods of supervision and trying to live up to the explicit values that informed the curriculum.

Source

Harland (2005)

Learning to think like a philosopher: developing students’ research skills in a history of philosophy course, University of Leeds, UK

George MacDonald Ross has developed an active learning approach in a final-year Philosophy module, which engages his students directly with Kant’s *Critique of Pure Reason* and helps them develop key Philosophy research skills such as textual interpretation.

He teaches the course by running interactive seminars at which students are forbidden to take notes, except for a student secretary, who posts minutes on a website within 24 hours. This has the advantage that students focus more on discussion during seminars. Most of the class time is spent discussing the interpretation of key passages projected on a screen. However, most of the students’ learning time is taken up by reading the text out of class in conjunction with George’s running commentary; preparing short answers to interpretative questions, some of which will form the basis of the following seminar; and writing essays. Researching and writing essays is a small-scale version of what historians of philosophy do as researchers, and it is central to the module.

Source

www.philosophy.leeds.ac.uk/gmr/public/t&rnexuscasestudykant.doc

9. Policy and practice suggestions for departments

“Research, teaching and study can exist in not so splendid isolation, with full time research staff in one corner, some teaching staff off in one corner and only slightly guided, if at all, by the results of recent research, and students studying in another corner, with codified text in hand but out of the sight of research activities and peering at distant teachers as if through the wrong end of a telescope.”
Clark (1993, 301)

“Simply put, research activity and productivity, and the quality of teaching and learning, are influenced for better or worse by the way a department is managed or led.”
Ramsden (1998, xii)

Our organisational focus in this publication is largely on the department for that is where teaching and research are most clearly organised and immediately resourced. Clark (1993, 1997), in his discussion of the integration of research activities with teaching and learning, sees the institution as *formative*, that is setting a general context and strategies in which teaching-research relations are developed, but the key *enactment* is at department level. Also the department level is where disciplinary communities reside and are organised. As disciplines shape both the nature of pedagogy and of research (see section 7), discussions of departmental policy and practices need to recognise and value the practices and cultures of the disciplines. This is not to neglect intervention at other levels, including institutional and national levels. Other publications consider strategies for creating the teaching-research nexus from the level of the individual academic and course team, through the roles of departments, institutions and national systems (Jenkins *et al.*, 2003; Healey and Jenkins, 2007), and how institutional teaching and research strategies can enhance the potential links (Jenkins and Healey, 2005).

Clearly departments vary in size, resources, culture, and we offer no simple ‘how to do it manual’ as the issues are complex and there is no one ‘solution’. In particular they will vary between ‘research-intensive’ and ‘teaching-focused departments’ (Jenkins and Healey, 2007). What we do offer is a range of strategies that you can adapt to your context. The suggested strategies stem from our review of the research evidence, in particular at department level

(section 4); and from considering the available evidence from practice and policy. We do caution that despite the likely central role of the department, there is only a limited number of research studies at this level and most of the interventions have been little researched. However, we also recognise that what is presented here may only be making more explicit what is already effective practice in many departments. We do encourage you to research the impact of the policies you develop and make these strategies public.

Our suggestions are here organised through six key strategies (for a fuller review see Jenkins *et al.*, 2003). In addition, many of the strategies we have suggested for institutional policies could be adapted to department level (Jenkins and Healey, 2005).

As with other sections there follows at the end a set of case studies of what we see as 'interesting' examples of departmental strategies that are likely to enhance teaching-research relations. Where appropriate these are briefly referred to in the analysis below.

Strategy 1: Develop departmental and disciplinary understanding

Central to embedding the nexus is the need to support staff in the department both to develop an understanding of the complexities of the nexus, and in 'owning' a shared conception or conceptions of the nexus. For, as we have indicated above, these issues are complex, and often we approach them initially with strong preconceptions. Generic understanding of the issues needs to be complemented by an understanding of teaching-research relations in those disciplines in the department, and then progressed through discussions and decisions as to what is appropriate to particular departments and institutions. A useful model is the study of how three contrasting Australian institutions and different departments within them have developed what they see as conceptions of the nexus appropriate to their particular and contrasting institutions (Zubrick *et al.*, 2001).

Such discussions can be prompted by departmental seminars, away-days and publications. Thus one of the case studies below has Hospitality and Tourism staff at Cardiff holding a research focus group with an external researcher, in which they progressed their discipline-based understanding of teaching-research relations. In section 7 we made more explicit the rationale for the use of discipline case studies in this paper. Departments could use these case studies as prompts for discussion of their own practice, and where departments are composed of staff from linked disciplines, cross-department meetings may enable staff to adapt case studies from cognate disciplines.

Thought then needs to be given to how to lead these discussions into policy and actions. While perhaps the key actions are the responsibility of individuals and course teams, there are also other strategies departments can develop.

Strategy 2: Review current practice and culture

Departments have established cultures, practices and policies both formal and informal. In developing and strengthening the nexus, one place to start is to review what is already in place or perceived to be in place. Such reviews could include:

- Evaluating the students' experience and perceptions of teaching-research relations for the courses taught in their department and sharing these findings across the department. One of the authors, Healey, has developed a questionnaire for examining the student perception of research which has been used in several different HEIs and countries (Healey, 2005b; Healey *et al.*, in submission; Wuetherick *et al.*, in submission). A related approach is to hold focus groups of students organised in disciplinary teams (Jenkins *et al.*, 1998; Lindsay *et al.*, 2002). The case study below of Sociology at Warwick shows selected undergraduates researching their and their peers' learning and presenting the results of that research to the department.
- Investigating how academic and support staff perceive the teaching-research relationships in the department, and how they consider they could be strengthened (Durning and Jenkins, 2005).
- Auditing or reviewing current courses as to how they currently develop the link; identifying areas where there is good practice to guide others; and identifying what problems or issues need to be addressed. Such reviews might of course concentrate on particular types of courses, for example year 1 courses or those concerned with research training. From such reviews one can then move to developing department policies and projects to strengthen the nexus. This for example is the approach used in the case study below of auditing student research skills at Adelaide and Reading.
- Auditing how departmental research projects or research expertise are integrated into current undergraduate and postgraduate courses, possibly using Fig. 1 (Section 5) as a framework. One central way to achieve that is to adapt to your context the US model of 'undergraduate research' (Kinkead 2003). That is the approach of the York Psychology and Biology undergraduate journals in the case studies below.

