



The Academic's and Policy-Maker's Guides to the Teaching-Research Nexus: A suite of resources for enhancing reflective practice

Final project report

www.trnexus.edu.au

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Executive summary

This report outlines the findings from the two year national project on the teaching-research nexus (TRN). The team comprised Professor Kerri-Lee Krause (project leader), Dr Sophie Arkoudis, Professor Richard James, Ms Ros McCulloch, Ms Claire Jennings and Dr Alison Green. Project outcomes are based on interviews with academics, policy-makers and students across eight Australian universities. In addition, the team reviewed existing literature and consulted with national and international experts to develop a Guide on best practice in relation to teaching-research connections for academics and policy-makers. The project team were keen to enhance understanding and awareness of how student learning outcomes improve through the use of appropriate TRN strategies.

The broad findings of the project were as follows:

- While initiatives to link teaching and research can occur in all disciplines, our data suggest that views about the TRN are very individualistic. There appear to be as many differences across disciplines as within disciplines, with no particular disciplinary pattern emerging.
- TRN strategies vary widely across university types. No obvious pattern of strategies emerged as being associated with a particular university type.
- Most academic staff interviewees spoke of TRN initiatives occurring at all year levels. However, the tendency was for TRN strategies to be more commonly used in the later years of the undergraduate degree.
- All policy-maker interviewees acknowledged the importance of the teaching-research nexus in higher education, but the majority indicated that they had a lot more work to do in understanding, promoting and supporting the TRN in both policy and practice in their institution.
- Many interviewees viewed the connection between teaching and research as a fundamental, distinctive feature of university learning and teaching that sets it apart from teaching in further and vocational education settings. However, there was little evidence of formal evaluation of TRN initiatives and their impact on student learning.
- The majority of academic staff interviewees expressed the view that the TRN has benefits for students in relation to engagement and motivation, graduate attributes, and preparation for future employment.

Resources developed during the course of the project, including examples of the TRN across discipline and year levels, the self-review framework and various TRN strategies, have been synthesised and made available to the sector via the project website (www.trnexus.edu.au) and a booklet Guide for academics and policy-makers (available in both hard copy and electronic formats).

Three repeated national seminars were convened to raise awareness around the sector of the resources developed by the project team. Over 240 university staff registered to attend these seminars, which included the website launch and a keynote presentation and workshop from Professor Mick Healey, an internationally recognised expert on the TRN.

Overall, the seminars were well received by attendees. The dissemination strategy was also complemented by the preparation of papers for the ALTC National Forum in August 2007 and the HERDSA 2008 conference.

Introduction

The proposition that research contributes to educational quality and enhanced student outcomes has long been a basic tenet of higher education. However, as universities have become more diversified in response to a massified, market-driven environment, the role of discipline-based research in undergraduate learning and teaching has emerged as an issue for discussion, debate and close scrutiny. While the principle of research-led learning and teaching in higher education is advocated internationally, the question of how to operationalise and optimise this nexus is yet to be fully understood. At one end of the spectrum lies the assumption that the TRN is the remit of research-led universities and an experience best integrated into later year undergraduate curricula. By contrast, many others argue for the need to infuse teaching with research practices and principles, regardless of the character of the university or the year level involved.

Despite existing research and resources on the topic, this project was based on the premise that there remains a narrow conceptualisation of the TRN in Australian higher education and that, in order to make advances, two approaches must be advanced. First, the project team contend that individual academics need practical advice and resources to guide their planning, integration and self-review of TRN practices at the classroom and curriculum level. Second, institutions, faculties and departments need support and advice to guide enterprise-wide planning, policy-making and review that encourages, facilitates and monitors the embedding of research into pedagogy. This project has developed a new suite of resources that includes practical ideas and strategies for both academics and policy-makers.

Project aims

The purpose of this project was twofold. First, we sought to optimise understanding of how students' learning outcomes benefit from effective implementation of the TRN across year levels, across disciplines, and across university types. We achieved this through extensive analysis of the literature, and wide consultation and interviews with key stakeholders including students, academics, policy-makers and researchers in the field. Second, the project team sought to develop practical, evidence-based resources for policy-makers and academics that are designed to assist them in implementing and evaluating the TRN within their own disciplinary and institutional contexts and curricula. These resources acknowledge the disciplinary, year level and institutional differences associated with TRN strategies.

Outcomes of the project

Five key outcomes of the project are presented and discussed below. The final report is the sixth outcome of the project.

Project outcome 1: Academic's Guide to the Teaching-Research Nexus

The project team have chosen to develop a Guide that summarises the key material and resources presented on the project website. Originally, the project team intended to produce separate Guides for academics and policy-makers. After careful consideration, a single Guide was produced, in recognition of university staff who have both academic and senior level teaching and learning leadership responsibilities. This Guide contains separate sections pertaining to advice for academics and policy-makers respectively, in addition to topics of interest to both academics and policy-makers, such as a discussion of what the TRN is, and how the TRN benefits students. The section of the Guide specifically for academics focuses on discipline and year level factors and benefits for academics. Resources in the Guide are complemented and supported by the 'academic voice' – conceptualisations of TRN issues as articulated by the academic staff interviewees in the project. The Guide also presents the self-review framework, which was developed by the project team for academics and heads of department, and selected TRN strategies and examples of good practice by Australian academics. Originally the project team proposed to develop 'Models to Guide TRN Practice'. However, during the course of data collection and academic interviews it became apparent to the team that, as a result of the sheer diversity of TRN strategies described by academics from various disciplines, year levels and teaching contexts, the notion of a model or models to guide practice was not feasible within the scope of the project. Instead, examples categorised by discipline, year level and context are provided on the website to stimulate thought about suitable initiatives in a range of academic teaching and learning settings. In addition, a section of the website is devoted to the 'TRN in the Curriculum' to highlight strategies and suggestions for academics to adapt to their own curriculum context.

Project outcome 2: Policy-Maker's Guide to the Teaching-Research Nexus

The Policy-Maker's section of the Guide is aimed at senior policy-makers and academic staff with leadership responsibilities in teaching and learning. Categories of advice include: embedding the TRN into institutional policy, benefits to the institution, how to promote the TRN and recognising and rewarding the TRN. Strategies for policy-makers and the policy-maker self-review framework are also included. The Guide booklet will be sent to each Australian university. PDF versions of the Guide will also be available on the project website.

Project outcome 3: TRN project website

The project website, *The Teaching-Research Nexus: A guide for academics and policy-makers in higher education* (www.trnexus.edu.au) was launched in June 2008 to showcase the project's findings and resources. The written material is based on the

outcomes of the literature review and the team's interviews with Australian academics, policy-makers and students. The website comprises the following subsections:

- i) About this Project
- ii) What is the TRN?
- iii) Benefits for Students
- iv) In the Curriculum
- v) TRN in Policy
- vi) TRN and Your Career
- vii) Examples of TRN Practice

Please refer to Appendix 1 for a sitemap of the website's sections.

Evidence-based resources developed by the team are available for download on the site. These resources include 86 examples of good practice. The website examples are categorised by discipline, year level, TRN strategy, and teaching and learning context. There are also examples that are specific to the scholarship of teaching and learning, and seven examples from Australian policy-makers. The website examples can be found at: (<http://trnexus.edu.au/index.php?page=trn-examples>). The majority of these examples have been developed from project interviews. A small proportion of the examples were written by academics with an interest in the TRN, as identified through Expressions of Interest provided at a National ALTC TRN Forum in August 2007.

The project examples were not informed by interviews with UK academics because funding constraints prevented UK academics Professor Paul Blackmore (formerly at Coventry University, now at King's College London) and Ms Coronyn Edwards (University of Birmingham) from replicating the project interview schedule with their UK colleagues. Instead, both Professor Blackmore and Ms Edwards trialled and sought feedback from colleagues on the self-review framework. In this way, the project team was able to establish the international applicability and relevance of the self-review tool. In addition, Professor Blackmore and Ms Edwards plan to submit a case study from their own experiences with teaching-research linkages for inclusion on the TRN project website. These will be uploaded to the project website when available.

The self-review framework is available to download from the website. It is a self-review evaluative tool with versions for academics and policy-makers at departmental and institutional level. These tools are designed to be adapted to university contexts and are accompanied by guidelines and suggestions on the use of this tool. The URL for the framework is: <http://trnexus.edu.au/index.php?page=self-review-framework-to-guide-institutional-trn-policy-and-practice> .

Feedback on the draft website was sought from various stakeholders at different times during its development. Details of this process are included in the *Evaluation of project outcomes* section (p36).

The project leader has organised for the TRN project website to be linked from the UK Higher Education Academy website in three places:

- <http://www.heacademy.ac.uk/ourwork/research/teaching> (in the news section in the right hand margin)
- <http://www.heacademy.ac.uk/ourwork/research/teaching/projects> (under the heading *Selected national initiatives*)
- <http://www.heacademy.ac.uk/ourwork/research/teaching/links> (under the heading *Wide Ranging Web Resources*)

The project website also contains URLs for a variety of other websites with information and resources relevant to the TRN, to encourage further investigation and cross-referencing of key national and international website resources on these issues.

