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### Original Citation

Senaratne, S., Amaratunga, Dilanthi, Baldry, D., Haigh, Richard, Kagioglou, Mike and Aouad, Ghassan (2006) Integrating research and teaching in higher education: Conceptual issues. In: CIB W89 International Conference on Building Education and Research (BEAR), 12th April 2006, The Hong Kong Polytechnic University, Hong Kong.. (Unpublished)

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# **INTEGRATING RESEARCH AND TEACHING IN HIGHER EDUCATION: CONCEPTUAL ISSUES**

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Integrating new knowledge created through research with teaching has become an important area that needs prompt attention with the growing emphasis on student learning activities, quality assurance procedures and research funding mechanisms within the UK higher education system. The link between research and teaching is not automatic. Thus, it needs to be created in higher education departments in order to achieve a productive relationship and manage research activities of university staff with teaching duties. The research study, on which this paper is based on, aims to develop principles in relation to transferring research knowledge into teaching through a literature review and case studies. The paper reports conceptual issues related to such a transfer process based on the literature findings.

Keywords: higher education, knowledge transfer, learning, research, teaching

## **INTRODUCTION**

This paper presents literature findings of a research study that aimed at exploring the knowledge transfer process from research into teaching in higher education institutions. The paper is structured into four sections. First, the paper explains the background of the higher education system, in particular, in United Kingdom (UK). Second, the paper discusses the relationship between research and teaching (R&T). Third, the study extends into knowledge transfer literature and brings in new perspectives on the R&T link. Finally, the conclusions are offered.

## **BACKGROUND OF THE UK HIGHER EDUCATION**

Higher education system in the UK has significantly changed over the last few decades with the growing emphasis on student learning activities, quality assurance procedures and research funding mechanisms. For example, the student learning activities have been stimulated by initiations such as Higher Education Academy; and, Learning Teaching Support Network (LTSN). On the other hand, the existence of separate quality assurance mechanisms to monitor teaching (Teaching Quality Assessment) and research (Research Assessment Exercise) has negative impacts on research and teaching link. Moreover, increasing funding opportunities for research have resulted in staff favouring research over teaching duties. Rowland (1996) reveals that staff tends to value research high, as it is influential in leading to promotions while teaching has a lower status due to low financial incentives and rewards. Thus,

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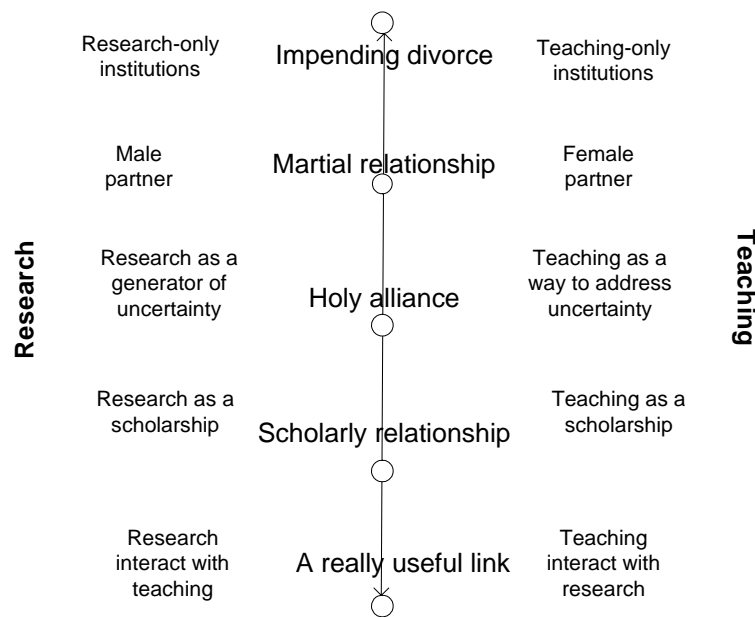
recent trends in higher education system have resulted in mixed impacts on the research and teaching relationship.

Linking research and teaching in higher education has become an international issue. The research work in Monash University (2003) explores the R&T link in the Australian context; accordingly, the existence of traditional teaching-only and research-biased departments across the university has adverse impacts on the R&T relationship. Brew (2003) looking further into R&T link in Australia, state that it is necessary to look at the relationship again due to number of changes in higher education, which challenge the relationship. According to Brew (2003), like in UK, in Australia the dual funding system for research and teaching has generated problems with respect to linking research and teaching. Woodhouse (1998) reveals that in New Zealand pressures for academics from professional bodies and government to do research; and, pressures for academics from students and society to do teaching have influenced on the R&T link. Thus, similar problems are encountered with respect to research and teaching relationship in many countries. The next section discusses research issues relating to the research and teaching link.