Strategy 3: Develop a set of related curricula interventions

Departments and, in particular, their leaders can do much to strengthen the link through structured interventions to support individual staff and course teams in designing and delivering the curriculum. Section 7 demonstrated what individual staff and course teams can do with respect to the curriculum. For us the curriculum is the key potential area of intervention; for here is where staff experience and expertise in research can most effectively support student learning, or alternatively remain separate from the student experience. Focussing on the curriculum and on department interventions can recognise what Boyer (1990) called the “kaleidoscope of talents” of faculty and to which we add the potentially key roles of support staff, students and departmental resources, such as laboratories and research collections. Certainly focussing on the curriculum and departmental support moves discussion and intervention in teaching-research relations away from an almost exclusive focus on the research expertise of individual academics, to how a department organises its varied resources, particularly staff, to support student learning of and through research.

The case study of chemistry at Michigan demonstrates how one department has organised selected upper level undergraduates to support student inquiry in introductory courses. We consider aspects of such an organisational perspective in the next sections on staffing policies and teaching and research structures. In terms of curricula interventions, departments can ensure that individual courses are part of a set of structured interventions that progressively develop students’ abilities and knowledge of research. The case studies of chemistry at Utrecht and geography and earth sciences at McMaster demonstrate how these departments have developed the curriculum from year 1 to postgraduate levels to progressively develop students as researchers.

Here recent US experience is particularly relevant. The Boyer Commission on Educating Undergraduates in the Research University (1998, 15-22, 27-28) called for ten key changes in undergraduate education, four of which directly call for organisational changes at department (and institutional) level to strengthen the teaching-research nexus:

1. Make Research-Based Learning the Standard – Learning is based on discovery guided by mentoring. Inherent in inquiry-based learning is an element of reciprocity: faculty can learn from students as students are learning from faculty...

2. Construct an Inquiry-Based Freshman Year – The first year of a university experience needs to provide new stimulation for intellectual growth and firm grounding in inquiry-based learning and communication of information and ideas...

3. Build on the Freshman Foundation – The freshman experience must be consolidated by extending its principles into the following years. Inquiry-based learning, collaborative experience, writing and speaking expectations need to characterize the whole of a research university education...

7. Culminate with a Capstone Experience – The final semester should focus on a major project and utilize to the full the research and communication skills learned in the previous years..."

While institutions can and should make such interventions to support individual staff, departments are in many ways in stronger positions to ensure the effectiveness of such interventions. For it is at department level that staff will find colleagues in the same or related disciplines and colleagues' ideas may more readily 'transfer' to their context. But perhaps most significantly department leaders can ensure through staff appraisal, workload planning, applications for research support or leave, research resources and equipment are targeted to support these interventions.

Strategy 4: Develop staffing policies

The skills, knowledge and roles of staff are central to supporting (or obstructing) the link. In most institutions it is at department level that staff are hired and their work is organised. This is one central reason why Clark (1993) sees the academic department as the level where the nexus is 'enacted' (or not). Specific strategies that departments can develop include:

- Deciding as a department whether you expect all or most staff to be centrally involved in both teaching and research. In part this may depend on whether you believe (as many still do) that the best researchers are the best teachers – or vice versa. In our view a tight coupling between teaching and research quality is not supported either by the anecdotal evidence or the research evidence (see Sections 3 and 4). Nor does a tight coupling of teaching and research at the level of the individual academic recognise that different teaching skills are needed to teach large introductory courses or supervise dissertations. We suspect that whatever one's beliefs as to what is desirable such a tight coupling will only be possible in selected 'research-rich' departments.
- In 'research-rich' departments it may be both possible and desirable for all teaching to be done by staff who are also centrally involved in discipline-based research. But in most departments, the pragmatic 'solution' is to conceive teaching-research links as primarily occurring in the student experience of their course; and then ensure this is supported by overall staffing policies in which individual staff take on more specialist roles, designed to support the nexus (Jenkins and Healey, in press).
- Convening staff teams to maximise the synergies between research and teaching. Often groups are put together on the basis of delivering specific parts of the programme curriculum – based perhaps on subjects, courses, projects and so on; but some, if not all, members of these teams conduct research in related areas. Teams might deploy their staff in such a way that the team's research work is delivered in taught programmes, but not necessarily by those whose exclusive or central role is research.
- Recognising and supporting staff who wish to change such roles through time, as long as such changed roles support overall department objectives.
- Making the nexus a central consideration in hiring new staff. This could involve ensuring that such staff have strong commitments and skills for both teaching and research or, in the case of more specialist roles, using selection procedures that in part focus on how candidates propose to support the link in that role.