Project outcome 4: National seminars

Three repeated half-day national seminars were held at the University of Western Australia, Griffith University and The University of Melbourne. These were held on June 16, 18 and 20 2008, respectively. The aim of these seminars was to:

- i) discuss TRN issues with academics and policy-makers;
- ii) showcase and workshop *The Teaching-Research Nexus: A guide for academics and policy-makers in higher education* website and self-review checklists to foster strategic curriculum and policy transformation;
- iii) feature an international keynote speaker and workshop facilitator; and
- iv) establish ongoing communication channels for discussion of these issues and the sharing of leading practice nationally and internationally.

Over 240 participants registered to attend (each venue reached maximum capacity). Professor Mick Healey, Professor and Director of the Centre for Active Learning, University of Gloucestershire (UK), was the invited international speaker. Professor Healey provided highly-rated interactive workshops at each seminar, entitled *Linking discipline-based research and teaching to benefit student learning*, and was a critical friend to all other activities in the seminars.

The seminars had an interactive focus and the resources developed by the team were introduced (including website launch) (see Appendix 2 for the program for each seminar). One of the group activities involved participants in using the self-review framework to identify challenges to optimising teaching research links, and opportunities for strategic change. Presentations were given by an ALTC representative and a policy-maker representative from the host universities in each state. Each seminar was facilitated by at least one project team member.

Feedback about the seminars was very positive (see *Evaluation of project outcomes* section (p36) for more details on evaluation data). The majority of participants particularly appreciated the opportunity for group discussion of TRN issues and informal networking with colleagues. Professor Mick Healey's interactive workshop, in which he offered his expertise and an international perspective on TRN issues, was also highly regarded.

In addition, Professors Krause and James collaborated with ALTC representatives to host an ALTC Project Forum on the TRN at the University of Melbourne on June 19. The goal of this invited Forum was to highlight the role of the TRN in selected ALTC-funded discipline-based projects, leadership projects and fellowships. In this way, closer ties were established between and among several existing ALTC projects, with a particular focus on the role of teaching-research connections in each. Professor Healey also gave a well-received presentation, *Issues and purposes of teaching-research linkages in higher education: Setting the scene*, and contributed to an interactive discussion on the relevance of the TRN to ALTC disciplinary based projects, leadership projects and fellowships.

Project outcome 5: Dissemination activities

Dr Green and Ms McCulloch presented a refereed conference session titled *Fuelling the knowledge economy: The potential for research-based learning to engage communities* at the July 2008 HERDSA conference. This presentation, which was based on the project findings, was a special interest symposium at the conference. In place of a HERDSA TRN Special Interest Group (SIG) (as proposed in the initial project brief), the project team elected to foster interest and engagement around the TRN through the two Fora that were hosted by the ALTC (i.e., the National ALTC TRN Forum, August 2007 and the Invited ALTC Project Forum on the TRN, June 2008). The project team has the contact details of attendees at both Fora and will continue to maintain this database for any future TRN events.

In summary, the project team have met, or are currently finalising, the originally proposed outcomes. In the few instances where original targets were not met, alternative strategies for achieving the intended outcomes were put in place, as outlined above. The approach taken by the team to attain the project outcomes is described in the next section.

Approach and methodology

The project comprised four phases:

1. Review of existing national and international TRN activity
2. Data gathering and consultation
3. Resource development and website pilot
4. National release, promotion and discussion of the project resources

Each phase consisted of multiple strands of related activity, which are outlined below. During each phase, the project team met regularly either for face-to-face or teleconference meetings. Email exchanges were also maintained regularly. Advisory Group meetings were scheduled for key milestone points of the project. Contact with UK collaborators was maintained by email, phone and face-to-face contact when the project leader was visiting the UK.

Phase 1: Review of existing international activity

Literature review

The project team undertook a review of national and international literature on the TRN to inform the position and focus of the project. The aim was to identify gaps in the existing resources available to academics and policy-makers and to develop resources that would effectively strengthen and encourage links to be made between teaching and research. This review also included an audit of ten higher education institutions in Australia, Canada, New Zealand, United Kingdom and United States to determine the level of support for and focus on curriculum and policy issues related to the TRN. This audit was in addition to the Krause (2007) analysis of ways in which Australian universities portrayed institutional teaching-research linkages online and in publicly available web-based documents. Other websites have also been audited for information about initiatives and other work pertaining to the TRN, such as the Higher Education Academy (HEA), UK, and the Carnegie Foundation, US. Findings from the review of TRN-related activity can be found on p21 of this report. The review of research and existing TRN initiatives was used to develop interview questions for academics, policy-makers and students.

Establishment of Advisory Group

The project team invited the following experts to participate in an advisory group for the project: Professor Alan Jenkins, *Emeritus Professor, Oxford Brookes University, and HEA Advisor, UK*; Professor Mick Healey, *Professor of Geography and Director, Centre for Active Learning, University of Gloucester, UK*; Professor Adrian Lee, *Emeritus Professor and former Pro Vice-Chancellor for Education and Quality Improvement, University of New South Wales*; Professor Sandra Wills, *Director, Centre for Educational Development and Interactive Resources, University of Wollongong*. Professors Jenkins and Healey provided extensive feedback on the project team's ideas and resources via

email and skype conversations with the project director. In addition, Professor Healey accepted an invitation to be the international speaker in the project seminars during Phase 4. The project team met with Professor Lee and Professor Wills via teleconference at key points in the project, and also communicated via email. Their respective contributions to this project are gratefully acknowledged.

Phase 2: Data gathering and consultation

Ethics

The project team sought approval from the Human Research Ethics Committee at the University of Melbourne to invite eight different Australian universities to participate in this project. Permission was also sought and acquired from the Vice-Chancellors at the university. Eight universities from the Australian higher education sector participated in the study, in the form of interviews with selected students, academic staff and policy-makers. University types represented were: one Innovative Research University, two Australian Technology Network universities, two Group of Eight universities, and two New Generation Universities, and one unaligned university. These universities were chosen to reflect the differing institutional missions in Australian universities. For instance, two of the universities in the sample were large multicampus universities, another one served a predominantly regional student population, and a further one was a dual sector university.

Establish contact

Vice-Chancellors at participating universities were asked to nominate a suitable contact person at their university, for example, the Head of the Academic Development Unit or PVC/DVC (Academic) to help facilitate the identification of suitable academics to interview. Each contact person was asked to nominate a leading practitioner or team in the fields of: Sciences, Applied Sciences and Technology, Humanities, Arts, and Creative Arts. The project team also requested, where possible, for the university academic nominees to represent three distinct year levels: first year, final year undergraduate and postgraduate coursework. Nominated academics could be deemed to exhibit leading practice in one or more of the following areas: research-infused teaching practice, curriculum design and/or program development. This focus recognises that the TRN may manifest itself in a broad range of contexts, thus adding a significant new dimension to existing resources and approaches. The project team contacted nominated academics to explain the nature of the study and invite them to take part. Most academics who were approached had already been made aware of the aims of the project by their nominee and were willing to participate. Policy-makers were contacted directly by the project team.

Interviews

The project team interviewed 35 academics, 10 policy-makers and five groups of students. (see Appendix 3). The academics interviewed represented a broad range of disciplines and year levels. Academics were asked about their conceptions of the TRN, how they achieve the link between teaching and research in their own practice, any benefits they perceived from connecting teaching and research, what facilitates and

hinders the link, and what resources they believed were necessary to help academics engage with teaching-research linkages. Policy-makers were interviewed about their beliefs surrounding the nature of the TRN (disciplinary and year level differences, benefits to students), whether TRN was a feature of policy at their university, and how implementation and encouragement of TRN initiatives were supported at various levels of the university. Policy-makers were also asked whether any dialogue was occurring between staff with leadership responsibilities in the different portfolios of research and teaching and learning.

Student interviews were originally planned to occur in as many of the sample universities as possible, among undergraduates and postgraduate coursework students. The project team had planned to interview a sample of students from the classes taught by selected academic interviewees. Unfortunately, the student interviews were not as comprehensive as planned. The timing of the majority of academic staff interviews (anticipated to commence in March but actually commenced in May 2007) made it difficult to access their students in the non-teaching period of the first semester. When the project team did interview undergraduate students from a small sample of universities, early responses tended to reinforce the findings of existing research such as that of Robertson & Blackler (2006) and Healey (2005a). Given the limited time for interviews, and the need to focus on developing resources for academics and policy-makers, it was decided to cut short the planned undergraduate student interviews in 2007. During 2008, the team interviewed a sample of postgraduate coursework students. These students were asked to reflect on: a) how research had been integrated into the teaching and learning they experienced; b) whether their assessment was linked to research; and c) their perceptions of the positive and negative consequences they believed resulted from being taught by a research-active academic. Their responses are documented on the website (see Appendix 4 for complete list of interview questions).

The extent of student interview data in this project is considered to be a limitation of the project outcomes, though it should be recognised that it never was the intention to gather extensive student-focussed data. Nevertheless, the project team acknowledge the importance and value of documenting the student voice and experiences with research across the year levels. For this reason, the Healey, Jordan and Short (2002) student survey instrument (*The student experience of teaching, research and consultancy*) is included as a resource on the TRN website to encourage future student-focussed research on this important subject that is based on both qualitative and quantitative data gathering methods.

UK involvement

As the project interview schedule developed, the project team realised that an original plan to seek a UK perspective on TRN strategies through interviewing colleagues based in the UK (at the universities of Professor Blackmore and Ms Edwards) would not be viable due to funding constraints. At this time, discussions took place with both Professor Blackmore and Ms Edwards to determine other possibilities for contribution of a UK perspective to the project. Professor Blackmore and Ms Edwards subsequently provided feedback on the development of the project resources and asked their UK colleagues to provide feedback on one of the project resources (the self-review framework). Both

Professor Blackmore and Ms Edwards also intend to prepare a case study of good TRN practice for use on the project website.

