

Deliverable 1 Jan 31 2007

**Tribes, Territories, Research and Teaching: Enhancing the
“Teaching-Research Nexus”. Literature Review.**

Paul Trowler and Terry Wareham

Table of Contents

Part 1: Organizing Principles	2
Cause of influence.....	3
Scope of influence.....	3
Strength of influence.....	3
Strong epistemological-essentialist positions	5
Social-constructionist positions	8
Individual agency positions	11
Part 2 Literature on the Teaching-Research Nexus	13
The Nexus: Introduction	13
A Normative Literature.....	13
A Distinctive Epistemological and Ontological Position	16
Problems Arising in Normative Foundationalist-Empiricist Instrumentalism	16
The Teaching-Research Nexus: dysfunctions?.....	17
Strategies for Enhancing the Teaching-Research Nexus	18
Disciplines and the Teaching-Research Nexus.....	18
Disciplinary Case Studies	20
The Significance of Institutional Context.....	20
The Teaching-Research Nexus and the Student Experience	21
Conclusions on the literature on the teaching-research nexus	22
Fruitful Directions for Further Research.....	23
References.....	24

Part 1: Organizing Principles

The aims of this project are:

1. To conduct a literature review in three areas (see below)
2. To conduct new empirical work in three institutional settings among four different disciplines/domains, providing new data on the differences between the conceptualisation, understanding and development of research-learning/teaching/assessment/curriculum (LTAC) linkages.
3. On the basis of the above, to provide an accessible framework setting out:
 - a. the different patterns of linkage between research practices and LTAC;
 - b. examples illustrating linkages found to be beneficial to the student experience;
 - c. examples illustrating linkages found to be detrimental to the student experience

Three literatures in this area have developed, but largely in isolation from each other:

1. Linkages between disciplinary differences and research practices
2. Linkages between disciplinary differences and teaching and learning
3. The nature of the teaching-research nexus

This paper, deliverable 1 of this project, sets out a summary of key themes in the literature in these three areas and explores the connections between the areas. The main emphasis here is on areas 2 and 3 because the first, the linkages between discipline and research practices, have been extensively reviewed in Becher and Trowler 2001.

A number of reviews of literature in the area of the teaching-research nexus have already been conducted (see bibliography). Our view is that what is now required is an overview of the concepts and approaches taken rather than another descriptive review. Literatures in the first two areas (discipline and research, discipline and teaching) have tended to grow up in different ways and offer disparate sets of perspectives. What is needed is a better conceptual framework with which to make sense of current thinking so that subsequent research can be better informed and more "clear eyed".

We propose a framework which evaluates three dimensions of the nature of the influence of discipline on academic practices and attitudes as demonstrated in the literature considered in the review: a) cause, b) scope and c) strength, This framework is elaborated below and represented in the schema in figure 1. Figure one incorporates three axes along which can be placed the different perspectives on the relationship between disciplines on the one hand and academic practices (both teaching and research) on the other. We suggest that the three axes together offer a way of positioning particular studies in terms of the cause, the scope and the strength of the influence of disciplines, and indeed other structural features.

Cause of influence

The first question to address is: "what causes any link between disciplines and practices and attitudes?" (Axis 1). These cause might be placed along a spectrum which moves from the structural to the agentic. The term *structural* is used to describe causal mechanisms which impose regularities and predictability on practices, values and attitudes around teaching and/or research. One very significant structural factor found in the literature is the epistemological character of different disciplines: the nature of the knowledge structures found there. Under *agentic*, conversely, are included causal influences due to choices made by individual people. Here, more psychologistic explanations come to the fore: for example self-selection by particular types of people into different disciplinary areas or the ideological resources individuals draw on in considering the nature and purposes of higher education (Trowler, 1998). Between these two poles would come causal explanations which combine both structure and agency, for example those which see disciplines as conditioning practices and attitudes but not totally determining them, leaving room for agency or at the least multiple conditioning factors.

Scope of influence

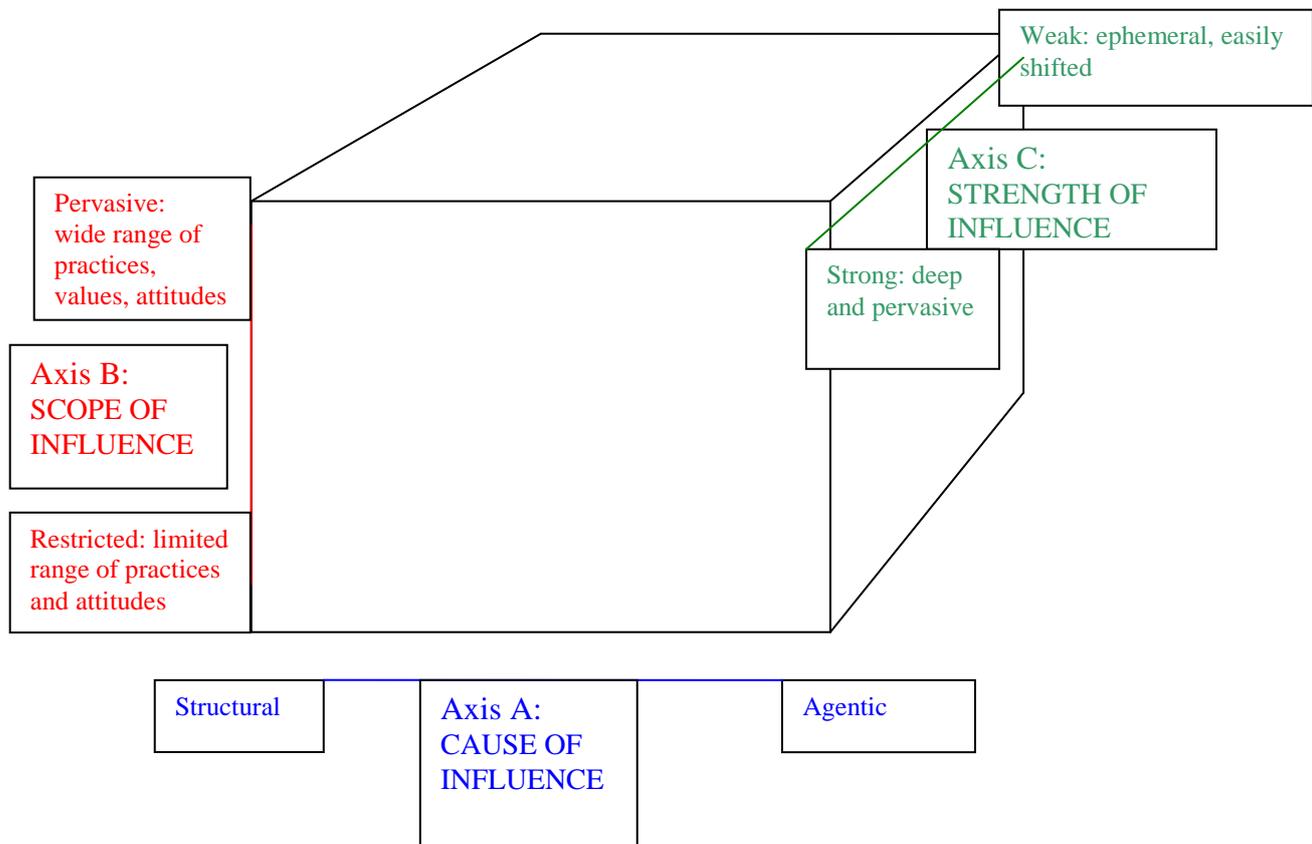
A second question is "how pervasive is the link between disciplines and practices and attitudes?" (Axis B). Under "pervasive" the linkage is conceptualised as very extensive, moving beyond simple classroom practices, for example, into the everyday life and ways of seeing of academics and students. Under "restricted" the linkage is conceptualised as much more limited: the restricted set of practices that occur only in particular places and underpinned by attitudes whose relevance and scope is limited to those contexts. Clearly there will be intermediate positions, this axis being a spectrum rather than bipolar.