## **RESEARCH AND TEACHING (R&T)**

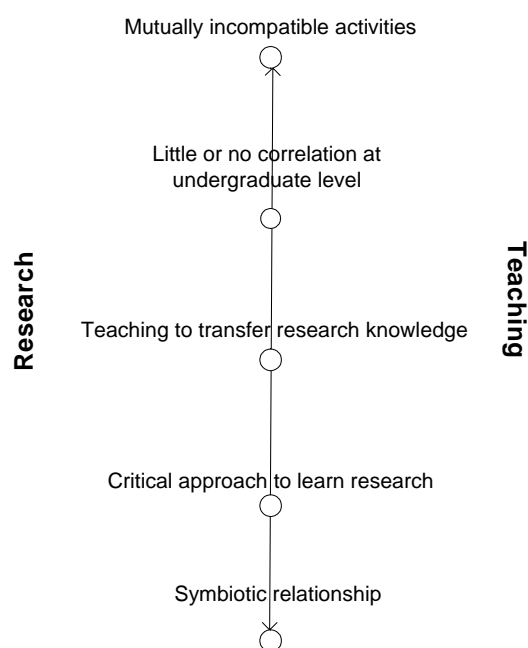
University research and teaching has been viewed by academics in different ways (Robertson & Bond, 2001). Healey (2000) and Brew (2003) state that the way that academics interpret the terms research, scholarship and teaching can influence on the R&T relationship. For example, some authors view research as outcome-oriented (external) while others view it as learning-oriented (internal). Brew (2003) states that most academics view scholarship as the way academics value professionalism. Teaching is equally valued as a scholarship after Boyer (1990). Healey (2000) argues that research into teaching should be included as a key element of the scholarship of teaching. Badley (2002) synthesises R&T relationships based on these different interpretations: namely, 'an impending divorce'; 'a martial relationship'; 'a holy alliance'; 'a scholarly relationship'; and, 'a really useful link' (see figure 1). In an impending divorce, separate institutions exist for research and teaching. For example, in USA existence of research institutions and teaching-only or all-teaching institutions; and, in UK identification of research-led and teaching-led departments. In a martial relationship, research is viewed as the male partner and teaching as the female partner. In a holy alliance view, research is seen as a generator of uncertainty; and, teaching need to address this uncertainty. In a scholarly relationship, research and teaching are separate but overlapping scholarly activities. For example, Boyer (1990) includes research and teaching in his typology of scholarship: the scholarship of knowledge discovery and integration; and, the scholarship of knowledge application. Badley (2002) adds a 'really useful link' by seeing R&T in an interactive relationship. Thus, the R&T link is seen from different viewpoints based on the different interpretations of the terms research, teaching and scholarship.

**Figure 1:** Different interpretations of the R&T relationship



Similarly, research studies that have explored the relationship between research and teaching had revealed different levels of the R&T relationship. The quantitative studies, which have considered different outcomes to measure research and teaching, have generally concluded that there is no relationship between university staff research and teaching (for example, see Hattie & Marsh, 1996). The qualitative studies, which have considered actor perspectives, for example, staff, student and researchers' views, have concluded that a symbiosis relationship exists between university staff research and teaching (for example, see Jenkins, 2000; Robertson & Bond, 2001). Brew (2003) explains that these differences are sometimes due to positivist or interpretive viewpoints. Positivists view that R&T relationship is problematic while interpretive views believe in a symbiosis relationship. Robertson & Bond (2001) builds up a continuum view to the relationship and introduce five levels of the R&T link (see figure 2). At one extreme, R&T are viewed as mutually incompatible activities; and, at the other extreme, R&T share a symbiotic relationship in a learning community. The three levels that exist in the middle are, little or no correlation exist between R & T at the undergraduate level; teaching as a means of transmitting research knowledge; and, teachers encourage a critical inquiry approach to learning. These levels correspond to Badley's (2002) analysis of the R&T link, in particular, at the two extremes.