- Making the nexus central or intrinsic to role description and, where relevant, workload planning. Here specific policies will vary greatly between strong research-based departments, where it may well be required of all staff that they be 'active' in both research and teaching; and departments outside the research élite. It may well be that in some departments, role descriptions and workload planning will mean that some staff have much of their time allocated to teaching and others to research. If so, and if the nexus is really valued, then such policies and practices need in part to focus on ensuring that such specialist roles and work allocations support the link. If the department focuses the link on the student experience of the course then specialist roles can be defined in terms of how they support the nexus. For example, certain staff may have much of their time allocated to research. But such research will be clearly shaped, in part, to support the curriculum; such staff may take on key roles in overall curriculum design; and their research materials may be central to selected courses. The role of research-teaching teams discussed above is relevant here.
- Considering how postgraduate students and their research interests and expertise can be used to help undergraduate students to see connections between teaching and research; and how selected undergraduates can see themselves as future postgraduates/ researchers.
- Considering also how postgraduate students can be encouraged to see that any future career in academia offers opportunities to link their roles as teachers and researchers.
- Ensuring a periodic focus on the role of departmental support staff and those in central departments, such as learning support, in helping students and staff to implement a research-based curriculum.
- Ensuring that *teaching* is valued by emphasising a conception of teaching that is 'research-based'. Paradoxically this may be particularly appropriate in research-based departments.
- Making the nexus central to role descriptions for leadership positions, including professorships.
- Supporting all staff to be scholars in their discipline and in the teaching of their discipline (Healey, 2000). This approach may be particularly appropriate outside the research élite (e.g. Brown, 2003). Here we need to share and develop effective procedures for staff to provide evidence, for example through appraisal and promotion, that they are involved in current discussions and controversies in research and teaching of their discipline.

Strategy 5: Integrate policies and structures for teaching and research

A study of UK departments of History, Chemistry, Engineering and Business Studies concluded that:

“If teaching and research are as inseparable as many participants claimed, the lack of explicit strategies to promote this synergy is interesting. The discussions with heads of department and other managers of staff time indicated that on a managerial level, it is more convenient for teaching and research to be treated as separate activities. On an intellectual level, however, academic managers would rather perceive the two to be synergistic. What seems to be missing is an intellectual perception of teaching and research as integrated. For example, we visited many departments where Research Committees and Teaching Committees had been established, but these two bodies worked independently of each other.”
(Coate et al., 2001, 162) [our emphasis]

In developing policies and structures to support the nexus specific strategies to adapt include:

- Review/revise the current *teaching* strategy in terms of the extent to which it explicitly relates to and supports the research strategy.
- Review/revise the current *research* strategy in terms of the extent to which it explicitly relates to and supports the *teaching* strategy.
- Consider the elements of these strategies which could be made one common strategy.
- Review policies for sabbaticals and research leave for the extent to which they support the nexus.
- Examine the extent to which specialist research centres or units relate to and support the postgraduate and the undergraduate curriculum and whether and how such links could be strengthened.
- Consider, particularly but not exclusively in the sciences, how laboratories, equipment, space allocation, library and technical support promote the nexus.
- Review how the departmental human resources strategy, and in particular the reward structure, supports effective teaching-research

It is perhaps significant that as with our paper on *Institutional strategies to link teaching and research* (Jenkins and Healey, 2005), we have found it

hard to get effective case studies of departmental *research* strategies that demonstrate structured interventions to bring teaching and research together. Forging the links appears to be largely focused on teaching strategies. However, the case study of History at the University of Virginia does demonstrate a set of structured interventions from the research side of the department to support undergraduate students learning through research.

Strategy 6: Progressing the link

Drawing on research and scholarly literature and our experience in working in a large range of institutions, we believe that addressing the following questions may help a department seeking to progress the link:

Curriculum and research-based learning

- What is your departmental (and disciplinary) understanding or conception of research-‘led’, ‘-based’ or ‘-informed’ learning?
- What forms of pedagogy and their assessment do you consider appropriate to support these conceptions?
- Can you clearly identify where research-based learning is integrated in the programme?
- Where is current research in your field presented in the programme? How does research relate to programme design and programme outcomes; curriculum content and delivery in the modules; and assessment methods?
- Where are research methods/skills/ethics taught and practised? Is this progressive? Is a variety of appropriate skills/methods delivered?
- Are the research knowledge/skills the student will have acquired made clear in the module learning outcomes?
- Can/do students participate in departmental research projects as e.g. research assistants?
- Where is the scope for students to conduct independent research in their programmes and in what ways do the programmes allow progression?
- How are research skills and the links between teaching and research embedded in monitoring and review of modules and programmes?
- How are students supported in making explicit how this research training/knowledge increases their employability?
- How are undergraduate students made aware of postgraduate research opportunities?

Management, organisational structure and staffing at departmental level

- How does the department's learning and teaching strategy articulate research and teaching links?
- How does the department's research strategy articulate teaching and research links?
- How are the teaching and research activities organised, motivated and resourced? Are they managed for mutual engagement? Are all researchers involved in teaching? How are 'non-research active' teaching staff mentored and encouraged to develop a research/scholarly profile, and valued for their particular contributions to the nexus?
- How do research teams and course teaching teams link with each other? How are these links facilitated?
- Are research clusters also teaching teams?
- How are teaching staff 'managed' in developing a research and/or scholarly capacity?
- How are new staff and incoming students acculturated into the department values and practices?
- How is the staff and student experience of the nexus monitored and the results fed back into policies and practices?

Inclusive culture

Developing the links between teaching and research requires cultural change too:

- What are the mechanisms for disseminating and communicating research outputs and teaching practice development in the department?
- How is the research culture and activity given visibility to students? How do students come into contact with departmental research?
- What are the strategies to disseminate research-based teaching experience from the module level?
- What profile is given to (discipline-based) pedagogic research? How is this research disseminated and applied in programmes?

And finally

- Allow for diversity.
- Remember it is the individual's scholarly engagement with her/his subject and how this is brought to the teaching and research setting that mediates the relationship between teaching and research. You cannot tightly programme the nexus.
- Recognise that the relationships between teaching and research are reciprocal.

Sources

Based on Zetter (2002a, 2002b) and Oxford Brookes University (2002)

Case Studies 9: Department Strategies

Department and institutional research resources support undergraduate research in History at the University of Virginia, US

This case study demonstrates how the research resources of a research-intensive university department can support undergraduate research in a large course. The course leader, Edward Ayers, is Dean of Arts & Sciences at the University of Virginia and a leading researcher on the American South. The School hosts the Virginia Center for Digital History. The resources of this Center, including its research archives, research librarians, and a postgraduate research and teaching team support a range of undergraduate research programmes, including research in an undergraduate course with an enrolment of c.180 students for which Ayers is the course leader. The course involves undergraduate student teams using university archives to research a specific time or place and then publish their research on a website for use by current and future students and other researchers nationally.

