

Keynote: Linking research and teaching (in the biosciences)

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THE OHP SUMMARY

The nexus is under threat –The RAE and ‘Teaching only’ universities (Section 1)

The nexus is often asserted: until recently it has not been made explicit or been well structured. (Section 2)

The traditional model has long gone

Much of the research evidence questions the nexus (Section 2)

National Policies may be open to change – what happens after the 2008 RAE? Let’s learn from the National Science Foundation; and the English Research Informed Teaching Fund (Section 3)

Ultimately it’s a question of values re what is distinctive about *higher* education (at undergraduate level)

We have good evidence of students seeing (potential) benefits from staff/university research: but also feeling at ‘arms length’ from that research

We have good evidence of (selected) undergraduate students learning from research inquiry

We now have a ‘language’ to talk about it (Section 4)

The key issue is how the student learns: and this has to start in year one? (Section 5)

There is now increasing recognition that the potentially positive links between (staff) research and student learning have to explicitly structured into the

- Curriculum (Section 4 and Section 5)
- Department Policies and Structures (Section 6)
- Institutional Policies and Structures
- National Policies

As do the (potentially) negative consequences have to be recognised and managed (Section 5)

We have increasing evidence of disciplinary variations in teaching /research relations

The Bioscience Subject Centre has/had a key project with disciplinary case studies (Section 9)

There is much more to learn and do!

SECTION 1 TEACHING 'ONLY' AND RESEARCH CONCENTRATED INSTITUTIONS?

The Case of the UK 2003 White Paper

<http://www.dfes.gov.uk/highereducation/hestrategy/>

"4.31 At present, the 'University' title is reserved for institutions that have the power to award both taught degrees, and research degrees. The right to award research degrees requires that the institution demonstrate its strength in research. This situation is at odds with our belief that institutions should play to diverse strengths, and that excellent teaching is, in itself, a core mission for a university.... **It is clear that good scholarship, in the sense of remaining aware of the latest research and thinking within a subject, is essential for good teaching, but not that it is necessary to be active in cutting-edge research to be an excellent teacher.**" (my emphasis).

The Case of the Government Minister

"On the link between research and teaching, Mrs Hodge (then Minister for HE) said both she and the Education Secretary, Charles Clarke, "still need to be convinced". She added: "A good teacher needs good scholarship but I cannot see an inextricable link with being engaged in cutting edge research and being good at teaching."

Donald MacLeod, 'Hodge stands firm over research funding', Education Guardian Wednesday April 30, 2003

<http://education.guardian.co.uk/higher/research/story/0,9865,946781,00.html>

SECTION 2: THE HARSH EVIDENCE FROM SURVEYS OF PRACTICE AND RESEARCH

THE EVIDENCE FROM SURVEYS OF PRACTICE.

Students Not Tasting Research?

"... The research universities have often failed, and continue to fail, their undergraduate populations, thousands of students graduate without seeing the world - famous professors or tasting genuine research." Re-inventing Undergraduate Education: Boyer Commission on Educating Undergraduates in the Research University. (1998) Carnegie Foundation for the Advancement of Teaching. p1

Staff Not Appreciating the Nature of the Connection? Or perhaps not Having a Language to Talk About It?

An Audit of Exeter University (UK) stated:

"The Account argues strongly for the continuing and crucial value of the link between teaching and research; it acknowledges though that this relationship is more often assumed than explained. The audit team was told that this was a major question to be addressed, yet encountered staff who sometimes struggled to appreciate its significance. In practice, the precise relationship of the link between research and teaching seems not to have been addressed in any concerted way." Higher Education Quality Council: Academic Quality Assurance Group, (1997, 3). Academic Quality Audit, The University of Exeter, London, HEQC, p3

No Mission or Mechanisms?

" We found that only about 50% of institutions had any statement (in their teaching and learning strategies) resembling a commitment or objective in their strategies that research should have any impact on teaching, and a much smaller proportion (approximately 10%) identified in any detail the mechanisms by which this might be achieved." J.M Consulting (2000) Interactions Between Research, Teaching, and Other Academic Activities: Bristol, HEFCE (Higher Education Funding Council for England).

