The University of Sydney

Further Plan for the Development of Research-Led Teaching and Research-Based Learning at The University of Sydney

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1. Background and Context

> "A distinctive feature of study at the University of Sydney is its insistence on research-led teaching, both in content and delivery." (Strategic Directions 2005-2010).

In 2000 a University-wide project was established by the Pro-Vice Chancellor (Teaching and Learning) to address aspects of the Strategic Plan related to the relationship between teaching and research. Key project aims for 2001-2005 were to:

(a) Increasingly employ undergraduate teaching and learning strategies which enhance the links between research and teaching and utilise scholarly inquiry as an organising principle in departmental organisation, and curriculum development.
(b) Encourage and reward the scholarship of teaching.

In May 2002, a report was prepared and a presentation made to the University's Teaching and Learning Committee spelling out the vision and the results of an investigation into best practice, and outlining progress to date. Teaching and Learning Committee endorsed the recommendations of the report, including the establishment of a Working Group to discuss how to further this initiative at Faculty, School and Departmental levels and to develop a set of indicators based on international best practice whereby progress could be monitored. A Working Group consisting of Faculty representatives nominated by the Deans was accordingly set up. It reported to Teaching and Learning Committee in November 2003 identifying the following key achievements:

(a) Establishment of a set of performance indicators for research-led teaching and the scholarship of teaching and audit of them carried out.
(b) In collaboration with the Marketing Department, gathered data from incoming students on how their perceptions of the research record of the university affected their choice to study at Sydney.
(c) Educational output of cooperative research centres investigated.
(d) Establishment of a research-led teaching and scholarship of teaching website containing a database of teaching strategies to disseminate good practice.
(e) Workshops, presentations and forums on research-led teaching held in a number of faculties.
(f) A pilot project on students' experiences of research in the University of Sydney undertaken.
(g) Vice-Chancellor's showcases of good practice in the Scholarship of Teaching held in 2001 and 2003.
(h) Presentation on the research-led teaching project presented at the AUQA Forum (Prosser & Brew 2003).

The following recommendations were accepted by Academic Board:

a) the adoption of the statement on what the university understands by research-led teaching and scholarship of teaching as university policy.

b) endorsement of the report and agreement to monitor progress on the performance indicators on an ongoing basis.
c) agreement to monitor through its Undergraduate Studies and Postgraduate Coursework Committees that research and scholarship on teaching and learning is demonstrably used in designing new curricula.

Following the presentation of the report, key achievements in 2004-2005 were:

(a) A formal benchmarking relationship established with Monash University
(b) A statement on the ethics implications of research on teaching and learning negotiated and agreed with the Ethics Committee.
(c) Revised Faculty Teaching and Learning Plans to include evidence of ways links between teaching and research are being developed.
(d) Revision of the Generic Attributes of Graduates of the University of Sydney policy.
(e) Vice-Chancellor's Awards for Outstanding Teaching focused on research-led teaching.
(f) Graduate Certificate in Higher Education units which include discussion of how to progress research-led teaching and the scholarship of teaching and learning.
(g) HERDSA International Conference held in 2005 with over 60 presentations by University of Sydney staff.

In addition, faculties have developed strategies for the advancement of research-led teaching, these include:

a) Changes to faculty policies and procedures

1) Inclusion of research-led teaching and learning in faculty plans and policies.
2) Inclusion in approval processes for new courses/units of study proposals, a requirement to provide information about whether and how the unit involves research-led teaching and learning experiences
3) Inclusion of research-led teaching and learning criteria in faculty teaching awards.
4) Making sure that research-led teaching is listed in faculty documents.
5) Inclusion of an extra faculty-compulsory USE question: e.g. 'this unit incorporated a variety of research-led teaching and learning experiences'.
6) Further embedding of research & inquiry graduate attribute and alignment with assessment in unit of study outlines.
7) Clarifying boundaries for heads of schools approval/delegation to unit of study coordinators for coursework undergraduate students undertaking research-based projects.

b) Committee discussions of research-led teaching

1) Request to Chair of a Faculty Research Committee to make this a standing item on that Committee's Agenda.
2) Regularly discussing the Working Group meeting/research-led teaching at Faculty Learning and Teaching Committee meetings.