Appointment of an independent External Evaluator

Associate Professor Ruth Neumann (Macquarie University) accepted an invitation to be the project's independent External Evaluator. Associate Professor Neumann is an internationally recognised authority on the TRN, who has conducted widely-cited studies on the TRN, particularly for investigation into the student experience of research-led teaching. Given that the project was based on the underlying assumption that teaching-research linkages enhanced student learning outcomes, Associate Professor Neumann was chosen for her expertise in the student experience of the TRN. During the course of the project, Associate Professor Neumann conducted a formative and summative evaluation, as well as contributed valuable feedback regarding the development of various project resources and the national seminars. She participated in one of the Advisory Group meetings and attended two project team meetings in addition to teleconference participation as part of her evaluation role.

Phase 3: Resource development and website pilot

Resource development

The project team analysed interview transcripts for themes and used these to inform the development of project resources. The information sought during the review of international activity in phase one was also used to inform the development of resources. Resources developed include the examples of good practice, the self-review framework and the project website. These will be outlined below.

- Examples of good practice

The project team endeavoured to use the material from the interviews with Australian academics and policy-makers to develop examples of good practice to share with the sector. Initiatives that were discussed in the interviews were developed by the project team, and sent to the interviewee for feedback. Permission was also sought from interviewees to use the examples on the project website. The vast majority of interviewees provided feedback and permission to use the example(s). Academics who had submitted an expression of interest in the development of a TRN publication with at the National ALTC TRN Forum in August 2007 were also invited to submit an example of good practice for consideration. This resulted in a further 13 examples.

- Self-Review Framework

Development of an effective tool to evaluate the existence and effectiveness of TRN initiatives was a key goal of the project. Team members commenced the development of the self-review framework during the completion of the interviews and the literature review. The framework passed through several reiterations within the project team. Feedback was sought during the project from stakeholders both in Australia and the UK to improve the self-review framework. The framework is available in five different versions: Full self-review framework; self-review framework for academics; self-review framework for Faculty/Department/School Heads; self-review framework for institutional policy-makers; and the abbreviated self-review framework. Different versions were created to enhance the usability of the document, which is quite large given the complex nature of the TRN.

- Website: www.trnexus.edu.au

The website was one of the key deliverables for the project, in order to make the developed resources such as the examples of good practice and the self-review framework readily accessible to academics and senior administrators at universities. The booklet versions of the *Academic's Guide* and the *Policy-Maker's Guide* will also be available to download on the website. Prior to meeting with the website designer, the team developed a conceptual structure for the layout of the website. Material for the website was written and drafted by team members, with feedback on the beta (test) website provided by the Advisory Group and External Evaluator. While the content within the lower levels of the conceptual structure changed, the main topics from the conceptual structure were retained and refined into seven key categories:

1. About this Project

- Explanation of the project and acknowledgements

2. What is the TRN?

- The project team are aware that familiarity with the concept of the 'teaching-research nexus' varies among academics. In this section, there is a commentary about the definitions of the TRN, and presentation of some of the research that has been conducted into research-led teaching to date.

3. Benefits for Students

- One underlying assumption of this project is that teaching-research linkages can enhance the student learning experience and outcomes. On the basis of the literature and the interviews, four categories of student benefit were identified, and these are discussed.

4. In the Curriculum

- This section focuses on strategies and suggestions to implement stronger teaching and research links within the curriculum. It is particularly useful for academics with teaching responsibilities and policy-makers who wish to consider the encouragement of teaching and research connections at

School, Department and Faculty level. Research findings into disciplinary differences and year level considerations for TRN initiatives are also included in this section.

5. TRN in Policy

- While the TRN is often agreed to be a unique element that distinguishes a university education, it remains necessary to support the implementation of TRN initiatives in university policy. In this section, strategies for the support of teaching-research links are provided for the institutional, faculty and department levels. The benefits to institutions and the methods to encourage support from academics with teaching responsibilities (eg, recognition initiatives) are presented. The self-review framework resource developed by the project team is located in this area of the website.

6. TRN & Academic Careers

- Although academics and policy-makers who were interviewed advocated various student benefits as part of efforts to connect teaching and research, many also saw benefits to the academic. The ways in which the TRN may enhance academics' careers are briefly presented.

7. Examples of TRN Practice

- The examples of good practice developed throughout the project are presented here to download as PDF files. Examples are categorised under the following broad headings: Disciplinary Groupings, Year Levels, TRN Strategy, Policy-Maker, and Scholarship of Teaching and Learning. The examples were categorised in this manner to attempt to make it easier for users to find examples that are relevant to their own context.

Phase 4: National release, promotion and discussion of the project resources

During the final phase of the project, team members focused on the preparation of the national seminars and a HERDSA 2008 conference presentation. In consultation with the HEA, Professor Healey was invited to present a keynote during the national seminars. Exact locations were determined by suitable venue availability in each of the selected cities. Organisation of the venue and promotion of the seminars was undertaken months prior to the events. Advertising of the seminars was handled by project team members in their respective states.

Professor Denise Chalmers, the recently appointed Director of the Centre for the Advancement of Teaching and Learning, kindly agreed to promote the Western Australian seminar. A flyer was developed and various methods of advertising were used: for example, staff newsletters and online bulletins, word of mouth, emails to people on CSHE and GIHE mailing lists. In addition to this, the flyer was emailed to Heads of Teaching and Learning Units and the PVC/DVC (Academic) in each state, inviting them to attend the seminar, and also requesting for the flyer to be forwarded to interested

colleagues. Academics and policy-makers interviewed for the project were sent individual invitations. The seminars were used as a vehicle to promote the project and its resources, which included the official launch of the project website. Advertising flyers for the website have been designed by the project team; these will be distributed with the booklet *Guides to create a second wave of interest about the project website*.

Dr Green and Ms McCulloch prepared a conference submission for the HERDSA 2008 conference in New Zealand. Project team members were given the opportunity to give feedback on the conference paper prior to submission. The conference was also used as an opportunity to informally promote the project website to a wider international audience.

Conceptual framework guiding the project

The conceptual framework for this project was informed by the work of Blackmore and Fraser (2003) and Baldwin (2005). We used the elements of the research-based learning experiences proposed by Blackmore and Fraser (2003) as a reference point during the data collection phase of the project. In this model, research-teaching links are achieved in four broad ways, that is by focussing on: a) research outcomes (research outcomes are reported); b) research processes (using research-process-based methods of teaching and learning); c) research tools (students learn to use the tools of research); and d) research context (developing an inclusive research context and culture). These four inter-related elements guided the design of interview questions, data collection and analysis, reporting and development of the resources.

The project's conceptual framework was also informed by Baldwin's (2005) nine principles for establishing links between research, learning and teaching. These principles, listed below, were instrumental in guiding analysis and reporting of leading practice. Baldwin's principles for linking research, learning and teaching are:

- i. draw on personal research in designing and teaching courses
- ii. place the latest research in the field within its historical context in classroom teaching
- iii. design learning activities around contemporary research issues
- iv. teach research methods, techniques and skills explicitly within subjects
- v. build small-scale research activities into undergraduate assignments
- vi. involve students in departmental research projects
- vii. encourage students to feel part of the research culture of departments
- viii. infuse teaching with the values of researchers
- ix. conduct and draw on research into student learning to make evidence-based decisions about teaching.

Baldwin's principles were also useful during the development of the interview schedule and the collection and documentation of good practice examples. The project team

expanded upon a selection of Baldwin's nine principles in the creation of a list of strategies for academics (<http://trnexus.edu.au/index.php?page=strategies-for-linking-teaching-and-research>).

Use and advance of existing knowledge

This section provides an overview of some of the contributions this project has made in applying and advancing existing knowledge about teaching-research connections in Australian universities. In particular, the project has contributed a range of evidence-based resources to guide academics and policy-makers as they consider why, how and when to apply the principles of the TRN in their institution. Following is an outline of some of the key components of the approach and website resources themselves.

Literature review

It was beyond the scope of the project to produce a comprehensive literature review, nevertheless, extensive analysis of pertinent literature and existing resources was undertaken and an annotated bibliography of key references was prepared by the project officer in collaboration with the project team. This evidence base informed the methodology and interpretation of data and examples gathered. The website resources also draw on the existing literature. Selected excerpts from these website resources are included below to demonstrate how the project team has used and advanced existing research for the purposes of developing a range of practical TRN resources for academics and policy-makers.

1. Definitions of the TRN

There are many interpretations of the teaching-research nexus in the literature and it is difficult to be certain whether different users of the term attach the same meaning to the concept (Wareham & Trowler, 2007). The increasing use of a variety of terms in place of, or in addition to, the term ‘teaching-research nexus’ is evident (Jenkins, 2004).

Terms used (often interchangeably) with the teaching-research nexus:

- 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
- Teaching-research linkages

Some scholars argue there are distinctions to be made between the different terms (Brew, 2006; Griffith, 2004), while others appear to use many of these terms interchangeably. The debate exists partly because there are several potential manifestations of the TRN, both within and between disciplines. For detailed discussions on the use of terminology in this area please refer to Jenkins, Healey and Zetter (2007); Wareham and Trowler (2007); Brew (2006); Healey (2005b); Griffiths (2004) and Jenkins (2004).