Sources

www.vcdh.virginia.edu/shd/howtobegin.html

www.sunysb.edu/reinventioncenter/conference2006/edayers/summary.htm

www.virginia.edu/cue/urn/

artsandsciences.virginia.edu/edayers/#employment

Department focus group at University of Cardiff and ‘swap shop’ at the University of Gloucestershire, UK

Departments can organise staff development events that encourage staff to deepen their understanding of teaching-research relations, identify areas of ‘interesting practice’ that might be adapted by colleagues in cognate disciplines, and identify areas for department or course team intervention. Thus the Welsh School of Hospitality, Leisure and Tourism Management at Cardiff ran a large-scale focus group with all members of the department and an outside facilitator. This event introduced staff to the complexities of teaching-research relations. Then staff identified areas of departmental policy and practice that blocked effective teaching-research links, areas that supported them, and finally identified areas for intervention.

An effective way of sharing the different ways in which staff link teaching and research in a department is to organise a ‘swap shop’. A shared understanding of what teaching-research links mean to staff in the department is an added bonus from this exercise. The University of Gloucestershire has used this method at department, faculty, and institutional levels to share many teaching and learning practices. For example, the Environment area used it when bidding for a Centre for Excellence in Teaching and Learning to identify the range of ways in which staff engaged in active learning, with an emphasis on engaging students in inquiry-based learning. Colleagues were asked to come to a half-day workshop with an interesting idea they wished to share. In groups of 3s and 4s they had five minutes to explain the idea and 5 mins to answer questions. There were two rounds of this, topped and tailed by an introduction to the literature on the topic and a discussion of what delegates had got out of the day. Participants were positive about the usefulness of the event as an opportunity to share ideas and receive constructive criticism. The 27 case studies were then edited into a book and published on the web for a wider audience (Healey and Roberts, 2004). For many staff it was the first time they had published something about teaching and learning.

Sources

Botterill (2003)

Healey and Roberts (2004)

Cross-department undergraduate research programme in the College of Engineering, Maryland, US

Gemstone is a highly innovative programme for selected 'honors' students in Engineering and other disciplines. Student teams, formed in the freshman year, undertake three-year, student-initiated research projects in which they analyse and propose solutions to societal problems, which generally involve a significant technology focus. Team members work as a co-ordinated group, investigating their project from the perspective of individual majors, under the guidance of a faculty mentor. In their first two years students are encouraged to live on a residence hall floor reserved for Gemstone participants. The research projects (e.g. a comparative study of erosion control measures in the Chesapeake Bay area and homeowner response to such interventions) are developed in consultation with outside experts and agencies. In their final year student teams present their research to experts in the field or outside agencies and write a team thesis. The learning process mirrors the team-based, consultancy-style research that students are likely to carry out after graduating.

Sources

[www.gemstone.umd.edu/
ws.cc.stonybrook.edu/Reinventioncenter/spotlight.html](http://www.gemstone.umd.edu/ws.cc.stonybrook.edu/Reinventioncenter/spotlight.html)

Using undergraduates to evaluate student experiences of teaching and learning in the Sociology Department, University of Warwick, UK

In the Department of Sociology at Warwick selected second- and third-year Sociology students led an evaluation of their peers' experiences of teaching and learning. They used a variety of social research methods – including focus groups, interviews and participant observation – to explore the learning experiences of their peers. The results were widely discussed within the Department, and at a Department away-day, and have led to students being more involved in departmental academic debates. Clearly it is more transferable to those departments and disciplines, such as Sociology, Education, Psychology and Management, where students develop research skills which are central to those used in those subjects.

Source

Hughes (2005)

Department undergraduate student research journals in Biology at Universities of Chester, Leeds and Nottingham, UK

The Biology departments at the Universities of Chester, Leeds and Nottingham have developed journals to publish research by undergraduates. They are explicitly based on the US practice of undergraduate research journals (Kinkead, 2003). *Origin* (www.chester.ac.uk/origin/) at Chester is paper-based and generally involves selected students rewriting their dissertations or research projects for external publication. *Biolog-E* at Leeds (www.biolog-e.leeds.ac.uk) is an electronic journal, as is BURN from Biosciences at Nottingham University (www.nottingham.ac.uk/~sbzml/). These showcase first class degree undergraduate research and support those undergraduates seeking academic research careers from these research-intensive departments. Drawing on the expertise of these department journals there are plans to develop a national e-journal for Biology undergraduate research.

Sources

www.bioscience.heacademy.ac.uk/projects/tdf/potter.htm
Knight (2006)

Integrating the development of inquiry and research skills through a whole degree programme: Geography and Earth Sciences at McMaster University, Canada

Departments have the power and resources to develop coherent structures to develop undergraduate students systematically and progressively as researchers through their degree. Over the last ten years or so, in part response to McMaster's institutional policy to encourage student inquiry, the School of Geography and Earth Sciences has radically redesigned its Earth & Environmental Sciences (EES) programme.

In *Level I* the development of inquiry and research skills begins in courses where students are introduced to inquiry-based learning through the use of a Socratic, 'questioning style' of lecturing and lab assignments that require students to formulate and answer their own research questions. Students also develop introductory oral and written communication skills through research presentations to small groups of their peers and through writing short reports.

Many *Level II* and *III* courses involve students in short-term (several weeks) independent or team research projects. Students present the results of their research as a written paper, a poster or an oral presentation.

In *Level IV* all students are required to undertake some form of individual research project, either as a one term (13-week) research paper, or as a full year (minimum 26 weeks) undergraduate thesis that usually involves gathering of primary data prior to the start of *Level IV*.

