A Review of Linking Teaching and Research in the Health Sciences and Practice Disciplines.

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Contents

Introduction

This review identifies and explores the links between teaching and research within the health sciences and practice disciplines. Along with seven other subject Centres, it is part of a larger project for the Learning and Teaching Support Network (LTSN) generic Centre, directed by Professor Alan Jenkins. The raison d'être of the larger project is to develop and support the links between teaching and research in higher education. Whilst the Centre for Health Sciences and Practice (HS and P) acknowledges the value of this, it was felt that such an objective could only start to be addressed once an understanding had been gained of what the current links were within the HS and P disciplines. In-depth telephone interviews were therefore conducted with a sample of senior teaching staff to ascertain their perceptions of, and attitudes towards, the links within their disciplines.

In keeping with the remit from the generic Centre the project explored discipline based research rather than pedagogical research and focused on undergraduate, rather than postgraduate student learning. A brief review of the health sciences and practice literature showed a dearth of material on the links between teaching and discipline-based research. The findings from the sample are not necessarily representative of the wider population, nor did they aim to be so. Rather the concern was to open up the debate and lay the foundations for future work.

It is important to note that the interviewing process itself began to open up an area that is still not generally regarded as highly significant in the health sciences and practice disciplines. For many interviewees it was a relatively novel area of discussion and few had well rehearsed narratives to draw on. Although individuals were linking teaching and research to varying degrees, it was not something that they were particularly conscious of. Many had clearly had very little opportunity to consider the way in which they linked teaching and research but by the end of the interview were talking and debating fairly freely around the issues. There is evidence to suggest that the interviewing process itself will play some part in 'starting the ball rolling' in terms of developing increased awareness and interest amongst teaching staff. For example, three interviewees took the interview schedule, sent out to them prior to interview, to departmental meetings to ascertain the views of their colleagues. Two did this prior to interview and one after she had been interviewed. Another interviewee has shown much enthusiasm in setting up a Special Interest Group (SIG) on linking teaching and research in the health sciences and practice disciplines. This is currently being supported and promoted by the LTSN HS and P Centre. The recent White paper (The Future of Higher Education, 2003) and other government plans are likely to further increase any nascent interest in the area.

Methods

Twenty-one in-depth telephone interviews were conducted with senior teaching staff from 13 health science and practice disciplines. Potential interviewees were obtained from Centre lists of subject advisors and key contacts. Thirty individuals were contacted and 21 agreed to be interviewed. Eight were from old universities and 13 from new universities. Three were male and 18 were female. The following disciplines were represented on at least one occasion: nursing, midwifery, public health, physiotherapy, occupational therapy, speech and language therapy, complementary medicine, osteopathy, nutrition and dietetics, radiography, gerontology, podiatry, and pharmacy. All four UK countries were represented in the interviews. Ten interviews were with heads of departments or heads of divisions. The interviews lasted for 30 minutes on average but ranged from ten minutes to one hour.

They were based on an aide memoir (see appendix) that was send to interviewees prior to interview. Interviews were audio-taped and professionally transcribed. Permission to tape the interview was obtained from each interviewee prior to the start of the conversation and assurance were made that their anonymity would be preserved in any verbal or written outputs.
The methodology was qualitative in design. In particular it drew on phenomenological principles which "seek to understand, describe and interpret human behaviour from the perspective of the person or participants being studied (Finlay, 1999). The aim of the interview was therefore to gain an understanding of the interviewee's own position and that of their department or faculty in relation to the links between teaching and research.
The analytic process began during data collection. The researcher made notes after each interview of key points that arose in the conversation with participants. These helped to clarify the emerging issues and allowed minor adjustments to be made to the interview schedule. Each transcript was then read through carefully to identify the links between teaching and research and the perceptions and attitudes of teaching staff towards these links. The data were then explored in relation to the available literature and checked against the research notes to ensure that issues perceived as important to each interviewee had been addressed. A draft copy of the review was sent out to interviewees inviting their comments and allowing for some minor adjustments to be made. Quotes from interviews are given because they represent the views of many or to highlight a specific point. Pseudonyms are used throughout the paper to maximise interviewee anonymity.