Jenkins (2004) questions whether the phrase ‘teaching-research nexus’ is best defined as a singular relationship and suggests it is a concept that comprises multiple links between teaching and research. For example, academics talk about the latest research in the field during their lectures. This activity might be described as ‘research-informed teaching’. The same academics may also require their students to undertake a small research project. This activity could be classified as ‘research-infused learning’. They are both, however, conceptualised as activities in which links are made between teaching and research.

Use of the term TRN in this project

For the purposes of this project we use the term ‘teaching-research nexus’ to describe the multiple links we are advocating be made between teaching and research to benefit student learning and outcomes. We adopt a broad interpretation of the TRN based on the literature and our discussions with Australian academics and policy-makers. ‘Teaching-research nexus’ is intended to describe the relationship between teaching and research within a university, and is predicated on the assumption that not only is there a relationship between the two academic activities, but that they are mutually beneficial.

While we agree that the relationship is not unidirectional, the project primarily focuses on the *manner in which disciplinary research can be used to guide and enhance teaching and learning*. We have adopted a broad definition for we believe this is necessary in order to reflect that the TRN can be described and manifested in multiple ways.

The use of the term ‘nexus’ has often been the subject of debate. Critics argue that the term ‘nexus’ insufficiently describes the link, and also creates the impression that there is an equal amount of reciprocal influence between teaching and research. From the volume of literature available about the TRN, notwithstanding examples of how teaching can influence research, the TRN is mostly focused on how research can enhance teaching. However, whether the word ‘nexus’ is the most appropriate descriptor of the relationship between teaching and research is not the focus of this project.

As indicated, the focus of this project is on the connections between *disciplinary research*, learning and teaching. Nevertheless, we fully acknowledge and support the value of *pedagogic research* and the scholarship of teaching and learning. The importance of pedagogic research and its value is discussed in the next section.

2. Connections between the Scholarship of Teaching and Learning and the TRN

What is scholarship?

There has been growing interest in the notion of scholarship of teaching and learning since the work of Boyer (1990) and Rice (1991) in the early 1990s. Boyer (1990, p.23) argues that ‘when defined as *scholarship*...teaching both educates and entices future scholars’. According to Shulman and Hutchings (1998), an activity becomes scholarship when it possesses at least three attributes:

1. it becomes public

2. it is subject to critical review and evaluation by members of one's community
3. members of one's community begin to use, build upon and develop the activity.

An important fourth dimension of teaching scholarship is the posing of questions around issues of student learning (Braxton et al., 2002).

The scholarship of teaching and learning occurs when academic staff systematically investigate questions related to student learning with a view to improving their own classroom practice and the practice of teaching in their discipline. It involves research on student learning, how it occurs, what it looks like, and how it can be deepened (Hutchings & Shulman, 1999).

Expanding the notion of scholarship

Since the work of Boyer and Rice, several scholars have expanded the notion of the scholarship of teaching and learning. Kreber (2001) draws attention to the peer review dimension in teaching scholarship, arguing that this may manifest itself not only through peer reviewed publications or conference proposals, but also by 'peer-reviewed learning processes' (2001, p.19). The latter may include peer observation and assessment of the effectiveness of instructional strategies used. Further, Theall and Centra (2001) have proposed criteria for evaluating the scholarship of teaching. Thus, for many, some form of peer review must now take place to justify the scholarship of teaching and learning.

What, then, is the connection between the TRN and the scholarship of teaching and learning? Clearly, the scholarship of teaching and learning does have a research dimension, but it is not disciplinary research as such. Having acknowledged this, we recognize the somewhat 'grey areas' that our colleagues in Faculties of Education may face, where the scholarship of teaching and learning may in fact be very much part of their disciplinary focus. Nevertheless, for the majority of academics, it is possible to distinguish between pedagogic and disciplinary research.

There are many scholarly activities that constitute scholarship of teaching and learning. For instance, Braxton and colleagues (2002, pp. 145-146) identify several scholarly activities, unpublished scholarly outcomes and refereed publications as constituting scholarship of teaching and learning activities. These might include:

- preparation of a new syllabus for a course;
- presentation about new teaching techniques to academic colleagues;
- experimentation with and subsequent evaluation and improvement of new teaching methods or activities;
- a refereed publication reporting a new teaching approach developed by the author.

Significantly, there is a 'discovery' dimension evident in several of these scholarly activities, that leads more recent researchers like Colbeck and Wharton-Michael (2006) to advocate the reintegration of Boyer's four domains.

Integrating scholarship

The notion of ‘public scholarship’ challenges the assumption that academic work is made up of separate tasks, such as research and teaching. It is a holistic model of academic work that conceives of the scholarly domains as integrated (Colbeck & Michael, 2006a). Yapa (2006, p.73) defines public scholarship as:

scholarly activity generating new knowledge through academic reflection on issues of community engagement. It integrates research, teaching and service. It does not assume that useful knowledge simply flows outward from the university to the larger community. It recognizes that new knowledge is created in its application in the field, and therefore benefits the teaching and research mission of the university.

Ramaley argues that public scholarship is a useful way to combine all the domains of ‘intellectual activity into a distinctive whole’ (2000, p.11). It emphasises ‘scholarly work as it is grounded in disciplined elements of scholarship, that is...peer reviewed...shared and available to others’ (Cohen & Yapa, 2003, p.6). Learning is viewed as a process of discovering how one might contribute to society using scholarly knowledge and processes. This process prioritises Mode 2 knowledge production (Gibbons et al., 1994) and its role in student learning and outcomes. Public scholarship might include addressing problems such as how to formulate, solve, and share a research problem using disciplinary knowledge (Janke, 2006, p.53). These scholarly processes take the TRN one step further by including a community engagement dimension.

In summary, there is growing interest in how we conceive of academic work and its relationship to student learning and outcomes. As universities and governments emphasise the importance of community engagement and knowledge transfer, there may be scope for giving serious consideration to approaches such as public scholarship as a way of integrating not only teaching and research, but also community engagement and knowledge transfer activities.

3. Studies of the relationship between teaching and research

Since the Boyer (1990) paper, substantial research into the TRN has been undertaken, particularly in the United Kingdom. Ramsden and Moses (1992) observed the ‘passionate allegiance’ (p.273) with which academic staff supported the mutually beneficial processes of teaching and research. Yet, as Hughes (2005) points out, there is a dearth of empirical evidence to support the existence of relationships between teaching and research.

Hattie and Marsh’s widely cited meta-analysis (1996) found no strong evidence for a positive or negative relationship between teaching and research involvement. In fact, they labelled as ‘myth’ the belief that the two are ‘inextricably entwined’ (p. 529). Nevertheless, they urge the following: ‘increase the circumstances in which teaching and research have occasion to meet, and ... provide rewards ... for demonstrations of the integration between teaching and research’ (p.533).

Commonly held assumptions about the connections between research and teaching

Hughes (2005, p.16) enlarges on the myths and assumptions about the connections between teaching and research in higher education in his analysis of literature over a 12 year period. He identifies five myths about the links between teaching and research, based on his analysis of literature. These myths are outlined below, accompanied by a brief, selective outline of Hughes' commentary on each.

The Myth	The challenge
The myth of the mutually beneficial relationship between research and teaching	Brew and Boud (1995) argue that learning is the key link between research and teaching. More empirical evidence is required to support this assumption.
The myth of a generalisable and static relationship	The connections between research and teaching vary significantly across disciplines, year levels and student cohorts.
The myth that scholarship is separate from research and teaching	Scholarship is central to both research and teaching (Elton, 1992; Hughes, 2005, p.25)
The myth of superiority of the lecturer as researcher	Hughes (2005) argues that there is not empirical evidence that 'lecturers as researchers are superior to lecturers who are not research active' (p.25). The challenge is to gather empirical data to address this assumption.
The myth of disinterested research into the relationship between research and teaching	Hughes (2005) contends that research on the connections between teaching and research has been conducted by academics with a vested interest in the outcome.

The table above provides evidence of the contentious nature of discussions about teaching-research linkages. This is not an unproblematic area of study and assumptions must be acknowledged as part of the discussion. Further, the methodology of some studies investigating the TRN has been questioned, and suggested as a possible reason for the failure to consistently demonstrate a positive relationship between teaching and research (Griffiths, 2004; Hounsell, 2002; Verburch et al. 2007).

Nevertheless, despite the challenges, much good work has been done and several investigators have taken up the challenge to provide context-specific examples of mutual benefits of teaching and research in the disciplines.

Going beyond the assumptions: Selected recent empirical studies

There has been much activity in relation to the gathering evidence and exemplars of the nature and impact of teaching-research linkages in recent years. While debate continues around the exact definition and appropriate terminology of the TRN, a number of areas of investigation have emerged that should be taken into account in any discussion of the relationship between teaching and research in higher education.

It is beyond the scope of this project to present a comprehensive literature review. Nevertheless, the bibliography provides an illustrative outline of the recent research conducted in order to meet the need for more rigorous empirical studies in the field.