THE EVIDENCE FROM RESEARCH.

An Enduring Myth

"That *good teachers are good researchers is a myth and that, at best, the association between ratings of undergraduate instruction and scholarly productivity is a small and positive one, with correlations in the .10 to .16 range*". (Terenzini and Pascarella, 1994, p30)

Loosely Coupled

In a meta analysis of these correlations studies of university academics Hattie and Marsh (1996) considered 58 research articles contributing 498 correlations and found that the overall correlation was 0.06. "*Based on this review we concluded that the common belief that teaching and research were inextricably intertwined is an enduring myth. At best teaching and research are very loosely coupled*" (Hattie and Marsh, 1996, 529) (emphasis added).

Student Dissatisfaction

Astin (1993) and Astin and Chang (1995) in a study of 200 US four- year undergraduate colleges and using sophisticated measures of student development, concluded that: "*a college whose faculty is research- orientated increases student dissatisfaction and impacts negatively on most measures of cognitive and affective development.*" Astin (1993, 363). The few institutions in this study that scored high on both 'teaching' and 'research' were a few rich, private colleges.

An Enduring Myth/ No Convincing Evidence

"*there is little functional interaction between undergraduate teaching and discovery research.*" (Ontario Council on University Affairs, 1994, p.18).

"*I have not seen any convincing evidence for a causal relationship between teaching and research.*" Bahram Bekhradnia, Director of Policy for the Higher Education Funding Council for England (1998).

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- Bekhradnia B. (1998). "The Polarisation of Teaching and Research - False Dichotomy, Principled Policy or Damaging Expedient?", *Research and Scholarship*, Southampton, Southampton Institute.
- Hattie J. and H. W. Marsh (1996). "The Relationship Between Research and Teaching: A Meta- Analysis." *Review of Educational Research* 66(4): 507- 542.
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- Ontario Council on University Affairs (1994) *Undergraduate Teaching, Research and Consulting/Community Service: What are the functional interactions? A Literature Survey*. Toronto, Ontario.
- Pascarella E.T. and Terenzini P.T. (1991) *How College Affects Students*, San Francisco, Jossey Bass
- Ramsden P. and Moses I. (1992) *Associations between research and teaching in Australian higher education*, *Higher Education*, 23, pp 273- 295.
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SECTION 3: MORE POSITIVE NATIONAL POLICIES?

National Science Foundation (USA)

“Research and education are not – and never have been – mutually exclusive realms.” (from GPRA Strategic Plan FY106; Core Strategies; cited in Rameley, 2004)
“Effective integration of research and education at all levels infuses learning with the excitement of discovery. Joining together research and education also ensures that the findings and methods of research are quickly and effectively communicated in a broader context and to a larger audience.” (GPRA Strategic Plan FY01-06; cited in Rameley, 2004)

Rameley, J. (2004) The integration of research and education: the National Science Foundation USA, paper presented to Research and teaching: closing the divide? An international colloquium. Marwell, Winchester, February 13-14. Available at www.solent.ac.uk/rtconference/default.asp?level1id=12432

England

In the UK, the response to the Government’s proposals to create ‘teaching-only universities’ and fears as to the impact of the RAE on teaching-research relations led to the Government establishing the Research Forum to examine teaching research links in the context of growing research selectivity.

The Research Forum Report (June 2004)

www.dfes.gov.uk/hegateway/herereform/herereform/index.cfm

The report concluded 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’

.... “... 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 ...”

The group then proposed a special fund for those outside the research élite to support student learning in a research environment.

The Minister (for HE) response (November 2004)

www.dfes.gov.uk/hegateway/herereform/herereform/index.cfm

“I am aware of the complexity of the issues surrounding teaching and research in particular, and it is to the Forum’s credit that it has suggested a way forward.”

