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Abstract

Research into, and discussions on, the relationships between teaching and research activities in universities and other tertiary education institutions have been gathering momentum for a number of decades in many parts of the world. The foci of these researches and discussions have varied greatly. At one end of the spectrum are the publications which were the result of large-scale projects, generally commissioned by a national body or an institution; these projects often had a broad focus. At the other end are the products of pursuits by an individual with a personal interest in the field, exploring a specific aspect of practice. This paper initially explores some key publications based on commissioned projects in the US, UK and Australia in order to gain a 'big picture' view of the teaching-research (TR) connection, then looks at TR relevant discussions emanating from the work of prominent scholars, and finally provides an insight into strategic initiatives for promoting TR connections at an institutional level. The paper provides evidence for the widening of discussion base for TR connections, while narrowing the discussion focus to student engagement, in different parts of the world.

Keywords

teaching-research connections trends

Introduction

Research into, and discussions on, the relationship between teaching and research activities in universities and other tertiary education institutions have been gathering momentum for a number of decades in many parts of the world. The foci of this research and discussion have varied greatly. At one end of the spectrum are publications which were the result of large-scale projects, generally commissioned by a national body or an institution. At the other end are the products of pursuits by individuals with a personal interest in the field. Given the large volume of publications on the topic of teaching-research (TR) connections, it is tempting to ask if there is a need for yet another paper on the topic and what can be learned that is not known already.

Those working in the field of academic or educational development have been aware that most academic staff and students in universities and colleges are seldom involved in early discussions on academic or educational development (other than to participate as interviewees and survey respondents in research projects). Often when a major funding body indicates a particular topic or theme to be its priority, then institutions develop policies and strategies to promote initiatives linked to that theme and the discussion base widens. For example, Gallagher (2001) identified government funding as an incentive for university responsiveness in Australia, and a major survey of 'The Academic Profession in Australia' indicated that "many staff professed ignorance about where important decisions were made in their universities" (Sheehan & Welch, 1996). In order to widen the discussion base and to learn from each other, the topic of TR connections needs to be visited and re-visited in as many discourses as possible.

This paper intends to add another pebble to the pond so that the water rises high enough for general consumption. The paper initially explores some key publications based on commissioned projects in the US, UK and Australia in order to gain a 'big picture' view of teaching-research (TR) connection, then looks at TR relevant discussions emanating from the work of prominent scholars, and finally provides an insight into strategic initiatives for promoting TR connections at an institutional level.

Global views of TR connections

A project instigated by Ernest Boyer who was a Commissioner of Education in the United States, and funded by the Carnegie Foundation for the Advancement of Teaching, produced a report entitled "Reinventing Undergraduate education: a Blueprint for America's Research Universities"



(Kenny et al., 1998). This project report is a good starting point to understand what prompted recent global discussions on the TR connection, even though there are many earlier studies that explored the field. The report is based on the findings of a large-scale investigation of the higher education sector and system from various angles, and a key finding was that research universities often fail to deliver what they appear to be promising their undergraduate students. For example,

Recruitment materials display proudly the world-famous professors, the splendid facilities and the groundbreaking research that goes on within them, but thousands of students graduate without ever seeing the world-famous professors or tasting genuine research. Some of their instructors are likely to be badly trained or even untrained teaching assistants who are groping their way toward a teaching technique; some others may be tenured drones who deliver set lectures from yellowed notes, making no effort to engage the bored minds of the students in front of them. (Kenny et al., 1998, pp. 5-6)

The project report argued that there should be greater opportunity for students to experience learning through research-based learning in their undergraduate education, and that inquiry-based learning should start at first year level in every course. The report also recommends that the undergraduate study should “culminate with a capstone experience”, such as a research or creative project that is conducted in collaboration with academic staff and graduate students (Kenny et al., 1998, pp. 27-28). The report acknowledged that universities were aware of the need for linking teaching and research at the undergraduate level, but that these attempts tend to be in a piece-meal fashion.

At the national level in the US, a more recent report suggests that progress has been made in connecting teaching and research through the National Science Foundation, such as the Science, Technology, Engineering and Mathematics (STEM) education initiatives (Haggert, 2006). Last year the National Science Board recommended to the then ‘President-Elect Obama Administration’ that “Mechanisms should be strengthened and expanded for the Federal Government to coordinate STEM education research and scale-up successful STEM educational activities for dissemination to state and local educational agencies” (National Science Board, 2009). Therefore connections between teaching and research in STEM disciplines have shifted from ad hoc efforts at the institutional level to an agenda item at the national level.