Strength of influence

The third question is "how strong is the linkage between disciplines and practices and attitudes?" (Axis C). At the stronger end of the scale the linkage is not easily shifted so that it is relatively impermeable to the influence of institutional context, local departmental cultures or other factors. At the weaker end of the scale the linkage, conversely, is easily displaced by other factors so that researchers find many exceptions to a hypothesised relationship between disciplines on the one hand and practices, values and attitudes on the other.

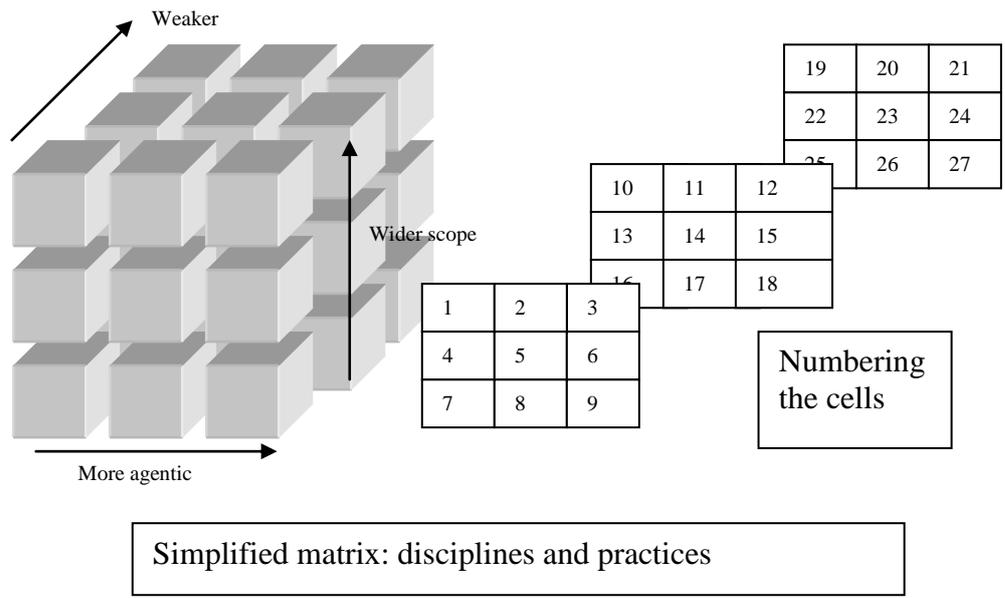
The inclusion of axes B and C is intended to address the need for the level of specificity about the extent and significance of causal effects. In the literature on the influence of disciplines on practices there has been a certain vagueness about the strength and range of effects. This has been evident in the language used which, for the same authors, often moves between very different terms: "preferences", "styles", "rituals", "tendencies", "conceptions", "approaches" and "practices". Similarly the literature on the teaching-research nexus is unclear about whether there is an "interaction", "interconnection" or "integration" between teaching and research, or perhaps simply an "influence" of one on the other (Neumann, 1996, p. 11).

Figure 1: Conceptualising the relationship between disciplines and teaching, disciplines and research.



Simplifying, then, allowing for only three positions on each axis one can conceptualise this schema in terms of 27 sub-boxes:

Figure 2: Simplified set of positions on the three axes



In this schema cell 1 represents an exceptionally strong, essentialist position. There is very strong structural determination of linkages between disciplines across a wide range of practices, values and attitudes extending across different contexts. From this position it would be possible to say that certain teaching and research practices are always found among specified disciplines. Conversely cell 27 represents a situation where individual agency within disciplines means there is little regularity between a particular disciplinary context and practices, values and attitudes found there. Whatever linkage there is tends to be weak and to extend only to a limited range of practices and attitudes. Such a tenuous linkage is at the limits of any claims for *disciplinary* distinctiveness. Here there would be very few regularities identified across the same discipline in different contexts.

The following summary of key themes in the literature will not mechanically explore each of these 27 boxes, but the answers to all three key questions which the axes on this matrix represent will be an organising principle for analysing this literature.

Strong epistemological-essentialist positions

The 1989 edition of Tony Becher’s classic book *Academic Tribes and Territories* classified disciplines according to both a cognitive dimension (elaborated by Kolb, 1981 and Biglan, 1973) and a social dimension (developed by Becher himself).

The *cognitive* dimension divides disciplines into hard and soft, pure and applied to give a four cell matrix. Hard disciplines have well-developed theory, universal laws, causal propositions, they are cumulative and have generalisable findings. Soft disciplines by contrast have unclear boundaries, relatively unspecified theoretical structure, are subject to fashions and have loosely defined problems. Pure disciplines are self-regulating and not directly applied to the professions or problems in the outside world, while applied disciplines are regulated by external influence to some

extent (for example the Law Society) and are more applied within the professions and to problems.

The *social* dimension again offers a four cell matrix. This time the axes run between convergent and divergent on the one hand and urban and rural on the other. Convergent disciplines have uniform standards and a relatively stable elite. Divergent disciplines sustain more intellectual deviance and frequently experience attempts to shift standards. Urban disciplines are characterised by intense interaction and a high people-to-problem ratio. Rural ones have bigger territories, less interaction and a lower people-to-problem ratio.

Combining these epistemic features it appears possible to say that physics for example is hard, pure, convergent and urban. Sociology is soft, pure, divergent and rural. Engineering is hard, applied, convergent and urban. Economics is hard, applied, convergent and rural.

Becher himself (1989) and others have tended to tie the epistemological (and related social) characteristics to practices, both research practices and learning, teaching and assessment practices in a very direct way. Thus Neumann et al (2002) make claims for pedagogical differences between disciplines in different locations on the social and cognitive dimensions, offering the following sets of differences using the disciplinary classification system mentioned above:

Table 1: Summary of Disciplinary Differences in Learning, Teaching, Assessment and Curriculum: according to Neumann et al, 2002

Learning, Teaching and Assessment Dimension	HARD PURE DISCIPLINES	HARD APPLIED DISCIPLINES	SOFT PURE DISCIPLINES	SOFT APPLIED DISCIPLINES
Curricular structure	Cumulative, atomistic curriculum		Reiterative, holistic curriculum	
	Linear programme design		Spiral curriculum	
Purposes of higher education	Purpose to acquire subject knowledge and reasoning powers	Emphasis on acquisition of problem-solving and practical skills	Purpose to acquire a broad command of intellectual ideas, fluency of expression	Emphasis on vocationally-related skills, but broadly defined, with intellectual breadth and personal growth
Teaching methods	Instructive (didactic) methods to 'deliver' fixed content. Small groups work on predetermined problems.		Constructive (student-centred) methods to explore ideas. Small groups work discursively	
	Teaching preparation is relatively quick		Teaching preparation is time-consuming	

	Large lectures with class labs. ICT use extensive.	Practical experience provided	Face-to-face teaching predominates, smaller class sizes. More limited use of ICT.	Practical experience provided, but knowledge base acquired first
Learning	Students need to memorize facts and apply problem-solving skills. Logical reasoning.	Practical competencies are needed in addition	Students need to think laterally, read copiously and have good powers of expression. Critical thinking, fluency, creativity.	The ability to solve open-ended problems is required in addition
Assessment	Outcomes of assessment objectively assessable		Outcomes of assessment require judgement	
	Objective tests and examinations often used		Essays, short answers, continuous assessment often used	
	Assessment by teacher using model answers and guides		Assessment by peers and self sometimes used. Assessment intuitive	

As is indicated by this nomothetic approach (ie one which categorises into boxes) Neumann et al take a position which sees disciplines as having a strong, structural and pervasive influence on practices (see figure 1) and so one which lies at or near cell 1 in figure 2, above.

Ylijoki's work (2000) on the *moral order of studying* in the disciplines of computer science, library science and informatics, public administration, and sociology and social psychology also stresses the significance of discipline. She argues that disciplines have their own traditions and categories of thought which provide the members of the field with shared concepts of theories, methods, techniques and problems. They also have their own social and cultural characteristics: norms, values, motor interaction, life-style, pedagogical and ethical codes (2000, p. 339). The "moral order" concept captures the basic beliefs, values, norms and aspirations prevailing in the culture which form the background ethos within the discipline. It operates as a form of social control but is also significant in providing individual identity. Thus the disciplines studied by Ylijoki can be seen as tribes with different but very coherent moral orders. These give rise to distinctive practices, for example learning by doing in computer science and, in library and information science, teaching and learning practices following the professional practices within libraries. Somewhat as a postscript Ylijoki does recognise the multivocality within disciplines, the significance of context and the dynamism of moral orders. But "in spite of all these reservations... it can be argued that disciplines still have a crucial role to play in the functioning of higher education" (p. 358).