Undergraduate Research. Many thesis students are employed as research or field assistants by faculty during the summer months or on a part-time basis during term-time. Funding is available to help offset the costs of hiring a student and competitive scholarships are available through funding agencies such as NSERC (Natural Sciences and Engineering Research Council of Canada). McMaster University hosts an Undergraduate Research Poster Session each year and many undergraduate students are encouraged to present the findings of their research at national or international conferences and to submit manuscripts, co-authored with their research supervisors, for publication in scientific journals.

Source

Correspondence with Carolyn H. Eyles and Susan Vajoczki, 2007

A department undergraduate research scheme: Psychology at the University of York, UK

Department initiatives to support undergraduates doing research, in close involvement with staff research, are a feature of many US departments (Kinkead, 2003). A growing number of UK departments are now developing their own undergraduate research programmes (Jenkins, 2006). The programme in the Psychology Department at York University was initiated in 2005 and built on previous informal arrangements. The scheme enables students who wish to gain research experience to volunteer to assist with current department staff projects. Any first- or second-year student can take part in the scheme, though preference is normally given to second-year students. (Third-year students are typically busy with their own projects and tend not to participate.) Staff enter details of their projects on PsychWeb (www.york.ac.uk/depts/psych/www/research/ures/), together with an outline of the research questions, what research assistance is needed and the rate of pay. Generally the payments to students come from research grants.

Source

Goebel and Gennari (2006)

Intergenerational student teams support first-year inquiry courses in Chemistry at the University of Michigan, US

Each year the Chemistry Department at Michigan has c. 100 students in term-time or over the summer involved in undergraduate research with the c. 40 Department research groups. In addition, standard undergraduate laboratory instruction courses have been modified in order to create a more deliberate link to more authentic research practices.

An inquiry-based curriculum for first-year students. The large (c. 1,400 students) introductory Organic Chemistry courses have been significantly revised to focus more on student inquiry, narrowing the gap between how faculty understand Chemistry and how students experience it in their coursework.

Authentic laboratory research. A subset of c. 160 students in this first-year course self-select into a supplemental instruction program where they spend two additional hours per week engaged in tasks that involve working with the primary literature. In the laboratory, after spending about half their time developing manipulative skills, they take on the design and implementation of limited but authentic primary laboratory research.

Upper-level student support and development. This supplemental instruction program is a collaborative activity between the primary faculty member and a team of eight upper-level undergraduate students (themselves graduates from the first-year course) who have co-designed the instructional materials and who are solely responsible, with guidance from the faculty member, for implementing these 2-hour sessions. These students are seen as potentially the next generation of teacher-researchers.

Sources

Correspondence with Brian Coppola, 2006
Coppola (2005)

Auditing and developing student research skills at University of Adelaide, Australia, and University of Reading, UK

Selected departments at both Adelaide and Reading have systematically audited department-based undergraduate and postgraduate programmes for the extent to which they develop student research 'skills'. Within departments, methods to collect data on undergraduates' research skills teaching and learning can be time-consuming.

Research at Adelaide has developed a conceptual framework on student research development and based on this a diagnostic tool to support interventions to strengthen student research skill development in courses. Thus two consecutive first-year courses in Medical Science have adapted their assessment tasks explicitly and systematically to develop student research skills in accordance with the Research Skill Development framework. A broadened application of the framework is being trialled, including laboratory-based and quantitative research, and extended to other disciplines and departments, including Petroleum Engineering, Nursing and English. The framework is publicly available for other institutions to adapt (Willinson and O'Regan, 2006, in press).

At the University of Reading a related electronic 'research skills audit tool' has been developed for staff systematically to map research skills teaching and assessment within their own modules. The tool facilitates quick and easy collation of modular data across entire degree programmes, thus making it a valuable departmental resource for reviewing undergraduate curriculum design (Fraser *et al.*, in press).

Sources

Willison and O'Regan (2006, in press)

Fraser, *et al.* (in press)

Introductions to academic practice: Humanities and Social Sciences at University of Windsor, Canada, and Economics and Business at University of Sydney, Australia

Departments at Windsor and Sydney have developed new year 1 courses as inductions for students into the academic worlds of the university.

‘Ways of Knowing’ in the departments of Arts and Social Sciences at the University of Windsor focuses on students developing disciplinary skills in research and critical thinking. Each year a particular theme is identified – generally one that reflects a Windsor community issue – and student teams investigate and present in public the results of their inquiries. Senior students and community members act as mentors to these investigations. There are institutional discussions on extending this ‘model’ to other departments.

The Faculty of Economics and Business at the University of Sydney has radically rethought its approach to issues of plagiarism and academic honesty. Through a collaborative action research project they have moved from an approach of compliance to inducting students into the nature of academic practice. Starting with a voluntary online first year module in 2004, academics are supported to reshape their courses and practices across the faculty in ways that reflect a view of students ‘as uninformed, but willing participants in the promotion of academic honesty.’ The Faculty’s management system has instituted ‘multiple linked activities’ to promote academic honesty amongst students and engage staff in such discussions. Thus in 2005 the module was made compulsory for all new students before submitting their first assignment. Videos of students talking about academic honesty are used in orientation and induction activities. Faculty are being supported in revising their assessments and course work to more explicitly integrate academic practices in research honesty and ethics into their courses, in part prompted by the institutional commitment to research-enhanced teaching.

Sources

apps.medialab.uwindsor.ca/cfl/reflexions/volume01/issue01/ways_of_knowing.htm

Freeman *et al.* (in press)

Integrating research and learning in the Chemistry Department of Utrecht University, The Netherlands

Traditionally, undergraduate Chemistry in the Netherlands involves a 'real' research assignment, which students undertake in one of the University's research groups. However, this model is not very effective in developing the required scientific skills for a chemist, such as presenting and critically evaluating their work, or designing new experiments based on the results of previous experiments. Most Chemistry students in The Netherlands go on to take a Masters at the same university (approx 95% at Utrecht). A few years ago Utrecht opted for a curriculum in which learning research skills and knowledge go hand in hand.