A brief outline of selected illustrative recent resources and empirical studies follows:

- Specific examples of institutional strategies for linking teaching and research (Jenkins & Healey, 2005)
- A paper on departmental and disciplinary teaching-research links (Jenkins, Healey & Zetter, 2007).
- Brew (2006) argues that universities should be transformed into scholarly communities where learning, teaching, scholarship, research and knowledge are intertwined as students and academics focus on joint inquiry.
- Hoddinott (2005) looks at ways of tracking the integration of teaching and research from a Canadian perspective.
- Lindsay, Breen and Jenkins (2002) examine undergraduate and postgraduate students' perspectives on academic research and teaching quality.
- Robertson and Blackler (2006) analyse students' experiences of learning in a research environment.
- Wareham and Trowler (2007) challenge the tendency to view teaching-research linkages in simplistic ways, arguing for the importance of a social constructionist approach that emphasises the key role of contextual factors.

4. Disciplinary variations in the TRN

Early research into the nature of teaching research linkages suggests that there is not a single set of initiatives that will result in the TRN in different disciplines. Manifestations of the TRN differ widely between disciplines (Moses, 1990; Neumann, 1994). Moses (1990) accredited this to differences in the form of teaching across departments, while Kinkead (2003) suggested that the differences in disciplinary research necessitate different manifestations of the nexus across disciplines. It is likely that both teaching and disciplinary research styles are at least partly responsible for the need to create and use discipline-specific initiatives to achieve stronger connections between teaching and research.

Smeby (1998) found that at undergraduate level, students in disciplines such as Humanities and Social Sciences were more likely to believe their learning was linked to research, while this was less likely for students in the Natural Sciences, Medicine and Technology. This difference was not evident at graduate level. Robertson and Blackler (2006) contend that these disciplinary differences are directly related to knowledge

structures in the discipline. They argue that in ‘high paradigm consensus disciplines (like physics), knowledge tends to be cumulative’ (p. 224). As a result, the connections between research, teaching and student learning are typically hierarchical, with research influencing teaching, which in turn enables learning. On the other hand, in ‘low-paradigm consensus disciplines (like English), the ‘flatter’, more accessible structure of knowledge means that it is possible for students to engage with that knowledge earlier and through their own research’. (p.225)

These propositions support those of Smeby (1998) who argued that research in the Humanities and Social Sciences was less specialised than research from other disciplines and therefore easier to link to undergraduate teaching. In Smeby’s study, academics from humanities and social sciences were more likely to believe there was a relationship between teaching and research. These academics were also more likely than colleagues in the other three disciplines to think that undergraduate learning should be shaped by research.

Disciplinary ‘forces’ shaping the TRN

Jenkins, Healey and Zetter (2007) argue that:

- effective teaching research links are not automatic and need to be constructed; and
- academic departments and disciplinary contexts are key to developing the links between research in the discipline and student learning for this is where students’ intellectual development and staff identity can and should be developed

In their comprehensive resource on linking research and teaching in disciplines and departments, they identify ten disciplinary ‘forces’ shaping ways in which students might experience the TRN in their discipline. These are as follows (adapted from pp.34-40):

- ***Research and teaching cultures and attitudes*** – disciplinary communities have distinct cultures and may differ in their attitudes to the roles of research in relation to teaching.
- ***Research organization*** – e.g. team-based (sciences) vs individualistic (humanities)
- ***Research and scholarship connections*** – in some disciplines (e.g. the humanities), the boundaries between research and scholarship may be less defined than in the sciences. It may therefore be easier to connect staff research and curriculum content in some disciplines than in others.
- ***Disciplinary research frontiers in relation to the curriculum*** – staff research in some disciplines may be too difficult for undergraduate students to understand.
- ***Hierarchical disciplinary knowledge structure*** – when the disciplinary knowledge structure is very hierarchical, it may not be feasible to engage undergraduate students in disciplinary inquiry until later years.

- *Disciplinary concepts of knowledge and ontology* - how individuals see knowledge shapes the teaching-research relations they perceive and construct.
- *Student perspectives and expectations* – students’ motivation for study and expectations of university learning will shape their attitudes to research and problem-solving activities.
- *The role of professional societies and accreditation requirements* – professional requirements for accreditation may support or impede teaching-research linkages in the curriculum.
- *The role of practice in shaping knowledge and the curricula in professional disciplines* – if professional knowledge of practice is valued over development of research skills and knowledge, then an emphasis on teaching-research linkages may be seen as an impediment.
- *The role of Mode 2 knowledge in professional disciplines* – in some disciplines, teaching-research linkages may need to emphasise staff consultancy-based research, dissemination and application over the research process.

5. Year level differences and the TRN

The TRN in the undergraduate years

Compared to disciplinary considerations of the TRN, there is less focus in the literature regarding the year level considerations of the TRN. This may be the result of an implicit assumption that year level will mitigate the extent to which university students are sufficiently advanced in their learning to experience and benefit from the TRN.

Researchers who have conducted studies on students from different year levels have found that students at all year levels can benefit from curricula that make explicit connections between research and teaching (Neumann, 1994). However, the nature of these interactions tends to vary depending on the year level of the student. Zamorski (2002) found many lecturers were inclined to think there were far more opportunities for linking teaching and research by the third year of the undergraduate degree, while students in earlier years were better suited to being taught about the core knowledge and skills of their discipline.

In their New Zealand study of undergraduate students’ experiences of research, Robertson and Blackler (2006) found that undergraduate physics students typically see research as ‘something that others do’. One student observed: ‘It’s like it’s another language really’ (p.221). A third year physics student observed that research was ‘more interesting as you get higher up and you can understand what they are actually doing’ (p.221). By contrast, Geography students in the study ‘even in year 1, consistently recognised the importance of starting with a research question’ (p.222). For these students, the notion of research was closely linked to field work, even from the early undergraduate years.

As conceptions of the TRN expand, the range of possibilities for academics to implement TRN initiatives across year levels becomes wider also. Although certain common manifestations of the TRN such as a small research project may not be possible in first year, there are other means in which teaching can be infused with research for student benefit.

Zamorski (2002) suggests that students may welcome the challenges of research linked teaching at an earlier stage of their degree. This desire to be involved in research from the first year was well illustrated in Robertson and Blackler's (2006) study where a first year English student said:

'I feel, even though I am a first semester student ... that I am working alongside people ... there is a collegial aspect ... As though we are all discovering something and that they [lecturers] are just doing it at a different level' (p.225)

Zamorski found that some students believed both that their teachers expected them to undertake research without proper grounding, while others believed that they weren't given enough opportunity to conduct research early on in their undergraduate degrees. While this may sound like conflicting responses to the same question, this may not necessarily be so. Zamorski elaborates on what students meant by not being confident in their ability to undertake research – that they believed they were not given sufficient training in research methods in earlier years and they were left to 'sink or swim'. This would indicate that the students in this study believed that with further training in research methods at younger undergraduate years, they would have been better placed to cope with the demands of their final year undergraduate research project.

The TRN and postgraduate coursework students

In Australia there are two types of postgraduate courses: coursework and research. For research higher degree students, the importance of establishing links between research and teaching are evident. These students are typically required to complete a major thesis in a research area of mutual interest to the student and their academic supervisor, who guides the student through the research process.

The place of the TRN for postgraduate coursework students may, however be less obvious. These students may not necessarily conduct a research project as part of their assessment and in some cases, postgraduate coursework subjects may be 'double-badged' with undergraduate subjects as a cost-saving measure. In such cases, usually the assessment is modified, but it may mean that postgraduate coursework students do not necessarily receive particular exposure to teaching-research connections as do their research higher degree counterparts.

Lindsay et al. (2002) conducted focus groups with a range of postgraduate coursework students from the UK. While these students reported both positive and negative consequences of the integration of teaching and research in their study, the majority of their feedback was positive. In the UK study, postgraduate students were more positive about the value of research in their learning if they deemed that it was relevant to their area of study. Similarly, in this Australian study, Business and Management postgraduate coursework student interviewees questioned the value of integrating 'too much literature

research and not that much real-life research' into their courses. These interviewees were international students with a particular interest in the relevance of research to their work.

Similarly, postgraduate coursework interviewees in the Medical/Health field commented on the value of research as being 'something concrete' that 'cements the learning process and gives you something to take hold and actually understand'.

One interviewee particularly valued 'academics that have been in their field ... and then gone back as an academic'. These people were highly valued as academics who could effectively connect learning with real-world research applications. Another student commented:

It's a bit too much emphasised on peer reviewed journals ... but there's a lot of information out there [that is] not peer reviewed ... I read magazines and newspapers and that's where we get our knowledge from.

Arguably, the professional demands of many coursework degrees may limit the ways in which research can be incorporated into teaching. Nevertheless, given the value of research knowledge and skills in the workplace, perhaps more consideration should be given to infusing coursework with research, with an emphasis on its relevance to the real-world settings that are so important to these students.

Moreover, with the national and international emphasis on knowledge transfer, knowledge exchange and community engagement in the higher education sector, postgraduate coursework programs offer particularly good opportunities for applying research knowledge, skills and processes to address real-world problems.

6. Synthesis of the TRN in Australian university policy

One aim of this project was to synthesise ways in which the TRN featured in the institutional policy statements of Australian universities. This was intended to complement work done in the United States (Boyer, 1990) and the United Kingdom (Jenkins and Healey, 2005). A comprehensive analysis of all Australian university websites was undertaken by the project director in order to provide a synthesis of the type, manner and frequency of references to teaching-research links in Australian university policy documents. While this research was conducted independently to the project, the results have informed the development of the current project and are available on the project website <http://trnexus.edu.au/index.php?page=national-policy>. The policy section of the website <http://trnexus.edu.au/index.php?page=trn-in-policy> summarises institutional practices in relation to the TRN and provides a self-review framework for university policy-makers.