There is ample evidence of investigations into TR connections and implementation of strategies at national, institutional and discipline levels in the United Kingdom. The main UK body driving the agenda is the Higher Education Academy (HEA). The following are examples of HEA commissioned investigations into TR connections:

- *A guide to the research evidence on teaching-research relations* (Jenkins, 2004)
- *Institutional strategies for linking teaching and research* (Jenkins & Healey, 2005)
- *Linking teaching and research in departments and disciplines* (Jenkins, Healey & Zetter, 2007)
- *Developing undergraduate research and enquiry* (Healy & Jenkins, 2009)

These reviews largely reflect the findings of other workers in the field, such as the myriad forms of TR connections, the benefits of making the connections in order to improve the quality of education at the undergraduate level, and the need to move from an individualistic effort to a more coherent initiative with appropriate policies and strategies at institutional and discipline levels.

In addition to reviews and other working papers, the HEA has supported discussions on the topic through conferences, such as *The Teaching and Research Relationship: Developing Institutional Policy and Practice* event (HEA, 2005) and the *Bringing Research and Teaching Together* event (HEA, 2006). The latter conference was a joint effort with the Research Councils UK Executive Group, in order to learn from past experiences in the US and UK, and to develop new strategies. This shows that the topic of TR connections has gained the attention of a peak research body in the UK, and not just the body that was set up to enhance the teaching/learning roles of universities.

With the help of the Higher Education Funding Council for England, a major funding source for HEA, 74 *Centres of Excellence in Teaching and Learning* have been established, and seven of these centres have formed the *Learning Through Enquiry Alliance (LTEA)*. The goals of the LTEA include sharing of ideas and resources to make strategic changes in “Supporting the development of students as competent, critical, independent and creative enquirers” and “to optimise the opportunities for staff and students to interact and together to create new communities of enquiry” (LTEA, 2006).

The LTEA members are:

- Centre for Excellence in Enquiry-Based Learning (CEEBL), The University of Manchester
- Centre for Excellence in Applied Undergraduate Research Skills, University of Reading
- Centre for Inquiry-based Learning in the Arts and Social Sciences (CILASS), The University of Sheffield
- Centre for Excellence in Professional Training and Education (SCEPTrE), University of Surrey
- The Reinvention Centre for Undergraduate Research, The University of Warwick & Oxford Brookes University
- Centre for Active Learning (CeAL), University of Gloucestershire
- Centre For Promoting Learner Autonomy (CPLA), Sheffield Hallam University

Financial support from the Higher Education Funding Council for England to some members of the LTEA may have ceased, since the funding model for the *Centres of Excellence in Teaching and Learning* was for a period of five years, from 2005-06 to 2009-10.

Other than the *Centres of Excellence in Teaching and Learning*, HEA supports 24 networks of ‘Subject Centres’ that promote various types of TR relationships within their disciplines. At the practitioner level, HEA makes available National Teaching Fellowships to enable investigation and implementation of TR relationships. Therefore there is evidence for the strong support provided by the HEA for developing the relationships between the twin roles of universities in the UK.

In the Australasian region, early discussions on TR connections have focussed on whether there is any evidence for the existence of a link between teaching and research. From late 1970s onwards some researchers have used meta-analysis to find almost zero correlation between teaching and research activities at individual and departmental levels (Hattie & Marsh, 1996; 2004), while others have argued that the research methodology used by Hattie and Marsh (1996) that showed no relationship between teaching and research was inappropriate for the context (Brew, 1999; Robertson & Bond, 2001). In 2001, a study funded by the Evaluations and Investigations Program of the then Department of Education, Training and Youth Affairs in Australia viewed the question “Is there a nexus?” as restrictive, and decided to examine the TR connection as they occurred at three universities with very different historical backgrounds (Zubrick, Reid & Rossiter, 2001, p. xi).

As can be expected from a study with a broad focus, these researchers found many kinds of connections and many factors that can influence the nature and extent of connection, and that the three universities had adopted different policies and strategies to promote the connections (Zubrick, Reid & Rossiter, 2001). Another investigation used case studies of students at different year levels to discover some factors that can influence students' perception of the TR connections, such as factors related to student background, discipline or department culture/practices, and the "opportunity for teacher-student interaction" (Neumann, 1994).