**Figure 2:** Different levels of the R&T relationship

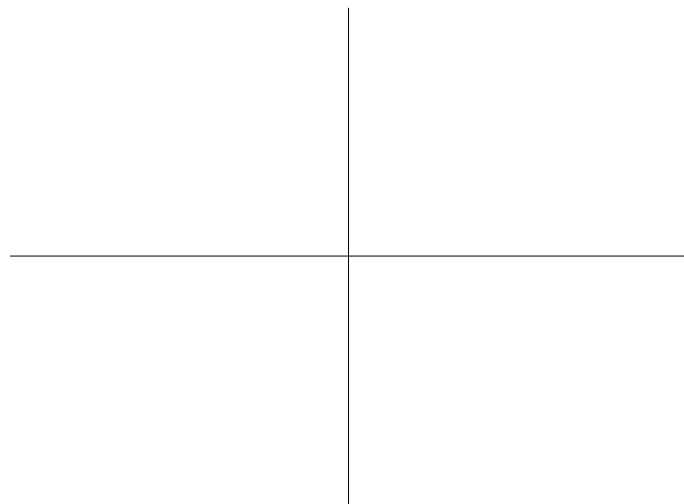


To approach ‘a really useful link’ (Badley, 2002) or ‘a symbiotic relationship’ (Robertson & Bond, 2001) most academics believe in research-informed teaching, in particular, that good research is necessary for good teaching (HEFCE, 2000). In fact, Department for Education and Skills (2003) explains that the UK government is not seeking an artificial divide between teaching and research; and, it expects lecturers to keep up to date with their field through engagement in some form of advanced scholarly activity. Clark (1997) states that professors generally find their own teaching and research activities ‘merging in a seamless blend.’ According to Lindsay *et al* (2002), academics believe that research and teaching is one of ‘symbiosis’; ‘mutuality’; and, ‘synergy’, especially when lecturer research activity increased in quantity and quality. They reveal that lecturer’s research activity enhances knowledge currency; credibility; competence in supervision; motivation; and, salience. According to Jenkins (2000), an effective way to link research and teaching is managing staff research to benefit student learning, which will benefit both students and staff; and, also, will improve knowledge development and learning within universities. However, increased lectures’ research will result in reduced contact time, teaching time and curriculum distortion (Lindsay *et al*, 2002). Thus, balancing individual staff’s research and teaching activities is needed to get academics engaged in research and, thereby, stimulate research-informed teaching. Colbeck (1998), however, reveals that time allocation for research and teaching does not directly represent research and teaching outputs as measured by publication counts and student evaluation respectively. According to him, the most influencing factors for research-informed teaching are individual ability and motivation; and, contextual factors such as resources, disciplines and university-level drivers.

Research-informed teaching can take different forms depending on the degree and the way research is included in teaching. For example, Griffiths (2004) explains four ways to feed research into teaching: research-led; research-oriented; research-based; and, research-tutored. In research-led teaching, students learn about research findings. In

research-oriented teaching, students learn about research processes. In research-based teaching, students learn as researchers. Finally, in research-tutored teaching, students write or discuss research work. Hughes (2004), too, emphasise on the importance of delivering both research processes and content to students. Griffiths (2004, p13) put forward these research-informed teaching methods in a nexus (Neumann, 1996) as depicted in figure 3.

**Figure 3:** Research and teaching nexus



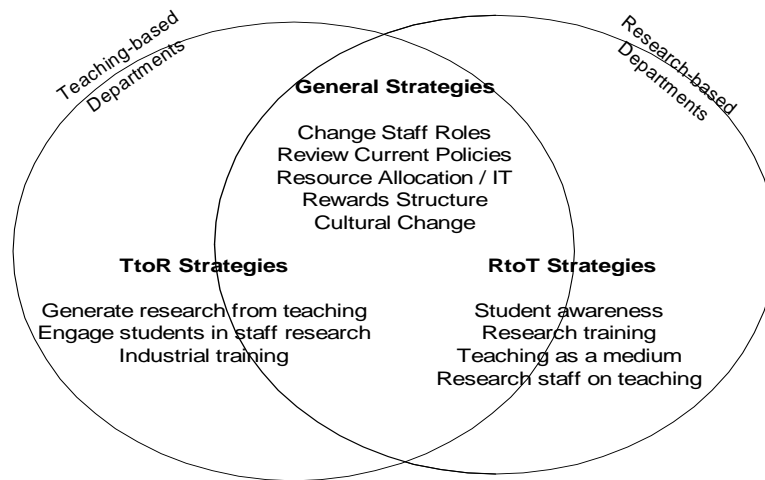
As the R&T nexus suggests, teaching approach can influence the R&T relationship depending on whether it is a deep approach (conceptual change/ student-focused) or a surface approach (information transmission/ teacher-focused) (Brew, 2003). Teacher-focused teaching is when teachers directly transmit research knowledge to student audience; and, student-focused teaching is when students construct their own knowledge through active participation in class (Griffiths, 2004). Griffiths (2004) explains that in soft-applied disciplines, compared to hard-pure disciplines, student-focused teaching can be better employed. According to Elton (2001), the most influencing factors that contribute to a positive R&T link are student-centred teaching and learning. Therefore, while all teaching types can be used in a certain course the most effective transfer is research-based teaching where students learn about research process through participation.