Background literature

The generic literature relating to the link between discipline based research and student learning focuses almost exclusively on the link between staff research activity and teaching quality. The conventional view is that to be an effective teacher one needs to be involved in research and that there is a vital interdependence between teaching and research. Such a view is promoted by many academics across the world and enshrined in many university mission statements. However, the research evidence overall does not suggest a strong association between staff research and teaching quality. Much of it is statistical in design and comes from non-UK sources, in particular the USA and Australia. For example, in a meta-analysis of 43 of the research studies Feldman (1987) concluded that research productivity is only slightly associated with teaching quality and the likelihood that it actually benefits teaching is extremely small. Similarly, in another meta-analysis Hattie and Marsh (1996) combined 58 research articles contributing 498 correlations and found no significant correlation between 'quality' in teaching and 'quality' in research'. These findings have been used in a recent government white paper to justify the move towards separating discipline-based research from undergraduate teaching and concentrating it in particular departments and universities (The Future of Higher Education, 2003). These studies can be criticised, however, for their narrow definition of what constitutes research and teaching quality. For the most part they used simple quantifiable measures, such as publication counts and student ratings. There has been no attempt to investigate what the relationship is between research and teaching at a departmental and institutional level and whether there is any interaction between the two. (Brew and Boud, 1995; Robertson and Bond, 2001).

In the UK there is some indication that strong positive correlations between teaching and research can and do exist at a subject and departmental level. Research

Assessment Exercise (RAE) grades and Teaching Quality Assurance/Quality Assurance Agency (TQA/QAA) ratings were found to be positively correlated in many UK institutions (Jenkins et al, 2003). Jenkins et al (2003) point out that this is often used to argue that good teaching is functionally dependent on high quality research by staff in that department. However, they suggest that equally the TQA/QAA grades may reflect higher levels of resources in research-based institutions or departments and external perceptions of reputation developed in large part through research.

A more convincing challenge to the lack of an association between staff research and teaching quality comes from a small number of qualitative studies conducted in the UK. For example, a series of research studies conducted at Oxford Brookes showed that lecturer research is, in general, positively valued by both undergraduates and postgraduates and perceived to have positive effects on their learning (Jenkins et al, 1998; Lindsay, Breen and Jenkins, 2002 – see Jenkins et al, 2003). Interviews and focus groups showed how both UG's and PG's think that research activity makes their lecturers more enthusiastic, ensures that their knowledge is up to date and increases their credibility. On the downside, however, they felt that involvement in research meant that lecturers are less accessible to their students and if narrowly focused research is given too much attention curriculum bias can result. Very similar findings have been found in the work of Zamorski (2000).

These qualitative studies take students as their starting point and focus on the actual *relationship* between staff research and quality in teaching rather than correlating teaching and research as separate entities. They indicate that staff and departmental research has much potential in enhancing the quality of both undergraduate and postgraduate teaching but that such a relationship is dependent on positive links being forged between the two. These qualitative studies are in keeping with the assertion that further understanding needs to be sought through 'more fine-grained studies' that gather evidence from the bottom up rather than the top down. (Brew and Boud, 1995; Hounsell, 2002). The review of the links between teaching and research in the health sciences and practice presented below follows in this tradition. It provides qualitative data from the perspective of teaching staff with the aim of understanding the links and the attitudes held towards them.

Linking Teaching and Research in the Health Sciences and Practice Disciplines

In the health sciences and practice disciplines the way in which research and teaching are linked and the meaning of this for the healthcare professions has received little formal attention. This paper begins the process of addressing this gap in the literature. In addition to the impact of staff research on student learning, discussed above, interviewees identified three further ways in which research and teaching are linked. First, they are linked through an evidence-based curriculum; second through research-based learning and third through the learning of research methods. These links and the context within which they take place are discussed below.

An evidence-based curriculum

Research without practice is like building castles in the air

Practice without research is like building castles on slippery ground.

(Parahoo, 1997, quoted in Pallen and Timmins, 2002, p 99)

In the health sciences and practice disciplines there is an increasing drive towards evidence-based health care. It is promoted by both professional bodies and the NHS and enshrined in recent government white papers (DoH 1997, 1998). It is hoped that through evidence-based health care the quality of healthcare services will be improved and maintained (Leung, 2002). Evidence-based health care refers to the use of the best available evidence in providing the most appropriate clinical care to patients. This evidence is informed not only by research findings but also by audit outcomes, reports and various papers. It has been defined as the "process of systematically finding, appraising and using contemporaneous research findings as the basis for clinical decisions" (Long and Harris, 1997).