First year. On the first day of their studies students start with a group laboratory project in which they are asked to prepare and characterise a polymer (a kind of plastic). The final material which they have to prepare is clearly specified, however, the route to prepare that material is developed by the students themselves. At the end of the first year all the students (approx 70) work for three weeks in groups in one of the research departments.

Second year. In order to keep a link between the students, lecturers and researchers, students visit and carry out experiments in the research departments. At the end of the second year students are involved in a five-week pre-determined group research project. The goal of their project is discussed with the supervisor (in most cases a senior PhD student). In that way the students are involved in a relevant, authentic research project.

Third year. At the end of the third year all students carry out an individual BSc thesis research project. Students contribute for ten weeks to current PhD research projects in which they are assigned to their own sub-project.

Source

Correspondence with Harry Bitter, 2007

Re-designing spaces to support student research and inquiry at Malaspina University College, Canada, and the Universities of Liverpool and Sheffield, UK

One way departments can enhance the way in which they support student involvement in research-based learning is to (re)design the spaces in which students and staff learn. Such spaces need to recognise the particular forms of research and pedagogy in the disciplines, and departments should seek to, in part, control and shape decisions on building design, room layout and equipment. Thus a study (Narum, 2004, 10) of recent innovative science buildings and classrooms in the USA revealed “spaces uniquely designed for 21st-century ‘sciencing’ ... [which] support learning that is inquiry-based ... recognize the increasingly social character of scientific research, teaching, and learning by facilitating interactions between and among students and faculty.”

The Faculty of Science and Technology at Malaspina University College, Canada, required the architects currently completing a science centre (in which much of the research is outward-facing and community-based and in part involves faculty and students researching together) to “design spaces that will bring students and the public closer to the research taking place, to include dialogue and seminar rooms and visual access to some of the research laboratories” (Horn, personal communication, 2007).

In England seven research- and inquiry-based Centres for Excellence in Teaching and Learning (CETLs) have large capital sums to build special buildings to support student research and inquiry, and their experience will provide ideas and structures for others to adapt (Appendix 2). A common theme running through their designs is the development of ‘social learning space’ in which students are encouraged to learn collaboratively with one another, with staff and, in many cases, with students in other institutions and other key people, in informal environments (see report on Social Learning Space Symposium, 2007 www.business.brookes.ac.uk/learningandteaching/aske/news.asp). Thus at Sheffield University’s CILASS, the Centre for Inquiry-based learning in the Arts and Social Sciences, a flexible, technology-rich space has been purpose-designed to support inquiry-based learning. Called a ‘collaboratory’, the space is suited specifically to support processes of group-based inquiry within arts and social sciences disciplines.

It is conceived as “a classroom as research environment”. Flexible furniture enables a variety of different spatial configurations and facilitates easy flow from one type of activity to another – including, for example: small and large group discussion; working with digital archives and information resources or the University’s virtual learning environment; producing collaborative writing or presentations; engaging in inquiry through elements of musical or dramatic performance.

At a more modest level, a £22,000 University grant has enabled the Department of Earth and Ocean Sciences at Liverpool University to redesign their stage 1 programme to support Geology problem-solving and conceptual reasoning. Teaching on two modules has been changed from a standard 12 lecture and 6 practical format to 12 studio sessions. As well as key changes in course materials, the move to more student inquiry was supported by a redesign of the classroom teaching space. This had featured “a large room with tables in rows designed to accommodate about 100 students facing the same way” (Boyle *et al* 2006, 34). The redesigned room allowed students to work in groups at tables with staff able to work alongside them, and gave students better access to research resources. In addition VLE resources were significantly enhanced to include photographs of all specimens used in the studio sessions. The examination format remained constant, thus enabling comparisons between student performance pre- and post-innovations in course design and delivery. Results demonstrated “improving problem-solving abilities without compromising their knowledge and technical skill acquisition” (p36).

Sources

Correspondence with Phil Levy, Sheffield University, and Jennifer Horn and Nancy Randall, Malaspina University College, 2007

[research.mala.bc.ca/committees/scicentre/
thenewsciencecentre.htm](http://research.mala.bc.ca/committees/scicentre/thenewsciencecentre.htm)

www.sheffield.ac.uk/cilass/learning-spaces

Boyle *et al.* (2006)

Appendix 2.

Developing an undergraduate research culture in Earth Sciences at Oxford University, UK

Philip England (in press), of the Department of Earth Sciences at Oxford University, comments on the culture of his department:

“The goal of our course is to give students the analytical and observational apparatus to ... [investigate the] processes that govern the evolution and present state of the planet ... When we discuss how we try to achieve this we rarely discuss teaching strategies or learning outcomes, because we regard the undergraduate experience as more akin to an apprenticeship than to four years of formal teaching. ... Fieldwork is a central aspect of Geology and, almost irresistibly, it imposes a flavour upon our teaching. ... A day in the field typically involves more than 12 hours of close-contact teaching, in which the agenda is set by the observations that the students make, and the questions that they pose. ... The informality engendered in field teaching cannot be erased or forgotten back in Oxford. ... A variety of practices underpin this informality in ways that, separately, do not appear particularly powerful but which, because they are valued by all, have a large cumulative effect. Interaction space is highly valued, and it is an (unwritten) guiding principle that anyone can interact with anyone else in the common space (library, staff coffee room, undergraduate common room, etc).”