Teaching informed by lecturer's own research should not be the only way to link research with teaching. In fact, Brew (2003) argues that all academics need not be good researchers; what is more important is that sharing research among academics. Barnett (1992) offers similar views and questions the need for every academic to engage in research. As mentioned above, Badley (2002) introduces an effective way to link research and teaching which he calls as 'a really useful' link. According to him, more than research-informed teaching it is about dialogical and dialectical processes between teachers and students. As most studies confirm, research and teaching are loosely coupled activities, which may not have a necessary or an automatic link; and, therefore, it is necessary to create this link to achieve a productive relationship (Jenkins & Zetter, 2003). Recent studies address this issue and introduce different

strategies to create a beneficial relationship rather than the problematic one that naturally exists. Elton (2001) describes that strategies to link R&T depend on various factors such as the unit of assessment (individual, departmental, institutional); level of competence (teaching or research); perspectives of stakeholders (academic staff, students, administrators, funding bodies); and, cultural factors (different countries, international dimension). Among these, the most influencing factors as identified in several studies are the type of department, discipline and level of study.

As Jenkin & Zetter (2003) argue, it is the academic departments who should develop this effective link. This is a two-way link (i.e. Research into Teaching [RtoT]; and, Teaching into Research [TtoR]) in which learning becomes the overlapping concept. Rowland (1996) describes this two-way link: research improves quality of university teaching while students' understanding and work can contribute to lecturer's research. However, the transfer should be appropriately created depending on whether the department is teaching-biased or research-biased. For teaching-biased departments, which have limited research funds, the R&T link should focus towards developing a research profile by creating research activities through teaching (for example, see Gorden *et al*, 2003). That is, the knowledge should flow from teaching to research. On the other hand, research-biased departments can create the link to benefit teaching from their research activities. In that, these departments can help students to appreciate the value of research within the department by creating this flow from research into teaching.

Hence, the strategies introduced by different studies can be identified based on the two-way transfer process and the type of departments (see Senaratne *et al*, 2003 for a detailed account on this). These strategies are grouped into three categories: general strategies, TtoR strategies and RtoT strategies (refer figure 4 for a summary of these strategies). General strategies were identified as necessary for both teaching-biased and research-biased departments. These include strategies such as changing staff roles (Jenkins & Zetter, 2003); reviewing current research and teaching policies (Rowland, 1996); allocating new resources (Badley, 2002); changing reward structures (Jenkins, 2000); and, creating a cultural change. For example, Rowland (1996) brings in the concept of 'critical interdisciplinarity' and suggests a cultural change through student-centred teaching. TtoR strategies were considered as more important for teaching-biased departments, which include strategies such as generating research from teaching activities (Rowley, 1996); engaging students in staff research activities (Rowley, 1996; Jenkins & Zetter, 2003) and, generating research through industrial training (Healey, 2000). RtoT strategies were identified as more appropriate for research-biased departments and include strategies such as student awareness of staff research (Zamorski, 2002); providing students with research training (Healey, 2000), using teaching as a medium to transfer research (Healey, 2000); and, using research staff in teaching (Cech, 2003; Turrell, 2003). However, as Rowland (1996) agrees, both TtoR and RtoT strategies should be in place in a particular department in an appropriate balance (for example, a research-biased department while focusing more on RtoT strategies should also implement TtoR strategies appropriately) in order to manage staff research with teaching commitments.