An evidence-based curriculum refers to an educational syllabus underpinned by research findings and other available evidence. Amongst health sciences and practice interviewees there was universal agreement that as far as possible students should learn through the available evidence. In some disciplines a well developed evidence-base can allow for a curriculum to be based almost entirely on this, and yet for others a lack of evidence, or of good quality evidence, may make such a wholehearted adoption less likely. This is shown in the following quotes:

..our new curriculum is entirely based around evidence based practice, and we, my joint head of department and I, devised our new curriculum to be based around evidence..you know to produce evidence-based practitioners. (Claire, Nursing)

There are areas where research is very lacking.. and one of the biggest problems that we've found is that a lot of the research, particularly in aromatherapy has been done by people who don't necessarily understand the initial concept of an essential oil and what it can and can't do, and therefore the research becomes flawed. (Andrea, Complementary Medicine)

In addition, two interviewees felt that some material may not have evidence underpinning it, but it should not be excluded from the curriculum on these grounds. Within any discipline there was inevitably going to be some core material based simply on "accepted wisdom" rather than evidence. In turn "accepted wisdom's" were likely to be based on experience of the best way to go about a task. One of the interviewees gave the following example:

Well there are certain core things that have to be taught. If you think about pre-registration nursing, they have to be able to make a bed with somebody in it..and I'm quite certain that there's no current research going on about it, but that doesn't mean [they] don't need to know about it. (Lynne, Nursing)

While there is strong support for evidence-based curriculums amongst teaching staff some interviewees expressed concern over a research-practice gap. This is shown in the following quotes:

..our biggest problem is in the clinical areas, where there are midwives not using research in their practice. Where there are practices going on, where we know there

is research out there, and they're not using it. And that's our biggest problem (Kirsty, Midwifery)
I think that some of the nursing that goes on in the clinical areas is still very ritualistic. And they are not using the evidence that's there…So this means that students, our current students are possibly still exposed to ritualistic, mechanistic nursing practice, and hence this complaining..Oh this is how we do it on the wards, and that's how we learn about it in school. (Lynne, Nursing)
These quotes show how significant areas of healthcare may still be bound by tradition and mechanistic practices inspite of evidence demonstrating different and more efficacious ways of working. Indeed, in nursing it has been estimated that a 10-15 year gap exists between research findings and their implementation in practice (Pallen and Timmins, 2002). Students may well then find themselves learning two different ways of practicing, one based on the best available evidence and the other based on more ritualistic and traditional ways of working.

The provision of an evidence-based curriculum for undergraduate students, therefore faces two major challenges across the health sciences and practice disciplines. First, the need to continue to develop the evidence base with good quality research and other forms of evidence. One interviewee stressed that this was not only important for the provision of healthcare but also as a way of developing the discipline:
I'm beginning to think that the thing that separates a profession from an occupation is its research base..it'll never be a real profession as opposed to a second order one, until it has a much stronger research ethos and history across the whole of the profession. (George, Radiography)
Second, to ensure as far as possible that this evidence is incorporated into actual practice, so that students' do not experience this bifurcation between what they are taught and what actually happens in practice.

Research based learning
Research based learning has been described as a learning strategy in which the curriculum is organised around the processes of research (Brew, 2002). It may be referred to as research led learning, enquiry-based learning or problem-based learning (PBL). Students learn in a way that mirrors the research process. It can take the form of lecture-based cases, case-method, modified case method or problem-based (Barrow et al, 2002). Students typically work in small groups with a true to life 'problem' that they have to investigate through literature and database searches. The 'problem' is sometimes given the less pejorative term of 'case' and may be replaced by a subject area rather than an individual 'problem' or 'case'. Students have to present the results of their investigations to their lecturers and sometimes fellow students. Research based learning has been identified as a learning strategy which enables students to develop skills for professional practice and life-long learning. For example, reasoning, listening and interpersonal skills, critical thinking and self-direction (Barrow et al, 2002; Mckee, 2002).
Interviews with teaching staff showed how some departments and disciplines integrated it more into their curriculum than others:

.. it's the first osteopathic programme in this country to have a sort of big chunk of PBL, and we use PBL as a way of integrating the different modules and knowledge and clinical experience and everything across the curriculum. (Tom, Osteopathy)

We're not terribly into that [PBL], I think we will be and I think perhaps we should be but at the moment, our major thrust is multi-professional education. (George, Radiography)

..we're very didactic, or have been up to now, we're only just starting to try and introduce case-based learning. (Paul, Pharmacy)

Only one interviewee expressed some concerns as to whether research-based learning enabled students to develop the required knowledge base:

I have doubts about [PBL]. I think there's quite a lot of body that you just have to learn, but also I think to do with the discipline, there are facts they need to know. They can't go around doing what they want, they've got to follow Trust protocols..or manufacturers' guidelines under the BNF, and it's not negotiable. (Jayne, Nursing)

Some interviewees discussed the challenges they faced in incorporating research-based learning into their courses. First, because of the numbers of students on some courses it could become "an administrative nightmare":

..nursing courses are often 400 strong..when they start..they can be up to 400…and a PBL group must only really be 8 or 10 people. If it goes over 10 it's a nonsense, you can't do it. So you have to divide them into groups, you have to allocate tutors to them, so it's an absolute administrative nightmare.(Lynne, Nursing)

Second, particularly in the early stages of a course students may struggle with taking the responsibility for their own learning.

..because of the wide entry gate to nursing, we actually have to start off with some students, when they first start, in actually showing them how to use a library..so there are certain skills they start with which is lacking, which wouldn't be lacking in a traditional course, where they come post A-level. So some students are very vulnerable within the system first of all..because they don't know whether they're learning the right things or learning enough (Lynne, Nursing)

Inspite of the challenges that could be experienced there were some very positive accounts of research based learning, as the following quotes show:

If it's done properly, it's absolutely superb, the students really blossom..I'm a great fan of PBL (Lynne, Nursing)

We've been evaluating what we've done so far, each stage of the way..and then thinking how can we take this forward a bit further now..and it's been brilliant, I'll be honest, it's been absolutely brilliant..they have been so enthusiastic..and they had to give a poster presentation at the end of last term, and when we looked at them they were stunning, they did really well at this, and they had very limited information but they went out and found the stuff. And I went round and I was saying to them things like..did you find any research on that and instead of shying away and go...ooh..like

they used to do when you mentioned research, they said oh yes, we found this and this and this..and it was really, really pleasing to see.. (Alison, Nursing)

The quotes in this section show the potential of research-based learning to facilitate the intellectual and personal growth of students, whilst also acknowledging the administrative complexities involved, along with the need to support students in developing the skills of a more student centred approach to learning.

Learning research methods

Learning research methods and developing research skills through specific modules in the undergraduate curriculum is another key way in which research and teaching are linked. Interviews with health science and practice lecturers showed that these modules occurred across all disciplines. However, the extent to which students were exposed to research methods modules was subject to considerable variation across disciplines and sometimes within disciplines. For example, in some undergraduate pre-registration nursing courses students are taught research methods throughout their course stating in the first term, whilst in others they may only have one relatively short block during the entire course. This is shown in the following two quotes:

Well, [we teach] research methodology right from the beginning..So it runs right the way through. (Lynne, Nursing)

..we run a BSC [research methods] module, which is three weeks long, that's pre-registration..(Alison, Nursing)

Interviews indicated that in many of the health sciences and practice disciplines there is an increasing emphasis being put on research methods modules so that in the future they are likely to become a more prominent part of the curriculum. The ability to understand, interpret and critically appraise research, as well as develop personal research skills is integral to the learning outcomes enshrined in the QAA benchmarking statements across the health sciences and practice disciplines

In the final year of the undergraduate course students are expected to produce their own dissertation. This serves as a 'capstone' experience (Boyer, 1987) and an opportunity to put into practice the research skills they have acquired. The opportunity to carry out empirical research, in which students collect and analyse their own data is becoming less of a feature in these dissertations. In some of the larger disciplines the sheer numbers of students and the stringent requirements of ethics committees, means that students only very rarely carry out an empirical investigation. Instead the dissertation commonly takes the form of a written proposal or a literature review. Whilst some interviewees felt that this was adequate at undergraduate level others argued that there was a need for students, even at undergraduate level, to experience 'hands on research'. It was felt that by experiencing the whole process of research in terms of collecting, analysing and presenting their findings students gained in confidence and would be more likely to pursue research activities in the future. There is research evidence to support this view. (For example, Zamorski, 2002; Neile and Jolly, 1997).