That perspective of the department culture is validated by external reviews and performance indicators. Thus Graham Gibbs' (in press) analysis of the department as part of a study of “research-intensive departments ... where the teaching is demonstrably outstanding”, observed that:

“The report of the most recent internal review of the department notes the way the programmes ... [bring] students into contact with leading scientists ... with ample opportunity for students to meet them in an informal context. ... Earth Sciences has amongst the highest student ratings on a number of scales of the Oxford Student Course Experience Questionnaire. It is rated particularly highly as ‘intellectually stimulating’. ... Students believe that they ‘benefit from being in contact with active researchers’. ... The central social space in the department has posters on the walls that have just come

back from conferences... It would not be possible for students to be unaware of what research was being undertaken or who was undertaking it. In this social space, informal discussion of research, with undergraduates involved, seemed to be going on constantly. Students were invited into research projects in the lab or the field in an ad hoc way if they showed interest. Students were being inducted into a 'community of practice' rather than only being taught, and there were blurred distinctions between teaching and research with everyone simply 'doing geology'. This is the most striking example I have encountered of the link between research and teaching being one of joint engagement in shared scholarly activity within a supportive social environment, with students gradually being included in the community as junior members."

Sources

England (in press)

Gibbs (in press)

10. Conclusion

We are convinced that ‘re-shaping’ or ‘reinventing’ our disciplines and departments in a way that focuses more on the teaching-research nexus can aid students’ learning, their pride in their discipline and department, staff morale, and the overall effectiveness of the department and the institution. To repeat earlier cautions, we are convinced from the research evidence and our own experience that these links have to be created. The nexus does not necessarily occur naturally; indeed much of immediate current practice and policy in the UK and internationally threatens the nexus. In creating the link, or rather links, departments and the disciplinary groups within them have key roles to play.

For many, perhaps most of us, the teaching-research nexus in varied forms lies at the heart of ‘higher’ education. We know that embedded in disciplines and departments there is much good practice to build on and from which others can learn. We realise full well that we have only been able to share a portion of that here. However, we are also well aware that we all have much to learn to support that nexus better, and the form in which the nexus develops should and will vary by disciplinary, departmental and institutional contexts. In the UK as a national system and as disciplinary communities we have now firmly embarked on developing our understanding and sharing good practice in strengthening discipline-based teaching-research relations. We hope this paper will support individuals, course teams, departments and institutions in reflecting on and building on their current practice, and sharing it with others with the support of the Higher Education Academy’s Subject Centres. Outside the UK, we hope that colleagues will also find the review of the research evidence, the discussion of strategies and practices, and the wide range of international discipline and department case studies helpful and stimulating. We firmly believe that, in the words of Burton Clark (1997, 241), “No issue is more basic in modern higher education than the relationship between research and teaching.”

Appendix I: Academy-funded research projects on discipline-based teaching-research relations

Relations between research active teachers and student learning

Keith Trigwell, University of Oxford (now University of Sydney) (Trigwell, in press)

Ontology, identity formation and lifelong learning outcomes: theorising the relationship between discipline-based research and teaching

Melanie Walker, University of Sheffield

Academics experiences and conceptions of research and teaching: developing the relationship between these activities to enhance student learning within different disciplines and institutions

Lisa Lucas, University of Bristol

Tribes, territories, research and teaching: enhancing the teaching-research nexus

Paul Trowler, Lancaster University

An investigation into the mechanisms that facilitate and encourage the research-teaching nexus in Science and Engineering Departments: staff and student perspectives

Joanne Jones and Maria Fasli, University of Essex

Sources

www.heacademy.ac.uk/4044.htm

www.heacademy.ac.uk/4588.htm

Appendix 2: CETLs focused on inquiry and research-based learning

HEFCE established 74 Centres for Excellence in Teaching and Learning (CETLs) in 2005, each of which received up to £2.35m capital and £0.5m recurrent expenditure pa for five years. Several are centrally concerned with aspects of the teaching-research nexus:

1. University of Gloucestershire, the Centre for Active Learning in Geography, Environment and Related Disciplines
www.glos.ac.uk/ceal/
2. University of Manchester, Centre for Excellence in Enquiry-Based Learning
www.manchester.ac.uk/ceeb/
3. University of Oxford Centre for Excellence in Preparing for Academic Practice
www.learning.ox.ac.uk/cetl.php?page=54
4. University of Reading Centre for Excellence in Applied Undergraduate Research Skills
www.rdg.ac.uk/cdotl/cetl-aurs/
5. University of Sheffield, Centre for Inquiry-based Learning in the Arts and Social Sciences (CILASS)
www.shef.ac.uk/cilass/
6. University of Surrey, Surrey Centre for Excellence in Professional Training and Education (SCEPTre)
portal.surrey.ac.uk/portal/page?_pageid=1218,1&_dad=portal&_schema=PORTAL
7. Universities of Warwick and Oxford Brookes, The Reinvention Centre for Undergraduate Research
www2.warwick.ac.uk/fac/soc/sociology/research/cetl/

Source

www.hefce.ac.uk/cetl

About the authors

Alan Jenkins long taught and researched Geography and was a founding editor of the international *Journal of Geography in Higher Education*. He is now an educational developer and researcher on higher education; Emeritus Professor at Oxford Brookes University, UK; consultant on teaching-research relations for the Higher Education Academy; a Reinvention Fellow for the Reinvention Centre for Undergraduate Research at Oxford Brookes and Warwick Universities; and Visiting Professor at the University of Staffordshire. His main area of expertise is on the relations between teaching and discipline-based research and he has given workshops and undertaken consultancies on this issue to institutions in the UK, Australasia, Canada, United States and continental Europe. With colleagues at Oxford Brookes he has researched undergraduate and postgraduate views of academic staff's research and staff's experience of teaching-research relations. His current interests focus on adapting US undergraduate research to UK contexts. He has published widely in the area.