**Figure 4:** Strategies to link research and teaching

Comparing this two-way nature of the R&T link, creation of research from teaching activities is more straightforward despite the doubts of the quality of such research. Activities associated with the transfer of research into teaching are comparatively difficult; and, is a long-term process that also involve students' motivation and commitment. Previous work shows that in research-biased departments, students are unaware of the high quality research discovered within these departments due to poor transfer mechanisms (for example, see Wood, 1999). Zamorski (2002) disclosing students views on staff research states that students value being close to research and the idea of university as a research community in which they are included; but, they often feel that they are excluded from university research. On the other hand, Jenkins (2000) reveals that it is difficult to get teaching valued by staff who generally prioritise discipline-based research over teaching duties. Therefore, transferring research into teaching in research-biased departments is an important task that needs prompt attention. By identifying this increased importance of RtoT transfer over TtoR transfer, the research study on which this paper is based focuses on how to implement RtoT transfer specifically in research-biased departments.

Research has also found that the R&T link is dependent on different disciplines (for example, see Healey, 2000). 'Linking Research & Teaching' (Online 1) is a national project that has broadly studied the R&T link in a variety of disciplines such as geography, biosciences, law, health science and hospitality disciplines. An associated project, namely LINK: Good Practice Resources Database (Online 2) explores the R&T link specifically in the built environment sector. In addition, the work of Fawcett *et al* (2003) on nursing; and, the work of Cech (2003) and Sears & Wood (2005) on bioscience provide useful insights into this link. Planet (2003) is a special issue that focuses on R&T link in geography, earth and environmental fields. However, Griffiths (2004) explains that the boundaries between disciplines are becoming less important with the growth of inter-disciplinarity; yet, at the broader level, there exist differences that affect the R&T link. The research study on which this paper is based mainly focuses on the BE discipline, which is a fertile area (Link, Online 2) to investigate the complex R&T relationship. BE falls under vocational and applied science disciplines as opposed to pure sciences discipline. Gann & Salter (1999) emphasise the need for improving interdisciplinary skills for BE students. Robertson & Bond (2001, p15)



state “in disciplines where there is a large body of technical knowledge organised hierarchically and being taught in huge lecture theatres to students from a range of disciplines, a relationship is difficult to sustain or nurture.” Considering this from the BE point of view, factors such as collaborative studies and high technical subject content that are inherent in BE education, suggest that establishing the R&T link will be difficult. Link: Good Practice Resource Database’ (Online 2) offers significant contributions to create R&T link in BE higher education. However, they fail to appreciate useful insights from the extant knowledge transfer and learning literature as discussed in Section 4.

The literature further reveals that this research knowledge transfer is more problematic at undergraduate compared to postgraduate (McLernon & Hughes, 2003; Jenkins, 2000; Lindsay *et al*, 2002)). Further difficulties in feeding research into undergraduate teaching come from modular systems, dynamism of research and constraints of syllabi (McLernon & Hughes, 2003). Thus, the study specifically aims to explore the undergraduate level while expanding to postgraduate level where appropriate. The extant literature on research and teaching relationship has failed to appreciate research into teaching as a knowledge transfer process; therefore, has ignored useful insights that could be gained from the knowledge age. The next section brings in knowledge management perspectives to this transfer process and develops a better understanding on the phenomenon.

## **RESEARCH INTO TEACHING AS A KNOWLEDGE TRANSFER PROCESS**

Some pedagogical researchers have identified the importance of knowledge management perspectives on university research and teaching. For example, Jenkins (2000) states that knowledge economy demands academics to be creative and gain ability to create; find; and, synthesise new knowledge. Scott (2002, p13) state, “in a ‘knowledge society’ all students –certainly all graduates – have to be researchers. Not only are they engaged in production of knowledge; they must also be educated to cope with risks and uncertainties generated by the advance of science.” Scott (2004), further, laments that in the knowledge society research and teaching are no more separable activities; and, the impact of the knowledge society has been to make research and teaching even more transgressive. Brew (2003) puts across knowledge-based views with respect to research and teaching link. Accordingly, research and teaching are seen as activities where individuals and groups negotiate meanings and build knowledge within a social context. Brew (2003) brings in the concept of academic community of practice where academic departments, disciplines, sub-specialisms, a university as a whole, or networks of professionals interact through face-to-face settings to disseminate research knowledge. Rowland (1996) has also emphasised on the importance of student-teacher interaction, improving interactive settings such as projects, tutorials and seminars in creating the R&T link. Badley (2002) through his ‘really useful’ link (see Section 2) suggests similar views: the importance of dialogical and dialectical processes between teachers and students. Thus, a key finding that emerges through the extant R&T literature that addresses knowledge management viewpoints is the importance of interaction and interactive settings in creating the R&T link.