c) *Opportunities to discuss research-led teaching or for students to present research at a variety of forums*

1) Forums for staff to showcase research to undergraduates/ prospective advanced students and introduce them to exciting research in the discipline.
2) Research-led teaching discussed and/or examples shared at annual Faculty teaching days.
3) Undergraduate and HDR students' projects presented at research seminars or annual Faculty research days.

d) *Development of curriculum practices*

1) Reassurance to academics that they are already doing research-led teaching and learning.
2) Visiting lecturers, research leaders and artists present lectures, workshops and master classes for students.
3) Units of study specifically related to research skills
4) Final year research thesis requirement with research presentations.
5) Research-based assessment tasks.
6) Specialised research units.
7) Numerous higher degree programs, some of which are research only, some a combination of research and coursework.
8) Lecturers presenting relevant examples of their current research during lectures.
9) Enquiry based activities - collecting and interpreting data.
10) Exercises with unknown outcomes in selected units of study
11) Training in the philosophy of research through discussion.
12) Selected advanced students undertake research in 1st year
13) One Faculty is moving towards an evidence-based approach leading to a number of curriculum changes. That means being explicit with the students about how to critically evaluate research for clinical application within the specific EBP framework. For example in many of the discipline specific undergraduate degrees fourth year subjects have started to adopt the evidence-based framework for both teaching and assessment.
14) Inclusion of problem based learning, including literature searching using databases, informal sharing of notes generated in PBL tutorial groups – emphasis on collaborative learning.
15) Student organized study groups outside of scheduled teaching sessions.
16) Use of student generated materials from literature searching.

2. Benchmarking outcomes

Benchmarking with Monash University revealed that the University of Sydney was achieving a high level with respect to terms and definition, recognition and rewarding of teaching-research nexus (eg University Awards); staff development opportunities, and mechanisms to improve the extent to which teachers bring research into the classroom. However, performance was relatively poor in relation to strategies for the inclusion of the teaching-research nexus in performance management; strategies to encourage and reward

disciplinary research projects that result from teaching; and strategies for inclusion of research-led teaching in recruitment documentation and probationary reports and promotion documentation.

Further room for development was also noted in processes for integrating research and teaching in strategic planning; and in planning documents including, for example, Learning and Teaching Plans, Support Services Plans, Research & Research Training Management Plans, Campus Plans, and Faculty Operational Plans. In addition, performance of staff in terms of numbers of senior staff teaching at junior undergraduate levels; reference to research-led nexus in internal and external communications; strategies to encourage students and staff to participate in a variety of scholarly communities; and the extent to which strategies encourage students and staff to engage in discussions about the nature of the disciplinary area, the nature of research and what it means to study the subject, require further development.

In addition, at the University of Sydney there was found to be variation among faculties with respect to:

a. processes for research-led teaching in terms of course approval, monitoring and review;
b. identification of research skills and the ability to undertake research;
c. extent to which faculty policy and incentives for curriculum development are informed by internationally based disciplinary and pedagogical research;
d. faculty policies and strategies to build students' research and inquiry capabilities;
e. the extent to which faculties implement a systematic and integrated approach to the teaching of research skills across the undergraduate curriculum and how faculties monitor this; and
f. the existence of strategies to encourage research on teaching and to use this in curriculum development.

Some faculties were considered to be at a high level while others were thought to have some considerable way to go. (A summary of benchmarking outcomes is provided in Appendix 1.)

3. Key Strategies 2006-2010

The overall objectives are:

1. to develop the University of Sydney as a world leader in research-based learning, the integration of research and teaching and the scholarship of teaching and learning
2. to provide rich and diverse research learning experiences for students and staff appropriate to a leading research-intensive university.

While considerable progress has been made, the 2003 report, the benchmarking exercise and visits to other universities have identified a number of challenges and opportunities.

In the light of progress so far achieved and in consideration of the objectives of the University's strategic directions and its 1: 5: 40 aspirations, four areas for development are necessary.