In this first category of explanation it is considered possible to "totalise" whole disciplines, making general statements about large categories (in the following example about 'academics in the sciences' and 'humanities academics'):

Academics in the sciences perceive a connection primarily at the postgraduate level, whereas humanities academics are described as being divided on this issue. (Jensen, 1988, reported in Neumann, 1996, p 12).

Donald (1995), for example, argues that:

Disciplines are the central source of identity for faculty... The degree of coherence or structure within a discipline and the principle methods of enquiry affect the quality of learning (p53-54).

This position means that she too feels able to make totalising statements, at least in places:

Psychology professors talked of developing students' capabilities through a series of courses which focus on different methods... In education, case studies are seen as important instructional methods to aid students in making complex situations coherent. English literature professors paid attention to the analysis of text to determine the underlying assumptions... and they were concerned with the development of argument in their courses. (Donald, 1995, p 16)

Social-constructionist positions

Social-constructionist positions lie around the central part of axis A. The basic argument is that, together, academics construct narratives about the nature of knowledge in their discipline, sharing and developing these narratives over time. Each discipline may have multiple narratives, and sometimes contrasting ones. Thus, for example, in academic law there are contrasts between "Black Letter law" which emphasises the transmission to students of legal knowledge, and "critical legal studies" which emphasises the fostering of a critical perspective among law students.

Quinlan (1999) suggests that academic historians as a group can hold very different beliefs about the nature of the discipline, learning goals for students, teaching approaches and the nature of student difficulties. There are intergenerational tensions along these lines, with sets of beliefs shared among distinct groups of academic historians. She came to similar findings in her PhD study of engineering (1996). Hers is a social, not a psychological explanation (1999, p. 462), with the departmental context seen as very significant.

In the literature on the teaching-research nexus, examples of authors who hold such a position are Brew (2003) and Robertson and Bond (2001). The latter state:

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. (p. 10).

In terms of research practices, Latour and Woolgar (1986) and Gilbert and Mulkey (1984) argue that there may be a narrative of objective and rigorous research practices, especially in the natural sciences. However the process of research is very much conditioned by social and psychological events and interactions in the laboratory or other context of research. It is a messy, social business, according to Brew (1999, 2002), which is only loosely linked to epistemological structures.

Many of the studies looking at the construction of such epistemological narratives and the significance for the 'teaching-research nexus' tend to understate or occlude the significance of *multiple* narratives and *conflicting* narratives within the same discipline. Instead they characterise the situation as much more monolithic than it often is.

This central position on axis A leaves room for multiple influences on practices, which interact with each other; for example institutional context and epistemological structures. An example here is Lattuca and Stark (1995) who place emphasis on this interaction:

Those who attempt to lead curricular reform may be more successful if they recognise both the strength of disciplinary culture and the campus contextual factors that make faculty redefine discipline cultures to meet local needs. (Lattuca and Stark, 1995, P. 340)

More recently Lindblom -Ylänne et al (2006) used two inventories administered to over 300 academics in three institutions in two countries to establish links between teaching and learning practises and discipline and teaching context. They found that teachers from 'hard' disciplines were more likely to report a more teacher-focused approach to teaching, whereas those teaching 'soft' disciplines were more student-focused, findings similar to those of Lueddeke (2003) and Trigwell (2002). The pure and applied categories were not significantly different, however. They also found though that teachers who have experienced different contexts or who change teaching context will sometimes adopt different approaches to teaching in those different contexts. Unfortunately this study is misnamed ("How Approaches to Teaching are Affected by Discipline and Teaching Context") because the methods used tell us only that teaching practices correlate with these two variables: *how* this happens can only be speculated upon.

Recent studies have suggested in some detail the ways in which the nature of disciplines might interact with more social factors. For example *ways of thinking and practising* (McCune and Hounsell, 2005) is a concept which is designed to express the particular understandings, forms of discourse, values and ways of acting which are central to graduate-level mastery of a discipline or subject area. The notions of *threshold concepts* and *troublesome knowledge* developed by Meyer and Land involve those ideas, techniques and concepts which create blockages to students, inhibiting academic progress. They tend to be counter-intuitive and so difficult to grasp. However, once mastered, troublesome knowledge can take students across the conceptual threshold:

A threshold concept can be considered as a key to a portal, opening up a new and previously inaccessible way of thinking about something. It represents a

transformed way of understanding, or interpreting, or viewing something without which the learner cannot progress. As a consequence of comprehending a threshold concept there may thus be a transformed internal view of subject matter, subject landscape or even world view. (Meyer and Land, 2003, p 1)

The significance of such epistemological concepts of practices is that they guide what lecturers consider to be appropriate ways of helping students come to terms with them: for example in media studies the use of shocking videos to challenge students' world view, or in electronic engineering ways of dealing with student difficulties in understanding the significance of circuit characteristics. However the Edinburgh team make it clear that there are multiple influences, including contextual influences, at work in conditioning practices: they are located around the middle of the axes in figure 1, not at extreme positions. Specific contexts can offer both affordances and constraints in terms of different ways of thinking and practising. As with other studies which recognise multiple conditioning factors, the team suggest that particular contexts can evoke responses which may be muted elsewhere. This recognition is much stronger than for example in Ylijoki's approach (2000), with which it otherwise has some commonality.

The work of Shulman (2005a and b) on signature pedagogies and of Huber (2002a and b) on disciplinary styles, both at the Carnegie Foundation for the Advancement of Teaching, bear many similarities to the approach adopted at Edinburgh. Shulman argues that in the professional disciplines at least there are 'signature' approaches to teaching and learning, for example the practice of doing clinical rounds with novice medics in medicine or the use of 'accountable talk' in law schools where case law is being taught and debated. Shulman writes:

What I mean by "signature pedagogy" is a mode of teaching that has become inextricably identified with preparing people for a particular profession. This means it has three characteristics: One, it's distinctive in that profession. Second, it is pervasive within the curriculum. So that students learn that as they go from course to course, there are certain continuities that thread through the program that are part of what it means to learn to "think like a lawyer," or "think like a physician," or "think like a priest." There are certain kinds of thinking that are called for in the rules of engagement of each course, even as you go from subject to subject. The third feature is another aspect of pervasiveness, which cuts across institutions and not only courses. Signature pedagogies have become essential to general pedagogy of an entire profession, as elements of instruction and of socialization. (Shulman, 2005b, p. 9)

Signature pedagogies are not necessarily the 'best' way to teach and learn according to Shulman, and neither are they inevitable. However, they do work, at least for the purposes for which they were originally designed, and they have become established routines wherever a particular profession is taught. They are the product not only of disciplinary characteristics but of "complex sociological and political" factors (ibid, p. 15).

Disciplinary styles, meanwhile, apply more broadly than just the professions. They offer conceptions that guide enquiry, influencing the problems we choose, the methods we use, and the arguments we find persuasive. The disciplinary style also

shapes (but does not determine) the teaching and learning methods used, giving academics:

a ready-made way to imagine projects and present their work—for example, metaphors such as the classroom as laboratory, as text, field site, or theater, might point you to different methods of inquiry and styles of analysis. (2002b, p 4)

However, like the WTP approach there is no singular driving mechanism at play here according to Huber. Disciplines are recognised to be divided and fissiparous:

each discipline has its own intellectual history of agreement and dispute about subject matter and methods that influence what is taught, to whom, when, where, how, and why. (Huber, 2002b, p. 4).

Individual agency positions

In these positions, to the right of axis A, the role of individual choice and action, beliefs and attitudes is the most significant variable. This understanding of the link between disciplines and practices is based on methodological individualism, which approaches the study of societies and organizations with the assumption that individuals' thoughts and decisions are more significant than the structures they operate within. It is individuals' agency, their decisions and actions, which shape the institutions and social circumstances they operate within rather than vice versa.