7. TRN resources for Australian academics across disciplines

To parallel the resources for policy-makers, the project team has produced a range of resources for academic staff, including curriculum design strategies, a self-review framework for academic staff, a wide range of examples of good practice, and a section that focuses on the TRN and its role in one's academic career.

Selected factors influencing project outcomes

Success factors

The following factors have been identified by the project team as critical to achieving a successful and timely project outcome:

- Dissemination of the project findings and resources to participants from 30 Australian universities through repeated national seminars located in Perth, Brisbane and Melbourne, and use of an effective, multi-strand advertising strategy to promote awareness of the seminars.
- Carefully chosen expert Advisory Group, comprising both national and international experts.
- Having the perspective of the independent External Evaluator who is internationally regarded for her own work in the area of TRN.
- Regular teleconference meetings with the team and the Australian members of the Advisory Group and the independent External Evaluator. These meetings were supplemented with a small number of face-to-face meetings (one at the beginning of the project – October 2006, one with the independent External Evaluator – September 2007, and another with an international Advisory Group member with four members of the project team – November 2007). These face-to-face meetings were extremely useful, although used sparingly given the costs involved.
- A well-structured proposal timeline ensured that the project team could easily review actual progress against intended progress during team meetings.
- A senior research assistant was invited into the team when the project gained momentum in Phase 2, which was an immense help in achieving project outcomes in a timely manner.
- Delegation of the website design to a professional. While the website design could have been completed by a team member, this would have delayed work on other project outcomes.
- Having the active engagement of Dr Elizabeth McDonald, ALTC representative. She engaged in discussions about the terminology issues, was supportive of the invited TRN project team Forum, and attended two of the three national seminars. This active endorsement and engagement with the project played a significant part in its overall success.

Inhibiting factors

The following factors have been identified by the project team as creating difficulties in achieving a successful outcome:

- The recruitment of academics to interview was problematic. Although requests were made through university contacts with respect to the fact that the project team sought to interview academics who taught in different

disciplines and year levels, the team were aware that these requirements could only be used as a guide, and the outcome was dependent on the availability of nominated academics. For example, the team interviewed many academics from the Natural and Physical Sciences disciplines, but few from other disciplines such as Law and Engineering, and no academics from Business or Health were interviewed. In hindsight, it may have been better for the project team to describe discipline areas more broadly to university contacts or to have sought to interview a larger number of academics.

- A variety of factors contributed to problems in terms of the extent of UK colleagues' involvement in the project. No research assistance funds were available to support UK colleagues for the purposes of conducting parallel academic and policy-maker interviews in the UK. This lack of funding also had implications for other aspects of the research process, such as our colleagues ability to secure sufficient time to interview academics and policy-makers, but also for administrative matters such as obtaining ethical approval to conduct these interviews within their respective institutions.
- It was difficult to secure interview times with senior administrators and policy-makers, hence the rather limited number in the sample.
- Convening group feedback sessions was difficult, particularly in universities with multiple campuses. Originally the project team had hoped to visit interviewees a second time to gather their reflections post-interview and their feedback on the website, however time did not permit such a review. We did our best to follow up with interviewees by email.
- It was difficult to recruit undergraduate and postgraduate coursework students for this study and the interviews did not yield particularly rich data in the eyes of the project team. It may be that a future study of this kind should review the interview protocol used. Additionally, survey instruments such as that of Healey, Jordan & Short (2002 – available on the project website at <http://trnexus.edu.au/index.php?page=benefits-for-students>) may be used to address this limitation.
- Regular teleconferences with UK colleagues, as a group, proved difficult to coordinate due to time differences.

Implementation of project outcomes

The project website features a range of TRN initiatives and strategies for use at the level of the individual academic, faculty, department, school and institution. However, repeated emphasis is given to variables that must be considered prior to the implementation of the TRN strategies described. At the institutional level, policy-makers must make strategic decisions about the role and priority of the TRN in their university. Some universities may choose to make the nexus more explicit in policy documents than others. Some may choose to interpret the TRN not only in terms of disciplinary research but also scholarly pedagogic research (i.e., the scholarship of learning and teaching) as part of discussions and policy development in relation to the TRN. Some may choose to develop and implement indicators of the TRN, with a focus on demonstrating evidence and impact of the TRN in curriculum. Others will adopt a more tacit approach that is built on the assumption that the TRN is an inherent part of the university learning experience; that is, the TRN is part and parcel of what it is to learn, teach and research in a university. These institution-level decisions will shape policy and, in turn, will determine how policy makers relate to the resources of this project.

Importantly, the self-review tool for policy-makers is a useful starting point for all universities, no matter whether they choose to make the TRN more or less explicit in their policy statements. Either way, it should prove a useful catalyst for important discussions and decisions in this regard in the future.

In order to enhance implementation of project outcomes among policy-makers, our independent External Evaluator, Ruth Neumann recommends that the following activities be pursued (excerpt from Neumann's summative report, August 2008):

- Connect with the Deputy Vice-Chancellor Academic and Research groups and their regular meetings arranged through Universities Australia.
- Provide information on the project and the TRN website to Universities Australia.
- Connect with the formal meetings of the groups/councils of Deans across the disciplines.
- Monitor access to the website within the first six to 12 months of project completion.
- Ensure wide distribution of booklets and project/website information to university Vice-Chancellors to raise awareness as indicated in the project application.

These suggestions will prove most useful in ensuring that project outcomes are optimised among policy-makers in the sector.

While it is important for policy-makers to engage with discussions and decisions in relation to the TRN in their university, at the same time, academic staff and leaders of learning and teaching across the institution also need to conceptualise the types of TRN initiatives that will be suitable for their discipline, level of students taught, and individual teaching and learning contexts. Adding to the complexity of this process is the fact that

different strategies may be used by different universities for different purposes and in different settings. The strategies and examples provided on the project website must be considered by individuals, as well as academic departments in the context of what they know about what will work in their institution, with their particular students and in their curriculum context. The self-review tool for academic staff and for heads of department may be useful for this purpose. It is designed to prompt discussion and debate in relation to the most pedagogically appropriate ways to integrate teaching and research for the benefit of student learning and outcomes.

The project outcomes are designed for use by individual academics, disciplinary teaching teams and senior administrators; however, achieving sufficient interest in the use of these resources may be a challenge. Given the range of priorities for academics and limited time available, it will be necessary to demonstrate to academics and policy-makers the usefulness of this resource. Our External Evaluator's suggestions for engaging policy-makers will be very helpful. Other strategies might include raising awareness among academic and sessional staff through strategically fostering the TRN in university induction and graduate certificate programs.

Dissemination of project outcomes

Nationally

- Website
- *Achieving Teaching-Research Connections* seminars (repeated in Perth, Brisbane and Melbourne).
- Development of *The Academic's and Policy-Maker's Guide* which is available in booklet form and to be distributed to all Australian universities. (They will also be available for download from the website.)
- Website advertising pamphlets that have been designed and will be circulated to universities with the Booklet Guide.
- National ALTC TRN Forum in August 2007 & Invited ALTC Project Forum on the TRN in June 2008. Includes stimulus paper at National ALTC TRN Forum *Teaching-Research Linkages: Opportunities and Challenges for Practice and Policy* (Krause, Arkoudis & Green), which will be available on project website.
- Keynote presentation, *Teaching-Research Nexus Workshop*, James Cook University, 24 June 2008 (Krause)
- Invited workshop, La Trobe University, 29 August 2008 (Krause)
- Links to project website from project's institutions, eg, Griffith Institute for Higher Education website, homepage of Centre for the Study of Higher Education website.

Internationally

- Website
- Links from HEA website.
- Collaboration/feedback from academics in the UK.
- Inclusion of our website in Mick Healey & Alan Jenkin's resource *Linking discipline-based research with teaching to benefit student learning*.
- Special interest symposium for HERDSA 2008 conference *Fuelling the knowledge economy: The potential for research-based learning to engage communities*. (Green & McCulloch)
available at: <http://conference.hersda.org.au/2008/program>
- Draft submission to HERD: *Australian policy-maker perspectives on teaching-research linkages in higher education* (Green & Krause).

Evaluation of project outcomes

In addition to the independent external evaluation of the project by Associate Professor Neumann (as described in the *Approach and methodology* section, p 16), the project team sought feedback on the progress of the project and developed resources from the Advisory Group and UK colleagues to ensure that the resources were relevant for an international audience. The team also engaged in regular self-review during the project team meetings.

The national seminars provided the opportunity for feedback on the website. Seminar participants were given the option to provide feedback on the website through evaluation forms distributed at the national seminars. In order to allow participants time to use the website, reply-paid envelopes were attached to the forms. Attendees were also asked to complete seminar evaluation forms in order to assess how valuable participants had found the seminar, interest in using the website, and likelihood of informing colleagues about the seminar and the website.

Links between this project, other ALTC projects and ALTC Strategic Priority Areas

This project was funded in the ALTC strategic priority area of Research and Development. As such its outcomes will strategically complement all other national projects funded under this priority area. Specifically, Krause (project leader) has made connections with the following ALTC funded projects/fellowships:

- University of Adelaide project – John Willison and team - *Making Research Skill Development Explicit in Coursework: Five Universities' adaptation of a model to numerous disciplines* (Krause is on the Advisory Group)
- ALTC Senior Fellowship – Angela Brew: *Enhancing undergraduate engagement through research and inquiry* (Krause is a member of the national team for this Fellowship).