More insights can be gained by viewing research into teaching as a knowledge transfer process. According to Sexton & Barrett (2004), knowledge transfer is viewed as the movement of knowledge via some channel from one individual or firm to

another. In this context, this means movement of research knowledge (be it research findings, skills or processes) from researchers (be they academics, researchers or practitioners) to students (be they undergraduates or postgraduates) through teaching and other mediums such as seminars, workshops, conferences and project-based work and.

Szulanski (2000) identifies the difficulty of a knowledge transfer process in six ways. First, strength of relationship between the staff (staff research) and students influences the effectiveness of the transfer. Such relationships can be strengthened by creating positive attitudes among students toward staff research through awareness. Second, direct transfer of research findings to students is inappropriate as this can create ambiguity. In order to overcome this difficulty, research output of projects can be reconstructed to suit the student audience. Rowland (1996) describes this as 'talk down to students'; that is devising a simple structure to deliver complex research knowledge to students. Third, absorptive capacity of students differs depending on their prior knowledge (Cohen & Levinthal, 1990). In fact, as Elton (2001) argues, a positive R&T link depends on the nature of student' learning experience and the abilities of students (absorptive capacity). Thus, strategies need to take this into account. For example, at level one, students can be given an introduction to the basic research process and at a higher level they can access direct research experience. Fourth, reliability of research results is an important factor in transferring research knowledge into teaching. Lindsay *et al* (2002) explains that research needs to be of interest, relevance and utility to students. This suggests that research results should be tested for their suitability and accuracy before transferring to students. Fifth, Szulanski (2000) points out motivation as an influencing factor during knowledge transfer. Not only staff motivation but also student motivation is required in creating this R&T link. This can be created by a cultural change within a department as described in Section 3. Finally, since the transfer does not occur in a vacuum, contextual factors such as organisational context can also have an influence (for example, see Colbeck, 1998). In sum, to transfer research into teaching effectively, these factors and their impacts need to be considered.

According to Davenport & Prusak (1998), effective knowledge transfer does not involve mere transmission but also absorption and use following such a transmission. As such, initiating the R&T link in a department and feeding research knowledge into teaching is insufficient; the transfer needs to ensure that such knowledge is absorbed and used by students after a transmission. Huberman (2002) confirms this when he claims that research data penetrates very slowly into the consciousness of the potential user, helped along by discussions and observations. According to him, the dissemination of research knowledge depends on its usefulness to the user and the absorptive capacity of the users. Accordingly, when students are considered as the potential users of such a transfer process, their learning process followed by such a transfer is an essential consideration. According to Elton (2001), the real teaching-research nexus lie in the curriculum process (all that contributes to the student learning process) rather than on merely the teachers or learners. As Griffiths (2004) emphasises, for an effective transfer and learning, providing students with learning opportunities is insufficient; therefore, it is equally important to evaluate student learning. In fact, learning is the key driving force that links research and teaching (Badley, 2002; Turrell, 2003; Hughes, 2004). As such, in transferring research knowledge into teaching, different student learning styles need to be addressed.

The literature on learning styles can be grouped into four theories (Smith, 2002; Vita 2001; Felder & Silverman, 1988). First, the 'field dependency' theory illustrates that learning can be influenced by the context that the students learn. Second, 'holistic versus sequential' learning theory describes that some students prefer visual approaches whereas some prefer verbal approaches to learning. Third, experiential learning theory (Kolb, 1984 cited in Smith, 2002) explains an individual's learning cycle in four aspects: activist, reflector, theorist and pragmatist. This role of experience in learning calls for activities such as project-based work that provide students with first-hand experience. Finally, based on 'surface versus deep' learning theory, it is the deep learning styles that should be encouraged in higher education institutions compared to surface learning. Active learning is learning by doing. Griffiths (2004) describes that inquiry-based learning as a powerful active learning tool, especially in the form of problem-based learning. Schon (1983) describes that 'reflection on action' is also needed when students engage in active learning processes. On the whole, these theories on learning, suggest that not everyone can be taught in the same way and the teaching approach need to take these differences into account.