Some studies suggest that self-selection into disciplines by particular sorts of personality types is a better explanation for any consistencies discovered within disciplines than, for example, the influence of epistemological structure. Greed (1991) looking at surveying as taught in universities argues that personality and background are significant in determining the type of individual who goes into that profession. Stevenson and Sander (2002) whose title begins *Medical Students are From Mars* argue that medical students arrive at university suspicious of student-centred learning methods and prefer more didactic ones. Their learning styles and general approach to studying as well as their experiences make them prefer what they see as more efficient and authoritative methods. As some of these students become lecturers they will tend to replicate their own preferred teaching styles, the argument runs, particularly as these are the ones still preferred by the types of students they find themselves teaching.

The outcome of student and staff choices is, again, regularities across the disciplines in terms of teaching learning and assessment practices. Stevenson and Sander for example might agree with the depiction by Neumann et al of disciplinary differences in relation to these practices (table 1). However the hypothesized causal mechanisms are very different – for Neumann et al regularities and differences in practices across the disciplines are the result of structural determination by disciplinary knowledge differences. For Stevenson and Sander by contrast such regularities are the product of human choice of their preferred discipline and profession.

Other positions which lie roughly in the same area of axis A suggest that individuals develop narratives about their discipline, take individual positions on teaching and learning as well as research. Thus the psychological makeup of individual people, their life journey and experiences as well as the choices they make eventually lead to the particular position with regard to the teaching-research nexus.

Bain et al (1998) suggest that “the educational context in which students learn is heavily influenced by the epistemological and educational assumptions of their academic teachers” (p. 49), a position which is replicated in much of the ‘teachers’ beliefs’ literature, for example Hativa and Goodyear 2002. Taking three individual teachers as case studies (Joy, Frank and John) Bain et al draw on phenomenographic studies and concepts to explore the differences between the three in terms of their pedagogical and curriculum beliefs and the ways these relate to their practice. They conclude that:

...academics differ in their beliefs about which forms of knowledge are valuable, how knowledge should be organized for learning, and what should occur during teaching and learning, and these differences influence the methods which they and their students use (Bain et al, 1998, p 56).

Here the link to discipline is almost entirely lost. Indeed, these authors choose to dismiss that link by focusing on the different orientations towards teaching and learning that can be found within the same discipline, quoting (p. 50) Quinlan’s (1999) finding that two historians differed in thematically consistent ways. In this they choose to ignore Quinlan’s major thesis that discipline does have a significant impact on LTAC practices, and that fractures in the discipline are ‘recapitulated’ at the individual level (Quinlan, 1999). Quinlan explicitly rejects an individualistic approach:

...this study has gone beyond most psychologically oriented studies of teacher thinking, by situating individual faculty members within the context of a department, a university and a discipline. (1999, p 462)

Psychologically-oriented approaches, such as phenomenographic ones, tend to lack an appreciation of context generally, and of the social context of teaching and learning practices, values and attitudes.

Part 2 Literature on the Teaching-Research Nexus

The Nexus: Introduction

Clark's 1994 paper offers one of the earliest overviews on what he calls the research-teaching-study nexus. In this he asks how much of the relationship exists among the activities involved in research, teaching and "study" or learning. Is there complete independence, or some form of compatibility or, at the extreme end, so much in common that "we can hardly tell one from another"? He looks at the conditions which enable the three activities to be more closely linked, arguing firmly that a strong nexus is a good nexus. Like much of the later literature he moves through different levels of analysis: from the national system to the University and down to the "factory floor" of higher education. He concludes:

The nexus is a magnet for resources, power and prestige. Nations honour it, academics pursue it, institutions seek to subsidise it; but as an increasingly expensive relationship, the research-teaching-study nexus tests the limit of scarce resources....Increasingly esoteric in substantive content, the nexus also tests the limits of university education. Its application pulls back from all students to limited cadres of highly advanced students... Institutionally delimited, the nexus becomes virtually *the* basis for the differentiation of higher education among types of institutions and across degree levels. (Clark , 1994, p. 16)

A Normative Literature

Clark is right to note that the issue of the nexus is not value-neutral, and this is reflected in the literature in this area. Indeed the very word *nexus*, meaning "that which unites or binds", carries an integrative and functional overtone. In the main the literature is characterised by a normative perspective which argues that there is strong value in enhancing the teaching-research nexus in terms of improving student learning and in other areas. There is a common assumption that this enhanced relationship between teaching and research can and should be achieved. Brew (2006, p xiv) writes "I am passionate about bringing research and teaching together because I believe that this is the key to the inquiry-based higher education that I think we need for the future". Jenkins (2004) begins his review of the research evidence on the teaching-research links with the section entitled "Statements of belief on the importance of teaching-research connections". There is however no corresponding section of statements of belief of the reverse even though, as Coate, Barnett and Williams (2001, p. 158) note "there are a range of relationships – both positive and negative – between teaching and research". In an earlier article (2000) Jenkins admits to having been previously biased in the other direction – believing that there was a negative or null relationship between teaching and research and viewing data from that perspective.

The few dissenting voices on the dominant positive view of at least the potential for research and teaching to be mutually beneficial include Barnett (1992 – though by 2000 he appears to have changed this position) and Webster (1985) who see the teaching role and the research role as separate enterprises which require different sets of skills and abilities. Romainville agrees (1996) regarding the persistent belief in complementarity as somewhat “masochistic”. More neutrally, Ramsden and Moses (1992) found that there was no association between good teaching and the relationship with research across Australian universities. Good teaching can very well exist outside a strong research context, they conclude. Jenkins (2004) acknowledges that some research findings are ambivalent about the (at least potentially) positive relationship between research and teaching. He cites the conclusions from Zaman’s (2004) review:

... the evidence gathered for this document suggests that research and quality teaching are not contradictory roles. However, we cannot conclude from the information at hand that the link is strongly positive. The evidence indicates the relationship may be modestly positive, though it is likely to be stronger at postgraduate than undergraduate levels. The overall quality of the statistical analyses on which these conclusions are based is not high (Zaman, 2004, p.5).

Rowland (2000) and Badley (2002) take a strong position that goes beyond mere complementarity, arguing that teaching and research are in effect the same activity (inquiry), simply with different audiences. Research has more ‘male’ characteristics and teaching more ‘female’, according to Rowland. The more usual position is that in an ideal world there would be a ‘seamless blend’ (Clark, 1987, p 30; Colbeck, 1998) between teaching and research so that academic staff and students both benefit from the synergies achieved. Boyer’s (1990) “complementary” scholarships of discovery, integration, application and teaching can be included in this category of thinking.

Coate et al (2001, p 165) summarise the possible relationships in this way:

Table 2: Possible relationships between teaching and research (1) (Coate et al, 2001)

<i>Integrated</i>	
<i>Research and teaching are not distinct, considerable overlap (if not identical)</i>	
<i>Positive: Research has a positive influence on teaching</i>	<i>Positive: Teaching has a positive influence on research</i>
<i>Independent</i>	
<i>Research and teaching independent of each other (neutral relationship)</i>	
<i>Negative: Research has a negative impact on teaching</i>	<i>Negative: Teaching has a negative impact on research</i>

It is, however, entirely possible that the relationship might be positive in one direction and negative in the other: for example that research might positively influence teaching but that teaching might negatively influence research. Thus the table should include an additional row:

Table 3: Possible relationships between teaching and research (2)

<i>Integrated</i>	
<i>Research and teaching are not distinct, considerable overlap (if not identical)</i>	
<i>Positive: Research has a positive influence on teaching</i>	<i>Positive: Teaching has a positive influence on research</i>
<i>Independent</i>	
<i>Research and teaching independent of each other (neutral relationship)</i>	
<i>Negative: Research has a negative impact on teaching</i>	<i>Negative: Teaching has a negative impact on research</i>
<i>Mixed</i>	
<i>Teaching positively influences research, research negatively influences teaching</i>	
<i>Teaching negatively influences research, research positively influences teaching</i>	

Moreover it is likely that any pattern of relationships will hold true only for certain types of case: disciplines, institutional contexts, levels of course, subject matter and so on. Colbeck’s excellent paper (2004) based in part on observational studies of faculty in different disciplines does show in some detail how disciplinary differences and other factors are important in this relationship. (Though, as an aside, that paper is strangely titled: it is not clear in what way Colbeck is actually applying a ‘cybernetic systems model’ within it).