These connections will enhance the strategic impact and sustainability of this project's outcomes and will strengthen the capacity of Krause to contribute to the above-named projects.

Furthermore, on June 19, 2008, the ALTC hosted a Project Forum which discussed teaching research connections from the perspective 'What is higher about higher education?' Selected ALTC project representatives and fellowship holders who were involved in projects related in some way to the TRN were invited to this event, which included a discussion of all the projects represented. The focus of this activity was to examine implications of the TRN for such issues as assessment (eg, *Online Assessment Feedback as an Instrument of Reflective Learning Practice in Human Biology: ALTC Priority Project led by the University of Western Australia*); preparing graduates with research skills (eg, *Making Research Skill Development Explicit in Coursework: Five Universities' adaptation of a model to numerous disciplines: ALTC Competitive Grant led by the University of Adelaide*); and learning and teaching in the disciplines (eg, *A programmatic approach to developing scientific writing embedded in Bachelor of Science courses: Moni ALTC Associate Fellowship, Griffith University*).

Concluding remarks

It is the contention of this project team, that a deep, evidence-based and considered appreciation of teaching-research connections in higher education is more important than it has ever been. As stakeholders across the higher education sector grapple with the question of what makes university curricula, learning experiences and outcomes distinctive, one cannot ignore the fundamental value of teaching-research links and their defining role in a university education. The resources developed as part of this project are intended to be a catalyst for discussion about these issues. We recognise that the resources will be differentially applicable and useful, and we encourage colleagues to adapt them for particular purposes and contexts. It is our hope that all who visit the website or consult the Guide for Academics and Policy-Makers will be challenged to consider their personal and institutional contributions to innovative, engaging ways of making meaningful connections between teaching, learning and research – in all its forms – for the benefit of university students both now and in the future.

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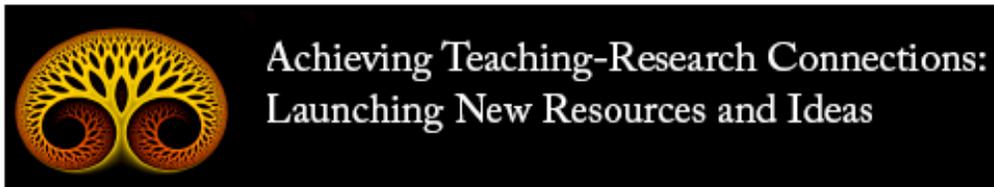
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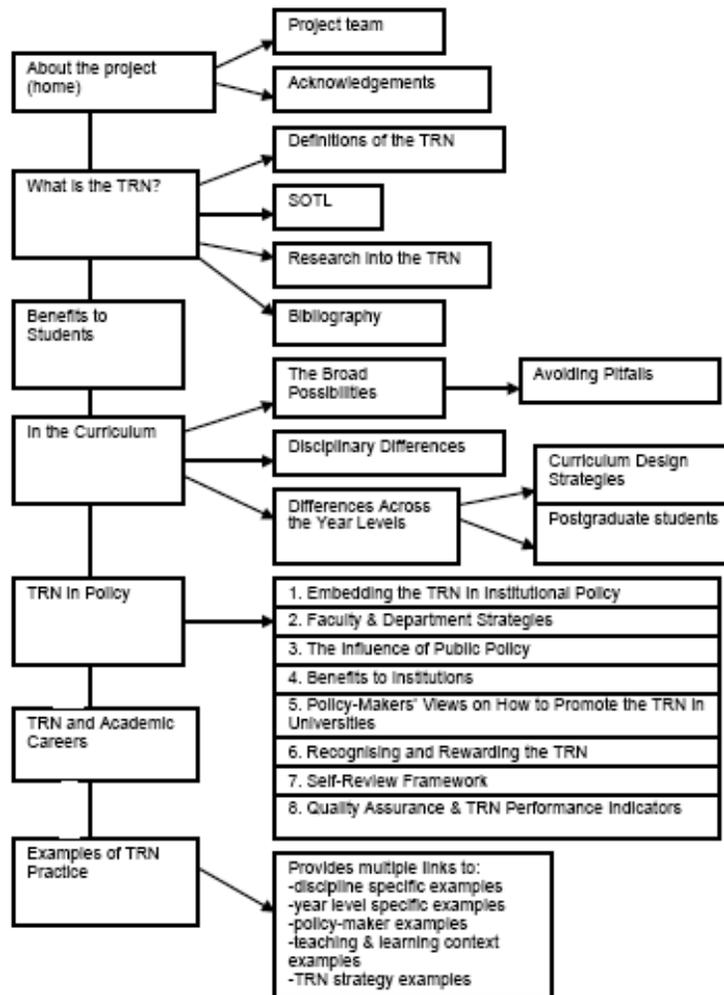
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Appendix 1: Sitemap of website



Achieving Teaching-Research Connections:
Launching New Resources and Ideas

Website Map - www.trnexus.edu.au



A project supported by
The Australian Learning and Teaching Council

Appendix 2: Achieving Teaching-Research Connections seminar programs

Perth (University of Western Australia) 16 June 2008

PROGRAM

ACHIEVING TEACHING-RESEARCH CONNECTIONS : LAUNCHING NEW RESOURCES AND IDEAS

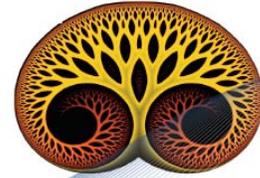
A national seminar co-hosted by the Centre for the Study of Higher Education, The University of Melbourne and the Centre for the Advancement of Teaching and Learning, The University of Western Australia

Monday 16 June 2008

Venue: Blue Room, Currie Hall, The University of Western Australia

9.30	Registration <i>Coffee/tea & refreshments will be provided</i>
10.00	Morning Session: Academic focus Welcome <i>Professor Richard James, (Director, CSHE) & Professor Denise Chalmers (Director, CATL)</i>
10.15	The national context <i>Ms Mary Kumvaj (Australian Learning and Teaching Council)</i>
10.30	Project Summary 'The Academic's and Policy-Maker's Guide to the Teaching-Research Nexus' <i>Professor Richard James</i>

10.50	Interactive workshop: 'Linking discipline-based research and teaching to benefit student learning' <i>Facilitated by Professor Mick Healey (Director, Centre for Active Learning, University of Gloucestershire, UK)</i>
12.10	Lunch
12.40	Afternoon Session: Policy & resources focus Website launch www.tmexus.edu.au <i>Professor Richard James</i>
1.00	The TRN from the policy-maker's perspective <i>Professor Don Markwell (Deputy Vice-Chancellor (Education), UWA)</i>
1.30	Self-review framework resource introduction <i>Professor Richard James</i>
1.45	Group activity: Identifying challenges and strategies in your context <i>Facilitated by Professor Richard James & Professor Mick Healey</i>
2.45	Close & evaluation



ABOUT THE PROJECT:

The purpose of this project was to prepare new strategies to assist Australian universities to strengthen the connections between teaching and research in both institutional policy and individual practice. The project team had a particular interest in how teaching and research linkages could enhance the student learning experience.

Academics and policy-makers from Australian universities were interviewed for this project. The academics represented a wide range of disciplines and year levels.

The website www.tmexus.edu.au is a resource developed by the team as a result of these interviews. This website, aimed at both academics and policy-makers in Australian higher education, provides strategies for strengthening and supporting teaching and research connections in universities.

The website also includes several examples of good practice for use by academics and policy-makers interested in teaching-research linkages.

The project was funded by the Australian Learning and Teaching Council

Brisbane (Griffith University) 18 June 2008

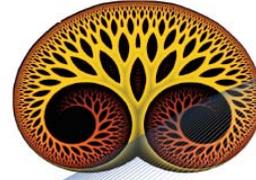
PROGRAM

ACHIEVING TEACHING-RESEARCH CONNECTIONS : LAUNCHING NEW RESOURCES AND IDEAS

A national seminar hosted by the Griffith Institute for Higher Education, Griffith University
 Wednesday 18 June 2008
 Venue: Griffith University, EcoCentre, Nathan Campus

9.30	<p>Registration <i>Coffee/tea & refreshments will be provided</i></p>
10.00	<p>Welcome and Seminar Overview <i>Professor Kerri-Lee Krause (TRN Project Leader, GIHE, Griffith University)</i></p> <p>Teaching-Research Connections - the national context <i>Dr Elizabeth McDonald, Australian Learning and Teaching Council</i></p> <p>A policy-maker's perspective on the TRN <i>Professor John Dewar, Deputy Vice Chancellor (Academic), Griffith University</i></p> <p>TRN Website Launch</p>

10.40	<p>The TRN equation - what it means for academics <i>Facilitated by Professor Mick Healey (Director, Centre for Active Learning, University of Gloucestershire, UK)</i></p>
12.25	<p>Lunch Break</p>
12.30	<p>TRN Website Feedback</p>
1.00	<p>The TRN, Community Engagement and Knowledge Transfer <i>Professor Vi McLean, Deputy Vice Chancellor (Teaching Quality), QUT</i></p>
1.30	<p>The TRN in Your Context: Challenges and Strategies <i>Professor Kerri-Lee Krause and Professor Mick Healey</i></p>
2.45	<p>Close and Evaluation <i>Professor Kerri-Lee Krause and Professor Mick Healey</i></p>
3.00	<p>Afternoon Tea</p>