Neile and Jolly (1997) have further argued that students need to actually experience the process of research before they are in a position to evaluate and critically appraise it:

Research, like the practice of midwifery and paediatric nursing is something that is difficult to learn from a book. Students are not generally expected to evaluate practice

before they have learned to practice themselves. Similarly, it may be inappropriate to expect that practitioners can evaluate research before they have experienced the research process themselves. It follows that practitioners may need to be able to undertake research themselves in order to skillfully evaluate published material" (pp 23)

Underlying these arguments is a difference in opinion as to what type of practitioner undergraduate courses are aiming to produce. In most of the health sciences and practice disciplines it appears that there is a concern to equip new practitioners with sufficient skills to critically appraise research findings as the basis for clinical decision making. As McSherry and Proctor-Childs (2001) have said in order to achieve evidence-based practice practitioners need to have, "the research awareness, skills, knowledge and competence to interpret research material to inform their clinical decision making" (p21). This model tends to be promoted by professional bodies and has in large part been incorporated into the learning outcomes of most undergraduate programmes.

White and Taylor (2002) have cogently argued against this model. They point out that few healthcare professionals once qualified actually have the time or resources to seek out, appraise and integrate research findings into their practice whilst at the same meeting their clinical obligations. Bostrom and Suter (1993) reported that only 23% of the 1588 nurses they surveyed thought that they had made a research based practice change during their career. The research skills that undergraduate students acquire may therefore be largely redundant once they qualify as practitioners.

Furthermore, White and Taylor (2002) argue that it is inappropriate that individual practitioners act independently in their clinical decision making. Professional accountability is generally based on a degree of consensus rather than an individual perspective. They point out that a range of organisations are in place to generate and collate research evidence on which to base clinical practice and service delivery. These include organisations, such as the NHS R and D strategy, Health Technologies Assessment (HTA), National Centre for Reviews and Dissemination (CRD), National Institute for Clinical Excellence (NICE) and an inspection system to monitor implementation - Commission for Health Improvement (CHI). These organisations have been set up to ensure clinical standards and provide clinical guidelines. They are based on the best available evidence and are drawn up by individuals skilled in appraising and utilising research. Such standards and guide-lines conflict with the model of an autonomous practitioner in that it aims as far as possible to eliminate the variations in practice associated with individual professional judgement.

In health sciences and practice disciplines there is thus a need to reflect upon the objectives of teaching research methods. White and Taylor (2002) have suggested that a more realistic approach would be to help undergraduate students develop an appreciation of research methods rather than trying to equip them with the skills to evaluate evidence as a basis for their own practice. Instead their future practice will be based on expert guidelines. At the same time White and Taylor recognize the need to develop an interest amongst some students to pursue a research career so that they can lead this area on behalf of their professional colleagues.

White and Taylor (2002) provide a convincing critique of the current model of the autonomous practitioner and the education on which this model is based. However, the need to continue to develop and maintain a strong evidence base to a discipline requires that at least some students are motivated to pursue research careers in the future. As discussed above it appears that aspects of the undergraduate curriculum,

such as research-based methods of learning and actually 'doing' research through conducting empirical investigations are the most likely ways of achieving this.