Notwithstanding the fact that there is some disagreement, the dominant normative position in the literature is that teaching and research can and should be synergistic. Jenkins and Zetter speak for many:

We are convinced that re-shaping our departments in a way that better focus on the nexus can aid student learning, staff morale, their pride in their department and the overall effectiveness of the department and the institution. (Jenkins and Zetter, 2003, p 22)

This belief in and promotion of the nexus is not a coincidence of course. The relationship between teaching and research is a very political issue: the UK government has misinterpreted the findings from the Hattie and Marsh (1996) meta-analysis of studies of the relationship to justify a funding policy which separates teaching and research, with separate and very different funding streams for each. Taken to its logical conclusion this could mean a system in which there are teaching-only universities and research intensive universities, with research funding very concentrated on the latter. Many, though not all, academics find this idea anathema. Meanwhile other areas of funding policy in the UK have tended to promote research rather than teaching, an inappropriate priority for those interested in teaching and student learning. The Research Assessment Exercise (RAE) has focused academics’ and managers’ attention very strongly in the direction of research and has led to some extent to the commodification of research, with academics being encouraged to deliver assessable products as quickly and frequently as possible. (Elton , 2000; McNay, 1997; Jenkins, 1995). While success in this field leads to financial reward for universities there is little or no institutional financial reward for excellence in teaching and learning.

A Distinctive Epistemological and Ontological Position

Related to the normative character of much of this literature are the ontological and epistemological positions adopted. Ontologically the usual standpoint is foundationalist and empiricist. There is generally an assumption of an objectively verifiable 'reality' in existence which research and scholarship can capture, or at least can approach with some degree of proximity. Epistemologically the approach tends to be empiricist and instrumentalist; that is there is an assumption that a correct knowledge and understanding of reality can be rendered through empirical studies of sufficient rigour. Findings can then be used to change practices for the better, in ways which are more attuned to empirical realities.

Much of this, of course, comes close to a positivist ontological position

An example may clarify the point. Jenkins and Zetter (2003, p 13) use work by Gibbons et al (1994) to make the claim that professional and vocational areas of knowledge are moving to mode 2 forms of knowledge creation (ones which are interdisciplinary, temporary, task-oriented rather than traditionally disciplinary in character). Here is a simple depiction of part of reality based on a particular type of research used to describe reality and, ultimately, offer proposals for changing it.

So what is problematic about adopting a foundationalist-empiricist perspective? One of the issues is to do with lacunae in the analysis from this perspective. Missing are the following:

- a) Allowance for the fact that social life is in constant change in multiple directions and in a contextually-contingent way.
- b) Acknowledgement of the role of theory: either of tacit theories underpinning the work referred to or of alternative theoretical perspectives. This work is based on abstracted empiricism. How one should theorise and conceptualise, for example, "students", "disciplines", "institutions" and "departments", and the extent to which such concepts are useful is rarely addressed.
- c) An absence of the many "isms" which permeate much of the rest of social science: modernism; feminism; critical social theory and the rest. Bourdieu, Foucault, and many of the other stars of social science make no appearance on this stage.

There are exceptions to this critique of course: Brew (1999, p. 300) calls for a recognition of the "kaleidoscopic, ever-changing nature of the relationship between teaching and research in the context of challenges to ideas about knowledge and knowing" among those looking at the teaching-research nexus.

Problems Arising in Normative Foundationalist-Empiricist Instrumentalism

This stance has the effect of de-focusing many authors in terms of the complexities of the relationship between teaching and research in universities and occluding some of the dysfunctional characteristics that such a relationship can have. In particular it is

noticeable that there are multiple possibilities as to what the benefits of this relationship are, and that these are often conceptually elided. They include:

- a. That students should become researchers (Scott , 2002, p 14)
- b. That students and lecturers should research together (NCIHE , 1963, para 555)
- c. That teaching is ‘enhanced and informed’ by the lecturer being a researcher (NCIHE , 1997 p 8);
- d. That understanding the process of knowledge generation helps students understand the nature of supercomplexity (Barnett, 2000)
- e. For staff, creating synergies between research and teaching can be time-efficient (Garrick and Rhodes, 2000; Zetter , 2002b)
- f. For Departments strong in one but not the other funding from the stronger can be used to enhance the weaker. (Zetter, 2002b)
- g. That because both teaching and research are “about learning” they can enhance learning when combined (Brew and Boud, 1995).

Zetter (2002b) usefully summarises these links as falling into three categories:

1. Experiential - as a process which benefits students and staff
2. Conceptual - in terms of societal needs and the development and communication of knowledge
3. Operational - in terms of the reciprocity of teaching and research as learning activities.

However in the literature itself the precise nature of the linkage being referred to is almost always not delineated, and unacknowledged conceptual shifts occur.

The Teaching-Research Nexus: dysfunctions?

Because of the normative nature of most of this literature any dysfunctional linkages between teaching and research are usually given limited attention with most discussions focussing on one issue: the distractions and absences of staff that research can create to the detriment of their teaching and learning role and to the feelings of exclusion that students can have as a result (eg Zamorski , 2000). Other dysfunctional relationships are reasonably easy to imagine. A far-from exhaustive list would include:

- Time spent teaching squeezes research into a ‘spare-time’ activity
- Speaking to two different types of audience (research specialists and beginning students) results in poor communication with one or both.
- Research-led teaching results in a very narrow syllabus
- Students are exposed to a narrow perspective

The differential effects of any dysfunctional relationships on different categories of staff and students have received very little attention in the literature. Female staff for example are more likely to spend time with students doing what American feminists call ‘mom work’ (pastoral and counselling work) and so this dimension of teaching is more likely to have detrimental effects on the time available for research than it is for male academics. As far as students are concerned, an elite research department may forget its duty to assist in widening participation when recruiting students.

Strategies for Enhancing the Teaching-Research Nexus

If there is a problem about the teaching-research nexus it is that in a “state of nature” they are independent constructs and so the benefits of their binding need to be built deliberately (Pascarella and Terenzini, 1991; Hattie and Marsh, 1996; Marsh and Hattie, 2002).

Ways in which the link can be developed and enhanced are:

1. In the design of courses (Brew and Boud, 1995, p 272)
2. By developing students’ understandings of the role of research in their disciplines (Jenkins and Zetter , 2003)
3. By developing students’ abilities to carry out research in their disciplines (Jenkins and Zetter, 2003).
4. Privileging research opportunities to selected students (Jenkins and Zetter, 2003)
5. Managing students’ experience of staff research (Jenkins and Zetter, 2003)
6. Making research-based learning the standard (Jenkins and Zetter, 2003)
7. Making the first year of undergraduate courses enquiry-based and build on that experience(Jenkins and Zetter, 2003)
8. Culminating courses with a capstone experience of learning through research (Jenkins and Zetter, 2003)
9. At the departmental level: developing an understanding of the nature of the nexus in one's own context; review current practice and culture; develop appropriate staffing policies; integrated policies and structures for teaching and research.

Disciplines and the Teaching-Research Nexus

However, operationalising these strategic and tactical proposals is made more complex by the fact that both “research” and “teaching” vary by discipline. This variable mediates in important ways what such maxims actually should mean in practice (Parker, 2002).

The literature on the nexus claims the following differences in disciplinary research:

1. There are ‘signature research methodologies’ in particular disciplines: informal learning and evidence-based research in medicine and health sciences for example (McKee , 2002)
2. That mode 2 knowledge creation approaches have become prevalent in professional and vocational areas (Gibbons et al, 1994; Gibbons , 1997; Nowotny et al 2001)

Unfortunately the literature itself fails to make such clear-cut distinctions in terms of the claims made or causal mechanisms proposed. Healey (2000) for example says the following in summarising arguments linking disciplines and teaching and research practices:

...for most academic staff their primary allegiance is to their subject or profession, and their sense of themselves as staff at a given institution is secondary (Becher , 1994; Diamond & Adam, 1995b; Gibbs , 1996; Jenkins , 1996). Secondly, there is a strong perception among staff that there are significant differences among disciplines in what academics do and how those activities are described.