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Melbourne (The University of Melbourne) 20 June 2008

PROGRAM

ACHIEVING TEACHING-RESEARCH CONNECTIONS : LAUNCHING NEW RESOURCES AND IDEAS

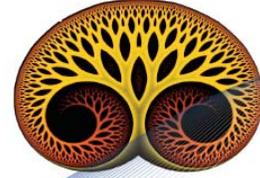
A national seminar co-hosted by the Centre for the Study of Higher Education, The University of Melbourne and Griffith Institute for Higher Education, Griffith University

Friday 20 June 2008

Venue: Junior Common Room, Queen's College, The University of Melbourne

9.30	Registration <i>Coffee/tea & refreshments will be provided</i>
10.00	Morning Session: Academic focus Welcome <i>Professor Richard James, (Director, CSHE) & Professor Kerri-Lee Krause (Director, GIHE)</i>
10.15	The national context <i>Dr Elizabeth McDonald (Australian Learning and Teaching Council)</i>
10.30	Project Summary 'The Academic's and Policy-Maker's Guide to the Teaching-Research Nexus' <i>Professor Kerri-Lee Krause</i>

10.50	Interactive workshop: 'Linking discipline-based research and teaching to benefit student learning' <i>Facilitated by Professor Mick Healey (Director, Centre for Active Learning, University of Gloucestershire, UK)</i>
12.10	Lunch -To be served in the Eakins Dining Hall, Queen's College
12.40	Afternoon Session: Policy & resources focus The TRN from the policy-maker's perspective <i>Professor Susan Elliott (Pro Vice-Chancellor [Teaching, Learning & Equity]), The University of Melbourne)</i>
1.10	Website launch www.tmexus.edu.au <i>Professor Richard James</i>
1.30	Self-review framework resource introduction <i>Professor Kerri-Lee Krause</i>
1.45	Group activity: Identifying challenges and strategies in your context <i>Facilitated by Professor Richard James, Professor Kerri-Lee Krause & Professor Mick Healey</i>
2.45	Close & evaluation



ABOUT THE PROJECT:

The purpose of this project was to prepare new strategies to assist Australian universities to strengthen the connections between teaching and research in both institutional policy and individual practice. The project team had a particular interest in how teaching and research linkages could enhance the student learning experience.

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The website also includes several examples of good practice for use by academics and policy-makers interested in teaching-research linkages.

The project was funded by the Australian Learning and Teaching Council

Appendix 3: Breakdown of project interviews

Institution	Number of academics	Number of policy-makers	Number of student focus groups
Griffith University	6	2	2
Queensland University of Technology	3	0	0
Southern Cross University	5	1	0
Swinburne University of Technology	3	3	0
The University of Melbourne	6	0	2
The University of New South Wales	2 (incl. one team interview)	1	0
The University of South Australia	4	2	1
The University of Western Sydney	6	1	0
Total	35	10	5

Appendix 4: Interview schedule

Interview questions for academics

You have been identified by your university as an academic who is effectively integrating the activities of teaching and research. We would like to explore your ideas about the links between teaching and research, particularly in your teaching at this university.

Preliminary:

- Tell me a little about your teaching responsibilities this year – what year level, what subject areas?
- What is/How would you describe your discipline area?

1. Conceptions of the TRN

- Before asking you about your current research, what are your conceptions of the nexus?
What about:
 - Discipline specific considerations?
 - What are your views on linking teaching and research in different year levels? Can it be done?
 - Do you believe there is strong support at your university for linking research and teaching in students' classes?
 - Does it make a difference if the links between R&T are in the institution's mission?

2. How they achieve the link

- Could you please elaborate on the methods you use to bring learning, teaching and research together for your students?
These could include (but are not limited to):
 - Discussing their own research with their students
 - Discussing current research in the discipline with their students
 - Involving students in research activities in tutorials and laboratory classes
 - Designing learning and assessment activities around research issues
 - Teaching students about research methods
 - Encouraging students to take part in the research culture of their department
 - Facilitating student research projects in the community
- Do the methods you employ to link teaching and research differ for first years compared with older undergraduates or postgraduate students
- Is the nexus/links between teaching and research discussed and supported in your department
- Do you believe that you endeavour to link your teaching and research activities more or less (about the same?) than other people in your department?

3. *Perceived benefits of the link*
 - In what ways do you think your students benefit from research infused teaching?
 - Do you believe that there are any benefits to academics such as yourself who make connections between research and teaching? Eg career path, motivation, engagement with students, promotion, publishing, awards, etc
 - Can you identify any ways in which your teaching has informed or influenced your research? Do you think there is any scope for this in your teaching/discipline area?
4. *What facilitates / what hinders the link?*
 - What factors help your department and your discipline to link teaching with research? Eg, Promotion policy, culture of department, senior staff seen to be linking these activities, holding a teaching forum
 - What factors hinder your department and your discipline in linking teaching with research?
5. *In your view, what kinds of resources would be most helpful in assisting academic staff to consider ways to link teaching and research?*

Interview questions for policy-makers

1. How do you think academics at {insert uni name here} conceptualise the TRN? (Prompt – do you agree with this or conceptualise it in slightly different ways?)
2. a) Does the TRN feature in key policies?
b) Are there specific resources applied to these? (Prompts: How does the nexus manifest itself within this university? – Planning documents and strategic plans – teaching and learning management plans, performance review, promotions etc. Do you believe that it is an important goal for this university? Do you have plans in place for developing key policies/resources?)
3. What are the structures that link institutional policy decisions with faculty policy formation? How have these been used in the dissemination of the TRN?
4. What, if any, mechanisms are in place to monitor the development of the TRN at faculty/department level?
5. What resources have been allocated for PD activities concerning the TRN?
6. Are the links between teaching and research achievable in all disciplines?
7. Are the links between teaching and research achievable in all year levels, both postgraduate and undergraduate?
8. Do you believe there are benefits to students resulting from the nexus? If so what are they?
9. Do you work with the DVC Research / Academic in any way to bring about the TRN at an institutional level? How do / would you see this working?

Interview questions for undergraduate students

To begin with, I would like to get an idea about what you know about research at university?

1. Are you aware of the teaching you experience being influenced by research? In what way? Prompts include: talking about his/her research work/discussing new findings in the field, undertaking a subject about research methods, having the opportunity to undertake UROP/IBL initiatives, conducting research activities in lab classes/tutorials, encouragement to attend seminars and guest lectures in your department.
2. Do you know if your lecturer is an active researcher? What kinds of topics does he/she research? If uncertain prompt students with: writing publications; attending conferences; employs research assistants; supervises PhD/Masters/Doctoral students; undertakes projects either alone or with other academics at the university; etc
3. How are you assessed in this subject? (ie, exam, project?) Has your assessment been based on research in any way, eg, thesis?
4. Do you think there are any benefits from being taught about research (/by research-active staff?) in this subject? Benefits may include: increased understanding of the subject; increased access to current information in their discipline; developed level of research skills; increased awareness of methodological issues; increased interest and enthusiasm for the subject; increased consideration of undertaking postgraduate study/academic career; increased respect for lecturer; assists students in choosing a thesis topic or supervisor in later years.
5. Do you believe that being taught by researchers has any negative effects for your learning? Disadvantages may include: staff have limited time to assist students; staff seem to be disinterested in teaching and learning activities; staff seem disinterested in supporting students' academic welfare; staff unable to communicate the course material effectively; staff ignoring the curriculum in favour of discussing their area of expertise; students feeling left out of the university academic community.
6. Are you interested in finding out about research being conducted within your course's faculty?

Interview questions for postgraduate coursework students

1.a. *In your current post grad course(s), in what ways do academics integrate research into their teaching?*

- How do your lecturers incorporate/ feature their own research?
 - Too much /Not enough?
- Where does this show up?
 - Examples in lectures
 - Exercises in workshops / tutorials
 - Case studies / designated readings?
- How do your lecturers incorporate / feature their Colleague's research?
- How do your lecturers incorporate / feature Others' research?
- What do they focus on?
 - Content /Methods/ Both?
- Can you give an example?
 - Urge students to provide specific examples

1.b. *In what ways are your assignments / assessment pieces connected to research or research-based?*

- Do you have research-based assignments / assessment pieces?
- How does teaching that integrates research help you with these assignments?
- Are you / will you undertake a research project as part of you Coursework degree?
 - Ask for details about what it will involve
 - Scope of the project
 - How is Topic area being selected?
 - Methodologies employed
 - Degree of supervision / guidance/ autonomy in research component?

2. *What do you see as some of the benefits of being taught by academics who make clear connections between research and teaching and learning?*

3. *Do you have plans to do further research of your own?*

- What has influenced you to become interested in research?

4. *Reflecting back on your undergraduate study, in what ways was an interest in research fostered?*

- Work through the years: Can you recall any research activities / assignments / learning about research during first year?
- Ask for details/examples – get to be specific
- What about second year? Third year?
- Was there an increasing emphasis on research as you progressed through your degree?
- What differences do you perceive in the way teaching and research is linked now compared with undergraduate level?

5. *Include depending on time and earlier responses:*

- Why did you choose to undertake a Postgraduate coursework degree rather than a postgraduate research degree/ PhD?