HEFCE Email to Higher Education Institutions (October 2005)

<http://www.jiscmail.ac.uk/cgi-bin/webadmin?A1=ind0510&L=admin-hefce>

“HEFCE Board approved ... additional funding to support teaching informed by research, for 2006-07 and 2007-08, to be allocated in inverse proportion to an institution’s research funding.”

The funding being provided by HEFCE will be focused where funds are most needed, to supplement HEFCE's funding for learning and teaching. Not all institutions will receive any of these additional funds, as these will be paid to institutions where research resources limit capacity to develop activity in this area.

SECTION FOUR: A 'LANGUAGE' TO TALK ABOUT IT...

Ron Griffiths from FDTL Project LINK (Linking Teaching and Research in Built Environment Disciplines)

Griffiths (in press) analyzing his and the LINK project team's experience of developing an understanding of what was meant by that simple phrase 'linking teaching and research, developed this model or typology of various teaching /research links

- **Teaching can be *research-led*** in the sense that the curriculum is structured around subject content, and the content selected is directly based on the specialist research interests of teaching staff; teaching is based on a traditional "information transmission" model; the emphasis is on understanding research findings rather than research processes; little attempt is made to capture the two-way benefits of the research-teaching relationship.
- **Teaching can be *research-oriented*** in the sense that the curriculum places emphasis as much on understanding the processes by which knowledge is produced in the field as on learning the codified knowledge that has been achieved; careful attention is given to the teaching of inquiry skills and on acquiring a "research ethos"; the research experiences of teaching staff are brought to bear in a more diffuse way.
- **Teaching can be *research-based*** in the sense that the curriculum is largely designed around inquiry-based activities, rather than on the acquisition of subject content; the experiences of staff in processes of inquiry are highly integrated into the student learning activities; the division of roles between teacher and student is minimised; the scope for two-way interactions between research and teaching is deliberately exploited.
- **Teaching can be *research-informed*** in the sense that it draws consciously on systematic inquiry into the teaching and learning process itself.

A Variation in Wording

Michael Bradford: Pro Vice Chancellor (Learning and Teaching) University of Manchester has modified the above wording to

- **Learning about others' research**
- **Learning to do research – research methods**
- **Learning in research mode – enquiry based**
- **Pedagogic research – enquiring and reflecting on learning**

A Diagrammatic Model

Mick Healey (University of Gloucestershire) has developed Griffith's and others' work as a diagrammatic model:

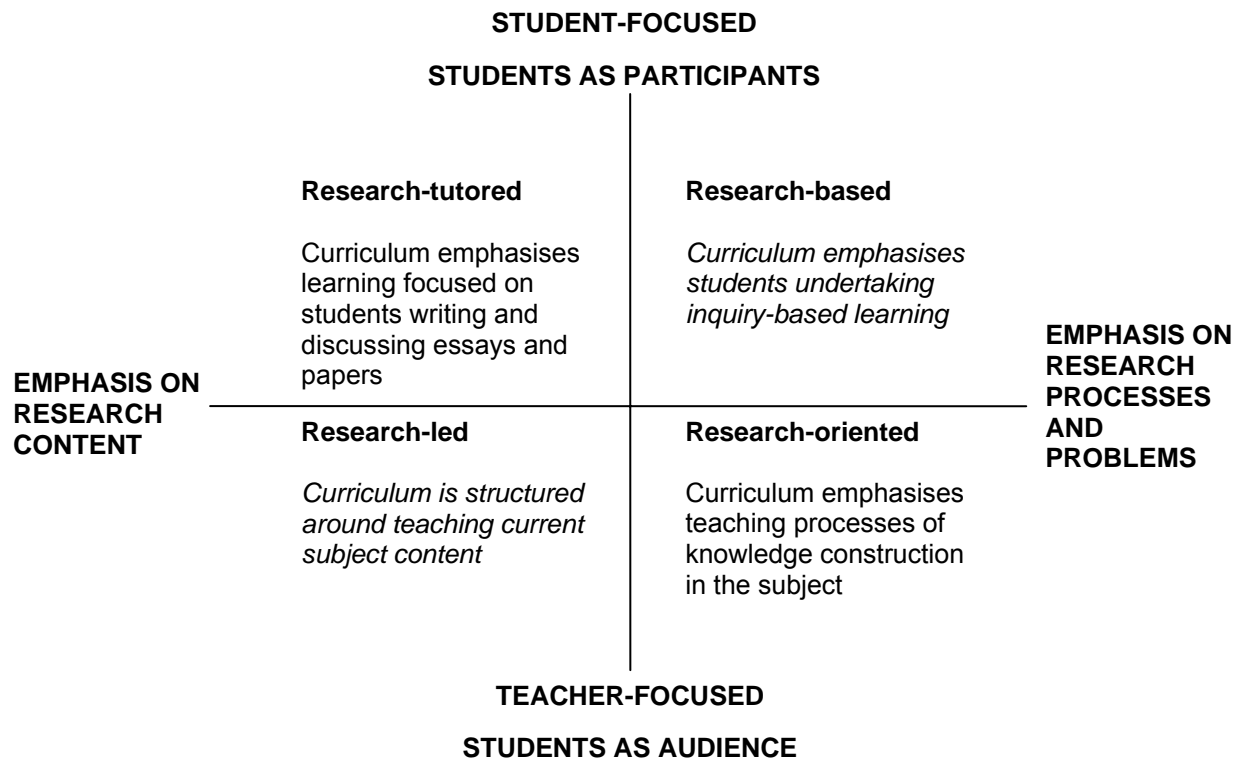


Figure 1: Curriculum design and the research-teaching nexus

The LTSN Engineering: http://www.engsc.ac.uk/er/teaching_research/index.asp

Content of curriculum - is partly or wholly derived from research

- Processes - students are taught/learn in research-like ways, typically through enquiry/project based activity
- Tools - students learn how to use particular equipment, software packages, etc. and hence learn research skills
- Context and community - intangible links and benefits to students and staff flowing from students being part of a researching community

From Novice to Expert

"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)

Side by Side: Apprentices in a Craft

"In these active learning situations, history teachers devote less class time to transmitting a synthesis of the products of historical scholarship and more to modelling the process by which historians come to make research based knowledge claims and critically appraise the contributions 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)

References

Griffiths R (2004) Knowledge Production and the research –teaching nexus: the case of the built environment disciplines, *Studies in Higher Education*, 29(6) 709-726.

Healey, M. (in press) Linking research and teaching: disciplinary spaces, in: R. Barnett (Ed.) *Reshaping the university: new relationships between research, scholarship and teaching* McGraw-Hill/Open University Press.

Roth J (2005, 3) Common Ground: How History professors and undergraduate students learn through history. In Riordan T and Roth J (2005) *Disciplines as Frameworks for Student Learning: Teaching the Practice of the Disciplines*, Sterling, Stylus, 3-20.

Wieman C (2004) Professors who are scholars: Bringing the act of discovery to the classroom, presentation at The Reinvention Centre, Conference, November 2004, Integrating Research into Undergraduate Education: the Value Added

http://ws.cc.stonybrook.edu/Reinventioncenter/Conference_04/Wieman/Presentation.htm

SECTION 5: STRATEGIES FOR LINKING TEACHING AND RESEARCH (AND CONSULTANCY) AT THE LEVEL OF THE MODULE/ COURSE AT UNDERGRADUATE/POSTGRADUATE LEVEL

This is a basic ‘model’ /typology that individuals and course teams can adapt and use to consider their current curriculum and in designing new courses.

Develop students understanding of the role of research in their discipline(s)

- Develop the curriculum to bring out current/or previous research developments in the discipline
- Develop student awareness of learning from staff involvement in research.
- Develop student understanding of how research is organised and funded in the discipline/institution.