There is much supporting evidence for these perceptions. Biglan (1973), for example, established that the structure and output of university departments are related to the characteristics of academic subject matter; while Kolb (1984) found that disciplines form clusters based on the learning styles predominant among their students. Furthermore, Moses (1990) has demonstrated that attitudes to teaching and research tasks, as well as patterns of communication, differ in different disciplines; while Donald (1997) has shown that learning goals vary between disciplines. These findings point to the need to consider how the characteristics of disciplines define limits on the extent to which studies in one area can be generalized to areas whose subject matter is different (Biglan, 1973, p. 213). It is important, therefore, that the scholarship of teaching in higher education is not divorced from the content of the discipline being taught. As Rice (1996, p. vi) notes: “improvement of teaching needs to be rooted in the intellectual substance of the field”. This principle has guided the development of the Carnegie Academy for the Scholarship of Teaching and Learning. For example, its Pew National Fellowships Program selects Carnegie Scholars in disciplinary groups to provide collegial interactions within the discipline (Cambridge , 1999). (Healey , 2000, p 173)

Building on this picture of the background Healey argues that:

The broad nature of geography means that geographers are used to borrowing and adapting ideas from outside their own discipline. Arguably, geographers are also more open than many other disciplines to innovations in learning, teaching and assessment (Healey , Jenkins, & Kneale, 2000). There is evidence that in the United Kingdom and the United States, geography is one of the leading disciplines in pedagogic innovation. (Healey, 2000, p 13)

In both these passages we see movement between an epistemological explanation and a social one. Referring back to figure 1, there is something of a shift in explanatory position along the axes (A, B and C). Some statements are based on epistemological characteristics (a strong essentialist position, close to box 1 in figure 2) while others either offer no causative mechanism, being based on empirical data or claims, while still others refer to social causes. A multi-causal explanation is of course a perfectly reasonable one, but here there is shifting and mixing of types of explanation. This mixing would not matter if there weren't such significant differences between the different types of explanations. For example, although disciplines are in a constant state of change (Clark, 1996) their rate of change is much slower and less amenable to deliberative intervention than are attitudes. Epistemological disciplinary differences are, in addition, much less contextually contingent than social ones.

Disciplinary Case Studies

Griffiths (2004) conducted a case study of the teaching-research nexus in the built environment area. His conclusion concurs with Brew's view (1999) that the particular characteristics of knowledge production have a strong influence on the nature of the relationship between teaching and research. In built environment disciplines the professional bodies tend in effect to restrict academic research, promoting instead "curriculum drift": the inclusion of more and more substance in the curriculum. Moreover staff themselves tend to come from a professional rather than a research background, sometimes having an ambivalent attitude towards research. This is compounded by the fact that students want, or are perceived to want, knowledge of how to do the job, not how to conduct research in the area. These negative factors are mitigated to some extent by the presence of enquiry-based approaches in some areas of built-environment disciplines which spill over into the academy, particularly at the dissertation stage of an undergraduate degree. For Griffiths then the characteristics of knowledge production is the significant variable in conditioning the nature of the teaching-research nexus in disciplines.

In a very small study of academic historians Mclean and Barker (2004) found two distinctive approaches to the understanding of student progression in the discipline: the "acquisition of transferable skills" and "becoming a practising historian". They conclude that the first is an impoverishment of higher education while the second requires both students and staff to engage in research practices. Indeed Maclean and Barker consider the practices being instilled in students in the "becoming a practising historian" model to be indistinguishable from research. Unlike Griffiths' study this one does not problematise knowledge-generation practices but takes them for granted. This study then lies within the dominant approach to thinking about teaching-research nexus: the normative foundationalist-empiricist one.

The Significance of Institutional Context

Jenkins (2004) notes that there is limited research on the relevance of institutional context to the teaching-research nexus compared to other factors. Zubrick, Reid and Rossiter (2001) studied three contrasting institutions in Australia while Colebeck (1998) studied two contrasting institutions in the United States and Hattie and Marsh (2004) studied one institution in New Zealand. In each case internal policies and structures, the nature of their staff specialisms, recruitment policies and institutional missions had strong effects on the linkages (or lack of them) between teaching and research. In each case too departmental influences as well as disciplinary differences had a strong conditioning effect on any institutional factors. Of course disciplines and their institutional locations are not separate entities: choices are made in different institutions about the location of disciplines, often for reasons of convenience, economy or marketing: history might be in a social science faculty or a humanities one; law is sometimes in with social sciences or may be located in a management school.

In reviewing the literature Jenkins (2004) concludes that institutions are strongly impacted by national funding policies, which in the UK have largely had the effect of separating teaching and research (Gibbs, 2001).

The Teaching-Research Nexus and the Student Experience

Jenkins' (2004) review of the research evidence in this area found that in terms of students' *perceptions*, they appreciated their lecturers and courses being up-to-date in relation to current research in their discipline as well as lecturers being active and interested in the area they taught. On the downside students often did not feel that they were stakeholders in staff research: it had little to do with them (Neumann (1994; Jenkins , Blackman, Lindsay and Paton-Saltzberg, 1998; Lindsay , Breen and Jenkins, 2002). For students however there could be negative consequences of research, particularly in terms of staff absences and sabbaticals.

Astin's study of over 200 American institutions took an even more negative view:

a college whose faculty is research-orientated increases student dissatisfaction and impacts negatively on most measures of cognitive and affective development (Astin, 1993, p.363).

The need for better management of the teaching-research nexus within institutions is an extremely common theme in this literature. Any negative effects of research on teaching can be mitigated if things are better managed, it is argued.

One study at Oxford Brookes University distinguished between different categories of students according to their motivational and attendance characteristics (along the lines of early American research about student cultures) and found that those who did not desire contact with staff were more likely to have a negative view of research. Zamorski (2002, p426) sums up a common theme in her findings that:

Student engagement with research occurs in a number of forms and at many levels of learning. However, students do not always recognise this engagement, fully welcome it or find it to be sufficiently well taught to consider it a useful or pleasurable learning experience. Moreover, it seems that students who actively search for a closer engagement with research cannot always find or access it or they discover that the curriculum and assessment structures may interfere with such a desire.

Brew's (2007) review of the literature on research and teaching from the student's perspective found a mixture of positive and negative attitudes towards their teachers doing research.

Moving from perceptions to the impact of the nexus on *student learning and development*, Neumann (1994) usefully categorises the different forms of effect from the teaching-research nexus in terms of tangible (knowledge and skills), intangible (attitudes and approaches) and global (general direction of the curriculum). There is some weak evidence of effect in all three areas in some contexts, both from Neumann's study and others. According to some studies of the *intangible* influence, students who engage in enquiry led learning develop more sophisticated understandings of knowledge and its development (e.g. Blackmore and Cousin, 2003). This appears to be particularly the case at postgraduate level (Smeby , 2002).

Brew's (2007) review of the literature on students' responses to and learning from inquiry-based approaches to teaching and learning suggests that discipline is an important conditioning factor. While there was generally found to be a positive effect of these approaches on student learning, especially in some disciplines, Brew notes that initial student uncertainty needs to be well-managed and that the questions being researched by students need to be authentic, important ones for them.

It is worth noting though is that what is meant by "the nexus" tends to shift around from student perceptions of *staff* engaging in research to *students* being engaged in research of different sorts, though Brew's review (2007) is very clear about drawing this distinction. This is another example of the conceptual shifts that tend to occur in this area of inquiry as noted above. Jenkins (2004, p.30) acknowledges this:

perhaps we overstate or distort these relationships by referring to 'a' or 'the' teaching-research nexus.