The Australian Learning and Teaching Council (ALTC), previously known as the Carrick Institute for Learning and Teaching in Higher Education, is funded by the Australian Government Department of Education, Employment and Workplace Relations. The ALTC follows the model of HEA in the UK and this is not surprising, given the historical ties between Australia and the UK. ALTC supports "outstanding teaching and practice through a suite of award, fellowship and grant schemes" (ALTC, nd). A two-year national project funded by ALTC aimed to "optimise understanding of how students' learning outcomes benefit from effective implementation of the TRN [Teaching Research Nexus] across year levels, across disciplines, and across university types" (Krause et al., 2008, p. 7). The university 'type' presumably refers to alliances among Australian universities, such as the 'Group of Eight' (Go8) universities, the 'Australian Technology Network' universities, 'Innovative Research Universities' and the institutions that do not belong to any particular group. The Go8 universities, which are based on the traditional university models in the UK and Germany, are known to be research-intensive, while some of the newer universities consisting of institutes that were initially created for providing teaching and/or technical training are in the process of building up their research reputation. With regards to TR connections, Krause and colleagues (2008) found that there was no distinct pattern in strategies that promote the connections and the university type. After acknowledging the variety of terms that have been used to describe TR relationship (such as, Research-based teaching/learning, Research-led teaching/learning, Research-infused teaching/learning, Inquiry-based teaching/learning, Research-informed teaching, Research-linked teaching, Research-enhanced teaching and Teaching-research linkages) and the discussions on the differences between the terms, the study adopted a broad interpretation for TR nexus which included all forms of relationship between teaching and research in a university (Krause et al., 2008). Krause and colleagues' (2008) study also confirmed what has been alluded to by other researchers, namely that the types of TR relationships vary within and across disciplines. The study interviewed policy makers, academics and students; while most of the interviewees in the project viewed TR Nexus as an important (even fundamental) aspect of teaching and learning in a university, formal evaluation of the nexus was found to be lacking, and the interviewees

acknowledged that TR relevant policies and strategies in the universities could be improved (Krause et al., 2008). Given these findings, Krause and colleagues (2008) developed an online resource with the title *The academic's and policy-maker's guides to the teaching-research nexus*. Additionally, Professor Angela Brew has been awarded as ALTC fellowship for the purpose of “Enhancing undergraduate engagement through research and inquiry” (ALTC, 2009). One of the outcomes of this fellowship is a survey of scholarships for undergraduate research in Australian universities. The survey results show that most funded research activities occur “outside of the university semester and curriculum” (Jewell, n.d.), suggesting that the activities would exclude many students. Thus there is evidence for further discussion on the topic of, and resources for the development of, TR connections in Australia.

Snapshots of an institutional progression in TR connections

On the pathway to TR connections, Monash University has produced a discussion paper, undertaken a benchmarking exercise, developed relevant policies and procedures through discussion at various committees, and has introduced programs with the purpose of enhancing existing links between teaching and research, as well as introducing new linkages between the two core functions of the University. The following section provides snapshots of the progression in TR connections at Monash.

The Teaching – Research Nexus: A discussion paper (Webb, 2003)

The paper described various previous instances when the topic of the TR nexus had been raised or were highlighted, such as, the Monash Research Review Committee Report in 1992; the Learning and Teaching Operational Plan in 1999, the institutional self-review report in 2002, and the Learning and Teaching Plan for 2003-2005 period, high level committee deliberations on enhancing the university's prestige and functions, discussions within faculties, and in the Monash graduate attributes. Some of the issues that were identified in the paper are common to most institutions (e.g., individual academics receive ‘mixed-messages’ from various levels of the university regarding the importance of teaching and research, and compartmentalising performance management and promotion into ‘teaching’, ‘research’ and ‘service’).

The report discussed nine dimensions of the nexus that included “Building students’ research and inquiry capabilities” dimension, and provided 11 examples for embedding the nexus, such as, developing a clear definition of the nexus at Monash, including the nexus at strategic planning and policy levels, and highlighting the nexus in the graduate attributes. A number of current practices at Monash that demonstrated TR nexus were identified and the report concluded that “The nexus has been and will continue to be core to the values and activities of Monash University” (p. 16).