The link between staff research activity and teaching

Although statistical studies have shown little convincing evidence for an association between staff research and undergraduate learning, qualitative studies have been more illuminative. From the perspectives of students they have shown that staff research can and does benefit undergraduate learning in a number of ways. Interviews with health sciences and practice teachers mirrored these findings. The interviews showed how teachers' perceived that being involved in research kept them in touch with current research findings and gave their teaching an edge, increased their credibility with students, enhanced discussions and helped students' feel part of a research milieu through departmental research seminars and staff/student collaboration on research projects. This is shown in the following quotes:

I mean you're not just doing your own research, you're doing the reading, so the reading that goes with the research..is absolutely vital. And if you're not actively involved on a project, I just wonder if you would be doing the reading..you'd certainly do a lot more and it gives it [your teaching] an edge.. (Jayne, Nursing)

I think it gives you a much more current picture of what's happening within your field..and I think it allows us to be a little bit more credible with what we're doing. (Andrea, Complementary medicine)

…it increases the credibility of the lecturer in the eyes of students, as being a believable practitioner, if they are publishing research in the subject. (George, Radiography)

..certainly we use our own research as a basis of discussion, to talk to them about research methodologies, and we expect them to criticise it, and they do. (George, Radiography)

..the undergraduates may be involved in some of the research projects..we may have done a piece of research on client group A, and a new question arises from it, which the students will know about because of our discussions with them about the research and we encourage them to use that [for their final year dissertations]. (Julia, Speech and Language therapy).

..the students are very much aware what we are researching, and we're just going to try this year, that the students can choose to do their own third year research projects in collaboration with staff members research interests. (Liz, OT)

And this year we're going to run a research symposium..the staff are going to do short presentations of their research and then graduates that have just completed their course are going to present their papers as well. (Liz, OT)

Whilst these interviewees talked enthusiastically about their research activities and the links with undergraduate learning, the data indicated that not all teaching staff were actively engaged in research. Of relevance here, however, is how 'research' is defined. Neile and Jolley (1997) have defined research simply as "the process of

systematic enquiry, the purpose of which is to identify truths" (pp 23). Interviewees indicated that staff who are not engaged in funded research at a RAE level, may still be involved in small scale enquiry's, which can lead to a range of scholarly activities, such as publications, poster and conference presentations and so forth.

For many staff the ability to engage in large scale, externally funded projects, and to some extent smaller scale investigations depended in large part on the departments and institutions in which they work. Jenkins et al (2003) have argued that the academic department and how it is managed and led has a major influence on the research activities of staff and the quality of learning and teaching. As they argue, "Departments play a critical role in shaping teaching and research cultures in staff" (pp 120). The pressure placed on staff to manage research activities and heavy teaching loads is acknowledged in the literature. Wills (1996), for example, provides a harrowing account of the long hours, overwork, stress and illness experienced by academics in higher education. Teaching loads in the health sciences and practice disciplines tend to be particularly high as they are vocational courses that lead to professional qualifications. The situation is exacerbated by the increase in student numbers from non-traditional academic backgrounds. NHS funded courses are monitored closely for the quantity and quality of teaching input.

In addition, most health sciences and practice disciplines face another stringent requirement. Their professional bodies and also increasingly the NHS funding bodies such as Workforce Development Confederations, require evidence of clinical competency. In nursing, for example, the professional body for nursing, midwifery and health visiting has advocated that nurse lecturers spend 20% of their time in clinical practice. This requirement is included in many nurse lecturer/teacher employment contracts. (Maslin-Prothero and Owen, 2001)

The pressures on staff and the increasing demands they had to grapple with were raised repeatedly in the interviews. Some interviewees expressed the need for guidance as the following quote shows:

I do think it's very stressful, and I think we need some clear guidance very soon. And what they're saying at the moment is we have to provide evidence of our clinical skills, research skills, education skills etc..and I just think they've got to be more realistic, because individuals cannot possibly achieve everything, cos there's not enough hours in the week or weeks in the year. (Liz, OT)

The position that many of the interviewees found themselves in was that teaching loads and clinical commitments took priority over research. Whilst they were encouraged to pursue research they were given little or no time away from their teaching and clinical roles. Some interviewees managed to conduct small-scale investigations by combining them with their clinical work. For others, any research they wished to do, including writing research proposals to try and secure external funding had to be in their own time. The following comments were typical:

The other thing is that the NHS, in this part of the world, is quite up front..we want research, we're going to award contracts where people are research active, but we don't want research done on our time with our money. (George, Radiography)

Well everybody wants you to do it [research], but what lecturers find increasingly difficult is the time constraints…we have to do research, we have to teach on three major programmes, plus we have to go into the clinical area with our students. So it's a lot, and I have to say ..when push comes to shove, the thing that becomes lower in priorities for many of us is the research, because to a certain extent, if we've got no

funding., there is no one banging on the door saying this has got to be finished by a certain time. (Jill, Podiatry)

The ethos and the culture of departments in relation to staff research are therefore crucial in defining the activities of staff. In turn these are largely, but perhaps not exclusively (see below), influenced by external bodies such as the Workforce Development Confederations, professional bodies and the University itself. Two interviewees showed how research activity may become a priority when the department is put under pressure from the wider institution in which it is embedded.