Conclusions on the literature on the teaching-research nexus

The conceptual review above leads us to the following conclusions about the literature on the nexus:

1. Much of it takes a partial position so that the potential negative features of research-teaching interactions tend to be underplayed. The possibility that separating the research and teaching functions might be beneficial to both is rarely entertained.
2. Much of the literature is conceptually and theoretically underpowered: there is almost never any elaboration of how complex phenomena such as disciplines, universities, university departments and research practices might be best conceived.
3. There is a tendency in the literature to use terms in a slippery way, the idea of the "teaching-research nexus" itself being the prime example, all three terms in the concept being used in multiple ways. For example it is often unclear whether authors are referring to the influence on teaching and learning of students doing research, staff doing research, staff practices being informed by research, the curriculum being informed by contemporary research, the "research culture of a particular context" and so on. The nature of the connections, and the nature of "research" also remain similarly unspecified in many cases.
4. Causal theories are rarely developed. Precise mechanisms of influence, strength of influence and range of influence of different factors on others tend to be left unelaborated.
5. There is a tendency to make unsubstantiated assertions. Elton just manages to refrain from noting that, like the Bellman in Lewis Carroll's *The Hunting of the Snark*, some of this literature takes the view that telling us a thing three times makes it so (Elton, 2001, p 54).

6. The findings of the literature tend to state the obvious (Rowland, 2000): that in some cases there is a positive influence, and in other cases not, that students both appreciated and are sometimes irritated by staff engaging in research for example.
7. That any positive effects of the nexus sometimes need to be encouraged through institutional and national policy. The literature offers advice in this area, but this tends to ignore the political processes that go on at different levels. Governments, for example, tend to read into research what they want to read. The encouragement to departments to reflect on "their" practices and values is predicated on a particular conception of the nature of departments.
8. The studies designed to investigate the influence of disciplines find that disciplines are important. Those designed to investigate the influence of institutions on the nexus similarly find that institutional context is important. As in all other fields, the questions asked condition the results obtained.

Fruitful Directions for Further Research

One could continue in the foundationalist-empiricist instrumentalism vein, seeking to fill in the gaps in our knowledge about the teaching and research nexus (Jenkins, 2004 p. 32, helpfully offers a the map of where our knowledge still requires colouring in by more empirical research). One could use the same data collection instruments that are prevalent in the field, usually questionnaires and interviews, or one could even adopt more bold and innovative methods.

However as Rowland (2000) notes, such research is likely to continue to do little more than state the obvious such as the fact that:

some of the most inspiring teachers are able researchers, but not all; that some prominent researchers are good teachers, but not all. (Rowland, 2000, p. 1)

Or, one could add, that students find that there are both benefits and costs to their lecturers engaging in research, or that when they engage in research themselves the process is engaging and interesting but also slow and limiting in terms of the ground covered.

Arguably as important or more important than continuing to collect more empirical data is the expenditure of effort in theorising and conceptualising in more nuanced ways the lived experiences, influences and constraints on both staff and students as regards the teaching-research "nexus". Empirical studies of teacher and student attitudes to an experience of the nexus is a field that has already been well ploughed.

We concur with Coate et al (2001, p 173):

it may be that there should be less effort spent on trying to establish that research enhances teaching, and more of an understanding of the ways in which different relationships between teaching and research are shaped.

Brew (2003, p5) also agrees that it is time for to develop improved conceptual clarity:

we need greater clarity about precisely which aspects of research and scholarship academics are focusing on. It is important to be clear what we mean by research, what we understand by scholarship and how these ideas are related to conceptions of knowledge and approaches to teaching... Different ideas about the nature of research, scholarship, teaching and knowledge have different consequences....

In this article Brew herself offers some very useful ways of categorising both research and scholarship which add much to the debate about the nexus.

In terms of our questions, then, we formulate the pursuit of greater conceptual clarity in this way:

1. How are 'teaching' and 'research' within specific disciplines best conceptualised in order to understand the experience and effects of the "teaching-research nexus" within them?
2. How is institutional context best conceptualised in order to understand the ways in which it influences the experience and effects of the "teaching-research nexus" within particular contexts?

References

- Altbach, P. (ed.). (1996). *The International Academic Profession: Portraits from fourteen countries*. Princeton: Carnegie Foundation for the Advancement of Teaching.
- Amaral, Alberto, Meek, V.L. and Larsen, I. (eds.), (2003). *The Higher Education Managerial Revolution?* Dordrecht: Kluwer Academic Publishers.
- Astin, A.W. (1993) *What matters in college? Four critical years revisited*. San Francisco: Jossey-Bass.
- Badley, G. (2002) *A Really Useful Link Between Teaching and Research*. *Teaching in Higher Education*, Vol. 7, No. 4, 443-445.
- Bain, J. D., McNaught, C., Mills, C. and Lueckenhausen, G. (1998) *Understanding CFL Practices in Higher Education in Terms of Academics' Educational Beliefs: enhancing Reeves' Analysis*. Paper presented to the ASCILITE conference, Woolongong, December. Australasian Society for Computers in Learning in Tertiary Education,.
- Barnett, R (1992) *Improving Higher Education: Total Quality Care*. Buckingham: Open University Press/SRHE.
- Becher, T. (1984) *The Cultural View*. in B. Clark *Perspectives on the Higher Education System*. San Francisco: University of California Press.
- Becher, T. (1989) *Academic Tribes and Territories: intellectual enquiry and the cultures of disciplines*. Buckingham: Open University Press/SRHE.
- Biglan, A. (1973) *Relationships between subject matter characteristics and the structure and output of university departments*. *Journal of Applied Psychology*, 57(3), 204-213.
- Blackmore, P. and Cousin, G. (2003) *Linking teaching and research through research-based learning*. *Educational Developments*, 4(4), 24-27.
- Boyer, E. 1990 *Scholarship Reconsidered: priorities of the professoriat* Carnegie Foundation for the Advancement of Teaching.

- Brew, A. (1999) Research and Teaching: Changing Relationships in a Changing Context. *Studies in Higher Education*, 24,3, 291-301.
- Brew, A. (1999) Research and teaching: Changing relationships in a changing context. *Studies in Higher Education*, 24, 3. 291 – 301.
- Brew, A. (2002) *The Nature of Research*. London: Sage.
- Brew, A. (2003) Teaching and research: New relationships and their implications for inquiry based teaching and learning in higher education. *Higher Education Research and Development*, 22, 3–18.
- Brew, A. (2007) Research and Teaching from the Students' Perspective. Available at http://portal-live.solent.ac.uk/university/rtconference/2007/resources/angela_brew.pdf Last accessed 30.4.07
- Brew, A. and Boud, D. (1995) Teaching and research: Stabilising the vital link with learning. *Higher Education*, 29, 261–273.
- Clark, B (1987) *The Academic Life: small worlds, different worlds*. The Carnegie Foundation for the Advancement of Teaching, Princeton.
- Clark, B. (1994) The Research-Teaching-Study Nexus in Modern Systems of Higher Education, *Higher Education Policy*, 7, 1, 11-17.
- Clarke, J., Gewirtz, S. et al. (Eds) (2000) *New managerialism, new welfare?* (London, Sage).
- Coate, K., Barnett, R. and Williams, G. (2001) Relationships between teaching and research in higher education in England. *Higher Education Quarterly*, 55(2), 158–174.
- Colbeck, C. (1998) Merging in a seamless blend. *The Journal of Higher Education* 69(6), 647–671.
- Donald, J. (1995) Disciplinary differences in knowledge validation. In N. Hativa and M. Marinovich (eds) *Disciplinary Differences in Teaching and Learning: Implications for practice*. San Francisco: Jossey-Bass.
- Donald, J. (1997) *Improving the Environment for Learning: academic leaders talk about what works*. SF: Jossey-Bass.
- Elton, L. (2000) The UK Research Assessment Exercise: unintended consequences. *Higher Education Quarterly*, 54 (3), 274–283.
- Elton, L. (2001) Research and Teaching: conditions for a positive link [1] *Teaching in Higher Education*, Vol. 6, No. 1, 2001, 43-56.
- Enders, J. (ed.) (2001). *Employment and Working Conditions of Academic Staff in Europe*. Frankfurt: Gewerkschaft Erziehung und Wissenschaft.
- Enders, J. and Teichler, U. (1997). A victim of their own success? Employment and working conditions of academic staff in comparative perspective. *Higher Education*. 34(3).
- File, J. and Goedegebuure, L. (eds.), (2003). *Real-time Systems. Reflections on higher education in the Czech Republic, Hungary, Poland and Slovenia*. Brno: Vutium.
- Gibbons, M. (1997) Development of Science and Basic Research: the implications of mode 2 science, in Etzkowitz, H. and Leydesdorff, L. (1997) (eds) *Universities and the Global Knowledge Economy: a triple helix of university-industry-government relations*.
- Gibbons, M. et al. (1994) *The New Production of Knowledge*. London: Sage.
- Gibbs, G. (2001) *Analysis of Strategies for Teaching and Learning*. http://www.hefce.ac.uk/Pubs/hefce/2001/01_37a.htm (accessed 27.11.01).