In summary, the pedagogical literature has established that R&T link is not automatic and need to be created in each academic department based on the discipline. The knowledge transfer and learning literature values the importance of student perspectives and maintenance of R&T link following an immediate transmission process. The key findings of these streams of literature are concluded in the next section.

## **CONCLUSIONS**

The importance of research knowledge transfer into teaching has been identified and debated by many authors with differing viewpoints ranging from the type of the discipline that built environment represents to the learning styles of students. Key areas such as knowledge management and organisational contexts have been largely ignored in the search for effective strategies of research knowledge into teaching.

Five key issues can be summarised based on the literature review. First, the findings reveal the importance of research-informed teaching. Many studies identify that it is essential for academics to be research-active in order to deliver good quality teaching. If academics are research-active the transfer of research into teaching will happen naturally and informally. Second, the study identifies the importance of teaching approach in delivering research knowledge to students. Student-focused teaching is suggested by many pedagogical researchers as the most effective teaching method. Third, through transfer of research into teaching most importantly students should be trained to critically think and analyse. Fourth, it is important to maintain and evaluate the success of knowledge transfer; especially student-learning generated from such a transfer. Fifth, research into teaching should be built into the culture of a higher education institution through an academic community of practice. These five conceptual findings offers significant contributions to higher education departments in integrating research with their teaching activities.

## REFERENCES

- Badley, G. (2002). "A really useful link between teaching and research." *Teaching in Higher Education* 7(4): 443-455.
- Barnett, R. (1992). "Linking research and teaching: a critical inquiry." *Journal of Higher Education* 63(613-636).
- Boyer Commission on Educating Undergraduates in the Research University (1998). *Reinventing Undergraduate Education: A Blueprint for America's Research Universities*. Carnegie Foundation for the Advancement of Teaching, CA.
- Brew, A. (2003). "Teaching and Research: New relationships and their implications for inquiry-based teaching and learning in higher education." *Higher Education Research & Development* 22(1): 3-18.
- Cech, T. R. (2003). "Rebalancing Teaching and Research: Editorial." *SCIENCE* 299(10): 165.
- Clark, B. R. (1997). "The modern integration of research activities with teaching and learning." *Journal of Higher Education* 68: 241-255.
- Cohen, W. M. and D. A. Levinthal (1990). "Absorptive capacity: a new perspective on learning and innovation." *Administrative Science Quarterly* 35(1): 128-153.
- Colbeck, C. L. (1998). "Merging a seamless blend: how faculty integrate teaching and research." *The Journal of Higher Education* 69(6): 647-671.
- Davenport, T. H. and L. Prusak (1998). *Working knowledge: how organisations manage what they know*. Boston, Harvard Business School Press.
- Department for Education and Skills (2003). *The future for Higher Education*. Norwich, The stationary office, [www.dfes.gov.uk/highereducation/hestrategy](http://www.dfes.gov.uk/highereducation/hestrategy).
- Elton, L. (2001). "Research and Teaching: conditions for a positive link." *Teaching in Higher Education* 6(1): 43-56.
- Fawcett, J., C. Aber, *et al.* (2003). "Teaching, Practice and Research: An integrative approach benefiting students and faculty." *Journal of Professional Nursing* 19(1): 17-21.
- Felder, R. M. and L. Silverman (1988). "Learning and teaching styles in engineering education." *Engineering Education* 78: 674-681.
- Gann, D. and A. Salter (1999). *Interdisciplinary skills for Built Environment professionals: A scoping study*. UK, The Ove Arup Foundation, [www.theovearupfoundation.org/](http://www.theovearupfoundation.org/).
- Gorden, G., V. D'Andrea, *et al.* (2003). *Building capacity for change: research on the scholarship of teaching- the report to HEFCE*. Bristol, [www.hefce.ac.uk/pubs/rdreports/2003/rd02](http://www.hefce.ac.uk/pubs/rdreports/2003/rd02).
- 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.
- 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.
- Hattie, J. and H. W. Marsh (1996). "The Relationship Between Research and Teaching: A Meta-Analysis." *Review of Educational Research* 66(4): 507-542.
- 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. (2004). *Linking research and teaching: exploring disciplinary spaces and the role of inquiry-based learning. Reshaping the University: New Relationships between Research, Scholarship and Teaching*. R. Barnett. McGraw Hill, Open University Press.