We have to be [research active], because that's the university's criteria, and we all have to produce a portfolio of activity every year, and a research plan every year of grants that we've applied for..publications that have been published or we're planning to publish or in press etc. (Liz, OT)

[X university] has a very, very strong pressure on the research led bit, to include making sure you're RAE results are as high as possible, so the RAE figures pretty strongly in the general department strategy of each department. (Julia, Speech and language therapy)

The second interviewee quoted above showed how her department managed the competing demands for research, teaching and clinical activity by dividing teaching staff into those who were predominantly either research active or clinically active:

.. in a sense, what the staff comprises is some people who do teaching on all the courses and some research, you know are very strongly research active under the RAE criteria, and there are some others of us, about half a dozen of us, who are very strongly clinically biased, who teach academic subjects, clinical subjects, and do research as well..but we're not classed as being research active. (Julia, Speech and language therapy)

This interviewee explained how those classed as research active were given sabbaticals in which to conduct their research activities. Indeed, Jenkins et al (2003) have argued the need for departments and institutions to harness the different interests and strengths of staff and manage them to the advantage of individuals and the department. They point out that resource management is crucial here because teaching and research compete for the time and energy of lecturers.

Another interviewee showed how the curriculum itself could make a difference to the amount of time available for lecturers to pursue research. A more student centred and indeed research-based curriculum could reduce the teaching loads on staff. Her quote also indicates however, that along with the external pressures on departments to deliver high quality research and teaching and maintain clinical competence, negative attitudes towards staff research may still remain an obstacle.

Well I think there are people in our organisation who believe we're a teaching institution, that uses research to support it, rather than a research institution that teaches. It's just very different..and we've come up through the old style School of Nursing..which was, in classroom, 9 to 4 and..whereas we've now got a much more student centred curriculum that could release teachers up, but it takes time to change those attitudes. (Claire, Nursing)

There are a number of reasons for staff engaging in research activities. First, externally funded projects, along with high RAE scores, bring money into the department. Second, it can lead to individual staff promotion. Third it develops the evidence-base of a discipline. Fourth, and of most relevance here, it can have an impact on student learning. And it is this fourth point that may be the most

controversial in health sciences and practice. Although some interviewees felt their research activities greatly enhanced undergraduate learning, over half felt that having an active research role, particularly that classified at an RAE level, was not essential to providing good quality undergraduate education. What they did stress was the need to be 'research aware'.

I think it's a research awareness. I think that you have a duty to know what is happening in your own area. (Lynne, Nursing)

I wouldn't say to be research active, to be research aware. I think to have some experience in research, yes..but to be constantly research active, I don't think it's practical, but to be research aware, in what's going on and what's developing, to be able to actually evaluate and critique, I think is incredibly important. (Jill, podiatry)

I think that they don't have to be research active, I think they have to be au fait with the latest techniques. I think that they should engage in scholarly activity, but I don't think they have to go out and research…[but] those who are involved in research and scholarly activity [need] to plough their discoveries if you like..back into the department, and really do it that way. (Janet, Radiography)

Thus these interviewees perceive that what is essential for good quality undergraduate education is research awareness but that this does not necessarily require staff to be actively involved in research. In effect, these interviewees are promoting the need for scholarship rather than research per se. Scholarship has been defined by Jenkins et al (2003) as "careful reflection on practice and review of the literature and research evidence".(p 9). Many interviewees discussed the scholarly activities they were involved in. These included literature and database searches, putting together learning packages, editing books and so forth. These activities helped them to engage in some way with current debates with their disciplines and by so doing remain research aware. Hounsell (2002) supports the views of these interviewees when he says that in some subject disciplines sound scholarship may be a valid alternative to active involvement in research. Likewise, Barnett (1992) argued:

" A genuine higher education today cannot be operated entirely separately from some kind of research base. But that does not mean that either institutions of higher education or their staff are obliged to conduct research. Staffs, though, do need to have the time and resources to keep up with their field of study, so that they are immersed in it's conversations". (pp 631)

Finally, before leaving this section it is important to address the monitoring of the links between research and teaching at the departmental and institutional levels. Whilst institutions have strategies for research and learning and for teaching they rarely have policies in place which aim to monitor or enhance the links between staff research and student learning (Jenkins et al, 2003; Gibbs, 2002). Interviews with health sciences and practice staff show that only one interviewee was aware of any attempts to monitor the links between the two. In all other departments the links made between research and teaching were ad hoc and left to the discretion of the individual teacher. With no clear policies or strategies in place there is the potential for research to simply detract from teaching through taking up valuable time and energy without putting anything back into it. This is of course one possible

explanation for the lack of a positive relationship between research activity and teaching quality found in most statistical studies. There is thus a clear need for departmental strategies and monitoring of the links being made between staff research and teaching. Indeed Gibbs (2002) has advocated rewarding research which benefits teaching and rewarding teaching which makes the best use of research.

Conclusion

This paper has identified and discussed the links between teaching and research in the health sciences and practice disciplines. It shows that whilst an evidence-based curriculum is promoted by most teaching staff, and is a vital link between research and teaching, it may be restricted in some disciplines by a lack of evidence or of good quality evidence. Students may also experience a research-practice gap when research evidence is not being incorporated into clinical practice.

A further link was identified in the more student centred approaches to learning which draw on research-based processes and are increasingly replacing more didactic methods of teaching. This, along with an increasing emphasis on research methods in the curriculum, may enhance the ability of students to utilize research findings in their clinical practice. The evidence suggests that at present this is only happening to a very limited extent. However, White and Taylor (2002) have challenged this model of the autonomous practitioner. They argue that organisations are in place to ensure clinical standards and set clinical guidelines based on expert opinion so as to eliminate variations in practice based on individual judgement. To a large extent professional accountability depends on consensus rather than individual judgement. This opens up to debate the type of practitioner that undergraduate courses are trying to produce and has far-reaching implications for the what is being learnt and how.

Finally, teaching staff is under immense pressure from their tripartite roles involving teaching, research and clinical activity. Staff identified a number of ways in which research could benefit their students, but there was clearly a need for these roles to be managed at a departmental level. In addition different types of curriculum, such as research-based ones, could help reduce teaching loads so that staff are freed up to engage in research activities. However, there was much debate over whether scholarly activities rather than research per se, could equally enhance undergraduate learning. Scholarly activity was seen by many as a way of remaining ‘research aware’ and up to date with the latest developments without actually engaging in research. Many interviewees felt that whilst research may be important to bring money into the department, to develop the evidence-base of their discipline and enhance their career prospects it was not a key factor in the provision of good quality teaching.

As is often the case in research studies more questions have been raised than answered. Thus there is a pressing need for academic staff within the health sciences and practice disciplines to engage with the issues raised in this paper. The proposal in the recent white paper to separate research and teaching at the undergraduate level needs to be taken seriously and it's potential impact on undergraduate education considered. More investigations exploring the perceptions of a range of stakeholders are called for. In particular there is a need for an increased understanding of the impact of the research-teaching nexus on students and newly qualified practitioners.

Appendix

Aide Memoir

1) Describe briefly your current post. How long have you been in post?
2) Where are you currently working?
3) What is your academic and professional background?
4) Do you currently link teaching and research?
a) If yes,
In what ways?
What factors support it or make it difficult?
What are the advantages (or disadvantages) to staff and students
b) If no,
Why not? Explain
5) Does your department have a philosophy of linking teaching and research? Please describe
6) Does your institution have a philosophy of linking teaching and research? Please describe
7) How, and to what extent, do students come into contact with the department's research?
8) How do students learn research methods and develop research techniques?
9) What opportunities are there for students to do their own research projects and self-directed work?
10) Is there anything-else that you feel is important in understanding the issues involved in linking teaching and research?

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