This discussion paper was considered by the Academic Board of Monash University in November 2003, and the Board recommended that relevant senior administrators of the University will have the responsibility for embedding TR nexus. The 11 examples for embedding TR nexus formed the action plan for the university, and the list was used in a subsequent benchmarking exercise with another research-intensive university in Australia, resulting in the “Teaching-Research Nexus Benchmarking Project: The University of Sydney and Monash University” report (Brew & Weir, 2004). Among the many similarities between the two institutions was the development of new graduate attributes that reflect the importance of the TR nexus; at that point in time, the University of Sydney had completed their process while Monash University was still in the process of developing the list.

The Monash Passport

The Monash Passport was a strategic initiative that started in 2007 under the auspices of the Deputy Vice-Chancellor (Education), and it is currently in its second phase. The aim was to enable “an education system that offers a broad menu of opportunities to students” for “the Passport combines degree programs with international exchanges, leadership programs, work training programs and volunteer and research opportunities as a grounding for outstanding careers” (Monash University, n.d.) There are various scholarships and other funds made available for students to engage in programs linked to the Passport initiative. Key components of the Passport are opportunities to: ‘choose’ (e.g., multiple pathways to complete a degree program), ‘enhance’ (e.g., secondary school students can enrol in first year units/subjects), ‘act’ (e.g., participation in volunteering programs in the wider community), ‘investigate’ (e.g., undergraduate research project as part of a degree program) and ‘explore’ (e.g., exchange programs that allow short-term study in either one of the Monash international campuses or in a partner institution).

Apart from promoting active learning, the initiative has spawned projects that are highly relevant to the discussion on TR connections at Monash. Two of these are given below:

- The ‘Undergraduate Research Opportunities Program’ offered by the Faculty of Engineering states that it provides “an early opportunity to experience real life in an engineering research environment, working either with a supervisor and/or a research group” which is usually only experienced at honours or postgraduate levels (UROP, 2010).
- The ‘Monash Undergraduate Research Projects Abroad’ offered by the Faculty of Information Technology enables students to take a summer semester research project at the University of California in San Diego.

Although the ‘Inter-campus exchange program’ and the ‘International exchange program’ with partner universities are not always focussed on research activities, these programs have been an incentive for students to engage in their studies, as well as helping them to become independent learners.

Discussion on the trends in TR connections

The major focus of discussions on TR connections in both US and UK seemed to have shifted from the *research into disciplinary teaching/learning* dimension to the *teaching/learning of disciplinary research* dimension. For example, while the Carnegie Foundation project in the US (described above) was initiated by Boyer whose publication “Scholarship Reconsidered: Priorities of the Professoriate” (Boyer, 1990) re-invigorated discussions on scholarship of teaching, there is little mention of the research into teaching and learning as a type of TR connection in the project report produced by Kenny and colleagues (Kenny et al., 1998). In the UK, the Higher Education Academy commissioned work ‘A Guide to the Research Evidence on Teaching-Research Relations’ which clearly states that “the sole focus is on staff involvement in research on the discipline *per se*, not on the impact of pedagogic research or research into higher education” (Jenkins, 2004, p. 3). This trend is appearing in the Australian higher education sector. After outlining nine TR approaches in the ‘Teaching Research Nexus’ document for the University of Melbourne, Gabrielle Baldwin’s discussion focuses on “how research informs teaching and does not consider how teaching might inform research” (Baldwin, 2005, p. 4). A recent summit to explore TR nexus in Australia stressed that research experiences for undergraduates are necessary

to meet the various needs of society, and urged the major research funding bodies in Australia (that is, the Australian Research Council, the National Health and Medical Research Council and the Australian Learning and Teaching Council) to collaborate and mandate that the research outcomes of the projects they fund should support education at all levels, similar to the strategy used by the National Science Foundation in the US (Brew, 2009).

One reason for the increased emphasis in student engagement in research might be the need to restrict discussions associated with strategic initiatives to a manageable level, given the growth in the study of TR connections over the decades. The discussions that have been highlighted in this paper are only a small fraction of the available publications on TR connections. Another reason can be the realisation that much has been discovered in student learning styles/strategies/approaches as well as in teaching styles/strategies/approaches, and that time and resources should now be spent on initiatives that may help to make a tangible (or measurable) difference in the quality of student learning process and outcomes. For instance, in a discussion of the TR nexus, Webb (2003) states that “30 years of research on university teaching point to the importance of teachers creating situations where students actively engage in inquiry that leads to learning” (p. 8).