- Gilbert, N. G. and Mulkay, M. (1984) *Opening Pandora's Box: a sociological analysis of scientists' discourse*. Cambridge University Press.
- Greed C. (1991) *Surveying Sisters*. London: Routledge.
- 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.
- Hativa, N. and Goodyear, P. (2002) *Teacher Thinking, Beliefs and Knowledge in Higher Education*. Dordrecht: Kluwer.
- Hattie, J. and Marsh, H. W. (1996) The Relationship between Research and Teaching: A Meta-Analysis. *Review of Educational Research*, Vol. 66, No. 4 (Winter), pp. 507-542.
- Hattie, J. and Marsh, H.W. (2004) One journey to unravel the relationship between research and teaching. *Research and teaching: Closing the divide? An International Colloquium*, Winchester, March 18-19, http://www.solent.ac.uk/ExternalUP/318/hattie_and_marsh_paper.doc (accessed 15 February 2004).
- Healey, M. (2000) Developing the scholarship of teaching in higher education: a discipline-based approach. *Higher Education Research and Development*, 19(2), 169–189.
- Healey, M., Jenkins, A. & Kneale, P. (2000). Small worlds on an interconnected planet: Teaching and learning geography in higher education. In C. Rust (Ed.), *Improving student*.
- Jenkins, A. (2004) *A Guide to the Research Evidence on Teaching-Research Relations*. York: Higher Education Academy.
- Jenkins, A. and Zetter, R. (2003) Linking research and teaching in departments. http://www.heacademy.ac.uk/resources.asp?process+full_record§ion=generic&id=257 (accessed 24 January 2004).
- Jenkins, A. and Zetter, R. (2003) *Linking Research and Teaching in Departments*. York: LTSN Generic Centre
- Committee on Higher Education (1963). *The Robbins Report CMND 2154*.
- Jenkins, A., Blackman, T., Lindsay, R., Paton-Saltzberg, R., (1998) Teaching and research: Student perspectives and policy implications. *Studies in Higher Education*, 23, 2, 127 - 141.
- Kolb, D. (1984) *Experiential Learning: Experience at the source of learning*. New Jersey: Prentice Hall.
- Kolb, D. A. (1981) Learning styles and disciplinary differences. In A. Chickering, (ed.) *The Modern American College*. San Francisco, Jossey Bass.
- Latour, B. and Woolgar, S. (1986) *Laboratory Life: the Construction of Scientific Facts*. Princeton, N J.: Princeton University press.
- Lattuca, L. and Stark, J. (1995) Will Disciplinary Perspectives Impede Curricular Reform?, *Journal of Higher Education*, 65, 4, 401-426.
- Leonardo, Z. (2003) Discourse and critique: outlines of a post-structural theory of ideology. *Journal of Education Policy*, 18, 2, 203-214.
- Lindblom-Ylänne, S., Trigwell, K., Nevgia, A. and Ashwin, P. (2006) How Approaches to Teaching are Affected by Discipline and Teaching Context. *Studies in Higher Education* Vol. 31, No. 3, June 2006, pp. 285–298.
- Lindsay, R., Breen, R. and Jenkins, A. (2002) Academic research and teaching quality: the views of undergraduate and postgraduate students. *Studies in Higher Education*, 27(3), 309–327.

- Marsh, H.W. and Hattie J. (2002) The relation between research productivity and teaching effectiveness. *Journal of Higher Education* 73(5), 603–641.
- McCune, V. and Hounsell, D. (2005) The Development of Students' Ways of Thinking and Practising in Three Final Year Biology Courses. *Higher Education*, .
- McKee, A. (2002) Evidence-based practice in Health Sciences. *Exchange*, 3, Autumn, 19–20 <http://www.exchange.ac.uk/issue3.asp>.
- Miller, H. with Meyenn, R. (1998) Academic Managers: bosses or colleagues? International sociology of education conference, Sheffield, UK. 2-4 January.
- NCIHE (1997) Higher Education in the Learning Society. London: DfEE. (The Dearing Report).
- Neumann, R. (1994). The teaching-research nexus: applying a framework to university students' learning experiences. *European Journal of Education*, 29(3), 323–339.
- Neumann, R. (1996) Researching the Teaching-Research Nexus: A critical review. *Australian Journal of Education*, 40, 1, 5-18.
- Neumann, R., Parry, S. and Becher, T. (2002) Teaching and Learning in their Disciplinary Contexts. *Studies in Higher Education*, 27, 4, 405-417.
- Nowotny, H., Scott, P., and Gibbons, M. (2001) *Rethinking Science: Knowledge and the Public in an Age of Uncertainty*. Cambridge: Polity.
- Quinlan, K. M. (1999) Commonalities and Controversy in Context: a study of academic historians' educational beliefs. *Teaching and Teacher Education*, 15, 447-463.
- Ramsden, P. and Moses, I. (1992) Associations between research and teaching in Australian higher education. *Higher Education*, 23, 273–295.
- Rice, R. E. (1996) Making a place for the new American scholar, paper presented to AAHE Conference 'Faculty Roles and Rewards', Atlanta, GA, 20/01/96.
- Robertson, J. and Bond, C. (2001) Experiences of the Relation between Teaching and Research: what do academics value? *Higher Education Research and Development*, 20, 1, 5-19.
- Romainville, M. (1996) Teaching and research at university: A difficult pairing. *Higher Education Management*, 8, 135–144.
- Rowland, S. (2000) Teaching and research: A marriage on the rocks? Presented to the 6th European Conference on Educational Research Edinburgh 20 – 23 Sept. 2000 and published in *THES* Oct. 27, 2000 pp28-9.
- Rowland, S. (2000) *The Enquiring University Teacher*, OUP/SRHE, Milton Keynes.
- Scott, P. (2002) A lot to learn: we are all researchers now. *Guardian Education*. 8 January.
- Smeby, J.-C. (2002) Consequences of project organisation in graduate education. *Studies in Higher Education* 7(2), 139–51.
- Stevenson, K and Sander, P (2002) Medical Students are From Mars – Business and Psychology Students are from Venus – University teachers are From Pluto? *Medical Teacher*, 24, 2, 27-31.
- Taylor, F. W. (first published 1911) *The Principles of Scientific Management*. Available online at <http://www.eldritchpress.org/fwt/taylor.html>. Last accessed 13.2.07.
- Teichler, U. (2003). The Future of Higher Education and the Future of Higher Education Research. *Tertiary Education and Management*, 9.3: 171-185.
- Tight, M. (ed) *International Perspectives on Higher Education*.

- Trow, M. (1993) *Managerialism and the Academic Profession: the case of England*. Stockholm: Council for Studies of Higher Education.
- Trowler, P. (1998) *Academics Responding to Change: new higher education frameworks and academic cultures*. Buckingham: Open University Press/SRHE.
- Trowler, P. (1998). *Academics Responding to Change: New Higher Education Frameworks and Academic Cultures*. Buckingham: Society for Research into Higher Education and Open University Press.
- Webster, D. (1985). Does research productivity enhance teaching? *Educational Record*, 66, 60–63.
- Ylijoki, O-H. (2000) *Disciplinary Cultures and the Moral Order of Studying*. *Higher Education*, 39, 339-362.
- Zamorski, B. (2000) *Research-led teaching and learning in Higher Education*. Norwich: Centre for Applied Research in Education.
- Zamorski, B. (2002) *Research-led teaching and learning in Higher Education: a case*. *Teaching in Higher Education*, 7(4), 411–427.
- Zubrick, A, Reid, I. and Rossiter, P. (2001) *Strengthening the nexus between teaching and research*. Australian Department of Education, Training and Youth Affairs, Canberra. http://www.dest.gov.au/archive/highered/eippubs/eip01_2/01_2.pdf (accessed 28 January 2004).