Mick Healey is Professor of Geography at the University of Gloucestershire, UK. He is Joint Director of the Centre for Active Learning in Geography, Environment and Related Disciplines and Senior Adviser for Geography to the Higher Education Academy's Subject Centre for Geography, Earth and Environmental Sciences. He is also Co-Director of a four-year Economic and Social Research Council project on *Enhancing the quality and outcomes of disabled students' learning in higher education*. In 2000 he was awarded a National Teaching Fellowship. Mick is an experienced presenter. Since 1995 he has given over 250 educational workshops, seminars and conference presentations in more than a dozen countries. He has written and edited over 100 publications on various aspects of teaching and learning in higher education. He is on the Editorial Board of the *Journal of Geography in Higher Education* and *Journal for Excellence in College Teaching*. He is currently Regional Vice-President (Europe) of the International Society for the Scholarship of Teaching and Learning, Co-chair of the International Network for Learning and Teaching Geography in Higher Education, an Accreditor for the Higher Education Academy, and a committee member of the UK Research and Teaching Forum and the Council of the Higher Education Academy.

Roger Zetter is currently Professor of Refugee Studies and Director of the Refugee Studies Centre at Oxford University. Prior to this he was Deputy Head of Planning at Oxford Brookes University (from 1996-2006) and Director of the FDTL 3 Project LINK (2000-3), entitled Linking

Teaching and Research in Built Environment disciplines **www.brookes.ac.uk/link**. His main teaching, research and consultancy interest is focused on the political, policy and managerial issues raised by humanitarian assistance to asylum seekers and refugees. He has published extensively in this field and has directed many projects and consultancy assignments for governments, intergovernmental organisations and NGOs. Whilst at Brookes, he also taught and researched issues of urbanisation and planning in the developing world, including education and training. His books include: *Planning cities: growth and sustainability in the developing world* (IT Publications 2002); *From welfare to market: urban sector policies in the developing world* (Earthscan 2004); and *Designing sustainable cities in the developing world* (Ashgate 2006).

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- A list of useful websites, providing an international listing of key resources to support teaching-research links, may be found at: **www.heacademy.ac.uk/rtnexus.htm**. For a longer list of references which is regularly updated see: *Linking research and teaching: a selected bibliography*. Available at: **www.glos.ac.uk/ceal/resources/litreview.cfm**.
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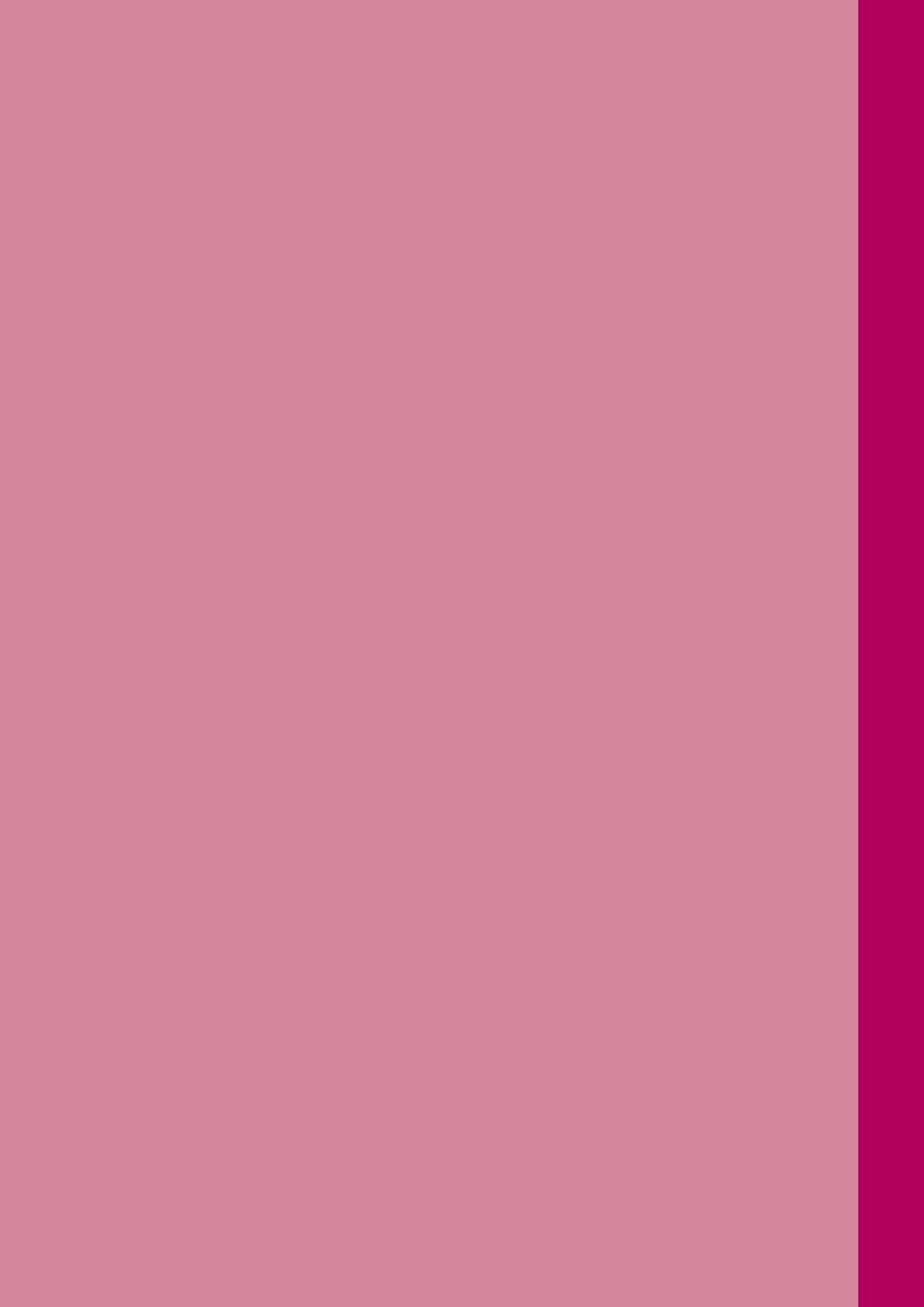
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Tel: +44 (0)1904 717500
Fax: +44 (0)1904 717505
enquiries@heacademy.ac.uk
www.heacademy.ac.uk

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