With the growth of the quality assurance movement across the globe, governments in many countries have introduced the requirement of evidence for educational quality when allocating funds to higher education institutions. For example, an evaluation of the Learning and Teaching Performance Fund that was introduced by the Australian government in 2006, showed that the Fund was a catalyst for the higher education sector to collect data on student experiences/perceptions through standardised tools (DEEWR, 2008). More recently, ALTC commissioned a national project to identify ‘Teaching Quality Indicators’; two global trends identified by the project are “Increasing interest in performance funding based on output measures and indicators”, and “Greater emphasis on quality auditing and accreditation within countries and regional groupings (e.g. Bologna, Higher Education Area in Europe, Spellings report and regional accreditation organisations in the USA, TEQSA in Australia)” (Chalmers, 2010, p. 8). The project developed a framework for teaching quality, and one of the dimensions in the framework is ‘engagement and learning community’ which refers to both “student’s commitment and engagement with their own education” and “staff engagement with their students and their institution” (Chalmers, 2010, p. 20). The trend indicates that not only are surveys of student perceptions of learning/teaching growing, but also student views on the level of engagement they experience in their learning are becoming important measurements of educational quality.

The trend also explains discussions in universities regarding the National Survey of Student Engagement tool in the US, and the equivalent Australasian Survey of Student Engagement data collection instrument, such as the '2010 Student engagement forum' (AUSSE, 2010).

The imperative from society at large, to prepare university graduates for a future that is unknown and where research activities are seen as vital for the betterment of society as a whole, appears to be another incentive for the shift in the TR focus. For instance, in a paper on 'The Modern Integration of Research Activities with Teaching and Learning', Burton Clark states that:

For life in an inquiring society, one where information becomes knowledge and knowledge occasionally becomes wisdom, a sense of inquiry and a related research enlightenment may be the best common tools that higher education can offer its graduates. (Clark, 1997, p. 253).

This line of discussion has been growing in recent decades, as noted by the editors of a special edition of the Higher Education Research and Development journal that was devoted to 'Generic graduate attributes: Citizens for an uncertain future' (Barrie & Prosser, 2004). Even when the future direction has become clear, such as the 21st century society being driven by science and technology, there is a view in the US that the current shortage of skilled workforce will be exacerbated if urgent measures are not taken, and that high quality inquiry-based education would help to address the shortage; the recommendation is to implement inquiry-based learning in schools as early as possible, and to strengthen the skills development at the higher levels of education (National Science Board, 2009). Similar views have been expressed by the Australian government, although the special report on 'Bridging the skills divide' focussed on vocational education and work-place training, rather than higher education sector (DEEWR, 2007).

The shift, from a theoretical discussion on TR connections to a more pragmatic approach that enables the connections at the undergraduate level of education, is obviously appealing to many stakeholders of higher education. While the aim of seamlessly embedding research activities at all levels of higher education should be pursued, the indicators of student engagement in the activities should not be entirely or mainly based on surveys of student views, (such as, the *Australasian Survey of Student Engagement* data). The outcomes of research into the use of questionnaires to survey student perceptions of teaching quality in universities have shown that the data collected through this means should be used in conjunction with data from other sources (McKeachie, 1997). One of the explorations into student feedback on teaching showed that some factors (that is, discipline area, student

gender and course year level) can influence how students rate the units/subjects, and that interaction of factors beyond the control of the academic staff member may cause a significant difference in teaching evaluation results (Santhanam & Hicks, 2002). Despite the usefulness and general reliability of the information collected via the teaching evaluation questionnaires, there is a possibility of misuse or abuse of the data collection process and products (Greenwald & Gillmore, 1997). From an administrative point of view, it may seem an expedient and a cost-effective means to make decisions regarding continuation of courses, or performance reviews of staff members, based mainly on data collected from students. Like the teaching evaluation information, student engagement measurements can be influenced by many factors and the misuse of the measurements has serious consequences. Therefore it is heartening to read that some Australian universities are actively engaged in developing various robust means to measure and sustain teaching quality, including the determination of student engagement (Chalmers, 2010).

The evidence presented in this paper clearly shows that there has been much discussion on various aspects of the relationship between teaching and research, and that there is an apparent shift in the focus of the discussion from general TR connections toward engaging students through inquiry- or research-based learning. Like any other major shift in a complex system, discussions on TR connections will continue at many levels, both within and outside the higher education sector. These discussions can be expected to increase, given the current skills shortage in the workforce and the realisation that the shortage will become critical with the 'baby boomer' population reaching retirement age in many developed countries. The information presented in this paper may be useful to further the dialogue on the development and implementation of strategic initiatives to embed TR connections in the undergraduate curriculum.

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