Develop student’s abilities to carry out research/consultancy in their discipline

- Develop the curriculum, in particular how students learn in ways that mirror/support the research/consultancy processes in the discipline
- Assess students in ways that mirror/support the research/consultancy processes in the discipline. For example requiring students to have their work assessed by colleagues according to the house style of a (fictitious) journal before submitting it to you; this mirrors how academic journals use referees to decide on whether an article is to be published.
- Provide training in relevant research/consultancy skills/knowledge.
- Require all students to undertake some research: This is the effective approach developed in those UK/Australian... institutions which require a dissertation for Honours Degrees.
- Develop student involvement in staff research/consultancy: This is the approach of many US universities – often supported by national/ corporate sponsorship.
- Perhaps, restrict certain research opportunities to selected students? In the USA which has long operated a mass higher education system, students being involved in research with staff is mainly /only for those with high grades / high motivation for research. There are also examples of special research

opportunity programmes supporting 'minority' students' access to / 'success' at university studies.

Manage student experience of staff research/consultancy

- Limit the negative consequences for students of staff involvement in research/consultancy. Most important here is managing the student experience of the days (and sabbatical terms) when staff are 'away' doing research.
- At a minimum students need clear information as to when staff are available/away.
- Support students in making clear to them the employability elements of research and consultancy: 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.

Evaluate/research student experience of research/consultancy and feed that back into the curriculum.

Other strategies you have developed

Based on: Jenkins A et al (2003) Re- Shaping Teaching in Higher Education: Linking Teaching and Research, London, Routledge Falmer /SEDA

SECTION 6: DEPARTMENTAL STRATEGIES TO ENHANCE THE TEACHING/RESEARCH NEXUS

<http://www.brookes.ac.uk/schools/planning/LTRC/change/change-strategies.htm!>

"While each level within the University has an important role, the academic department is where the most important decisions are made and the most important work is done. It is where faculty are hired, teaching assignments are made, and salary increases are determined." John A. Brighton, "Innovations in Honours Education and Its Institutional Role", Schreyer National Conference, June 24 1999.

"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) Interactions Between Research, Teaching and Other Academic Activities: Report for HEFCE, J.M Consulting Bristol, 36)

"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, B.R 1993, " The Research Foundations of Post- Graduate Education", Higher Education Quarterly, 301)

- Develop disciplinary (and departmental) understanding of teaching and research relations
- Make it a central consideration in hiring new staff
- Ensure it is fostered through how staff roles are defined - and be careful about setting up some staff who are teaching or research only or 'concentrated'?
- Ensure it is fostered through policies for appraisal and staff development
- Develop effective synergies between research centres, course planning teams and postgraduate and undergraduate teaching.

- Audit/review department based courses.
- Develop special programmes or structures to foster the nexus.
- Pay attention to issues of departmental culture
- Participate in National (and International Programmes)

References

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http://www.ltsn.ac.uk/application.asp?app=resources.asp&process=full_record§ion=generic&id=257

SECTION 9: Linking Teaching and Research in the Biosciences Project

<http://www.bioscience.heacademy.ac.uk/projects/ltr/>

There is a strong tradition across the Biosciences of linking research with teaching and evidence that students value and are motivated by the experience of studying in a research-rich environment. However, the connection between teaching and research needs to be created, planned and structured systematically. The aim of this project was to collect and share examples of how colleagues across the Biosciences are creating links between research and teaching.

SECTION 10: Key Web Based Publications on Linking T and R by Alan Jenkins

Jenkins A (2003) **Designing a Curriculum that values a research-based approach to student learning**

http://www.heacademy.ac.uk/resources.asp?id=163&process=full_record§ion=generic

Jenkins A and Setter R (2003) **Linking Research and Teaching in Departments**

http://www.heacademy.ac.uk/resources.asp?process=full_record§ion=generic&id=257

Jenkins a (2004) *A Guide to the Research Evidence on Teaching Research Relations*, York, Higher Education Academy

http://www.heacademy.ac.uk/resources.asp?process=full_record§ion=generic&id=383

Jenkins A and Healey M (2005: in press) *Institutional Strategies to Link Teaching and Research*. York .Higher Education Academy

And one you would have to buy!

Reshaping Teaching in Higher Education: Linking Teaching and Research: London: Routledge Falmer