- HEFCE (2000). Review of research. UK, Higher education funding council for England.
- Huberman, A. M. (2002). "Moving Towards the Inevitable: the sharing of research in education." *Teachers and Teaching* 8(3/4): 257-268.
- Hughes, M. (2004). The relationship between research and teaching in higher education - a review of literature (1990-2002) - Occasional paper No 2. University of Brighton, UK.
- Jenkins, A. (2000). "The relationship between Teaching and Research: where does geography stand and deliver?" *Journal of Geography in Higher Education* 24(3): 325-351.
- Jenkins, A. and R. Zetter (2003). *Linking Research and Teaching in Departments*. LTSN Generic Centre, Learning and Teaching Support Network, Oxford Brookes University, UK.
- Lindsay, R., R. Breen, *et al.* (2002). "Academic Research and Teaching Quality: the views of undergraduate and postgraduate students." *Studies in Higher Education* 27(3): 309-327.
- McLernon, T. and D. Hughes (2003). Research versus Teaching in the built environment discipline. CIB W89 Building Education and Research Conference, Salford.
- Monash University (2003). The teaching - research nexus: a discussion paper. Australia, Centre for Higher Education Quality, Monash University, [www.adm.monash.edu.au](http://www.adm.monash.edu.au).
- Neumann, R. (1992). "Perceptions of the teaching-research nexus: a framework for analysis." *Higher Education* 23: 159-171.
- Online 1 Linking Research & Teaching. [www.ltsn.ac.uk/genericcentre](http://www.ltsn.ac.uk/genericcentre) >projects>Research & Scholarship>Linking Research & Teaching.
- Online 2 LINK: Good Practice Resource Database. <http://www.brookes.ac.uk/schools/planning/LTRC/team.html>.
- Planet (2003). "Linking teaching and research and undertaking pedagogic research in geography, earth and environmental sciences." *Planet Special edition* 5.
- Robertson, J. and C. Bond (2001). "Experiences of the relation between teaching and research: what do academics value?" *Higher Education Research and Development* 20(10): 5-19.
- Rowland, S. (1996). "Relationships between teaching and research." *Teaching in Higher Education* 1(1): 7-20.
- Schon, D. A. (1983). *The reflective practitioner: How professionals think in action*. New York, Basic Books.
- Scott, P. (2002). "Let's stop trying to separate the inseparable." *Exchange* 2: 27-28, [www.exchange.ac.uk](http://www.exchange.ac.uk).
- Scott, P. (2004). Knowledge work in a knowledge society: rethinking the links between university teaching and research, The keynote speech presented at the Higher Education Academy Learning and Teaching conference, The University of Hertfordshire, UK., [http://www.heacademy.ac.uk/curriculum/ICO18D\\_KnowledgeWork.doc](http://www.heacademy.ac.uk/curriculum/ICO18D_KnowledgeWork.doc).
- Sears, H. J. and E. J. Wood (2005). " Linking teaching and research in the biosciences." *Bioscience Education E-journal* 5: 1-20, <http://www.bioscience.heacademy.ac.uk/journal/vol5/beej-5-4.pdf>.

- Senaratne, S., D. Amaratunga, *et al.* (2003). Research knowledge transfer into teaching in the built environment. 1st Education in the Changing Environment Conference, The university of Salford, UK.
- Sexton, M. & Barrett, P. (2004). "The role of technology transfer in innovation within small construction firms. *Engineering*", *Construction and Architectural Management*, 11(5): 342-348.
- Smith, J. (2002). "Learning styles: Fashion fad or lever for change? The application of learning style theory to inclusive curriculum delivery." *Innovations in Education and Teaching International* 39(10): 63-70.
- Szulanski, G. (2000). "The Process of Knowledge transfer: The diachronic analysis of stickiness." *Organisational Behavior and Human Decision Processes* 82(1): 9-27.
- Turrell, P. (2003). Teaching and Research - strengthening the relationship. CIB W89 Building Education and Research Conference, Salford.
- Vita, G. D. (2001). "Learning styles, culture and inclusive instruction in the multicultural classroom: a business and management perspective." *Innovations in Education and Teaching International* 38(2): 165-174.
- Wood, G. (1999). "Interdisciplinary working in the built environment education." *Education + Training* 41(8): 373-380.
- Woodhouse, D. (1998). "Auditing research and the research/teaching nexus." *New Zealand Journal of Educational Studies* 33(1): 39-53.
- Zamorski, B. (2002). "Research-led Teaching and Learning in Higher Education: a case." *Teaching in Higher Education* 7(4): 411-427.