1. ***Research-based learning*:** Extend opportunities for students at all levels to experience and conduct research, learn about research throughout their courses develop the skills of research and inquiry and contribute to the University's research effort.
2. ***Research-enhanced teaching***: Enhance academics' understanding and use of inquiry based learning approaches appropriate to higher education in the twenty-first century.
3. ***Scholarship of learning and teaching:*** Further develop the capacity of both academics and students to engage in the scholarship of teaching and learning necessary for a reflexive critique of academic practice.
4. ***Inquiry-based practice*:** implement inquiry-based approaches to understanding the effects and effectiveness of research-based approaches to learning and teaching.

This section provides the rationale for focusing on these three areas. Section 4 includes a detailed operational plan and Section 5 summarises the timetable for implementation.

3.1 Research-based learning: Extend opportunities for students at all levels to experience and conduct research, learn about research throughout their courses develop the skills of research and inquiry and contribute to the University's research effort.

Unlike some of our competitor research-intensive universities (for example the ANU) the University of Sydney does not have an extensive program of scholarships for students to engage in research during the summer or winter. There are a few schemes where undergraduate students participate in summer research programs which have had varied levels of success, but they are isolated from each other, are uncoordinated, and there are currently no institutional mechanisms to spread good practice. There is therefore a need to consolidate the marketing of such schemes, to share good practice and to provide support for the setting up of new schemes.

There is ample evidence that not only do students gain valuable skills and knowledge through participating in such programs, but that the research effort of the University can be enhanced by involving undergraduate students in, for example, gathering pilot data for an ARC or NH&MRC grant application, or a journal article, comparatively investigating different techniques or equipment, participating in the development of online resources and carrying out research leading directly to publication.

The University's policy on Generic Graduate Attributes includes the statement that graduates of the University will be able to create new knowledge and understanding through the process of research and inquiry. The ITL has been contributing to the implementation of this policy through the Graduate Attributes project and faculties have

now developed their own statements of Graduate Attributes based on the University's framework. These faculty statements have been developed in consultation with internal and external stakeholders. This consultation has also included an initial survey of the teaching and learning of these new attributes in units of study offered in each faculty. This work is making an important contribution to tracking the extent of research-based learning. It is important to build on this work to increase the spread of opportunities that students have for engaging in research and inquiry.

3.2. *Research-enhanced teaching: Enhance academics' understanding and use of inquiry based learning approaches appropriate to higher education in the twenty-first century. Expand opportunities for undergraduates to participate in research within the curriculum:*

In a research-intensive environment such as the University of Sydney, it appears to be clearly understood that courses should be research based and up to date. However, it is not always clear what this means and there is not a clearly understood rationale for integrating research and teaching beyond this. Appendix 2 provides a rationale for why students need research in the University of the twenty-first century.

There is evidence from the audit of performance indicators for research-led teaching and from the list of strategies currently being implemented in faculties that many of the University's initiatives in research-led teaching are teacher centred.

The Report to the Teaching and Learning Committee in 2003 identified the need for all Faculties to extend the ways in which they currently integrate research and teaching in curricula and to develop the opportunities students have to engage in research-based activities. It encouraged faculties to consider the extension of strategies to develop research-led teaching to more junior undergraduate levels. Given the focus on research-based learning in the University's Strategic Directions document, new impetus needs to be given to the development of more student-centred strategies that provide opportunities for students to have research based experiences at every stage of their university education.

The University does not have, neither does it actively support or encourage the development of independent study programs for students in second and third year where they participate in a research project with an academic for which they gain academic credit (Such as the Independent Study Contract program at Murdoch University for example.) There is a need to explore and develop such opportunities.

The 2003 Report suggested that research publications of staff should be publicised more widely in all faculties and that there should be further development of the relationship between research and teaching through TIF and strategic development funds. The need to extend academics' understanding in all faculties of what is involved in research-led teaching through discussions at all levels was highlighted. The report recommended further benchmarking of research-led teaching with other research-intensive universities.

It is estimated that Oxford University supplies 12% of all UK academics. Recognition of this fact has led to the realization that that University has a role in the preparation of future academics. It is not known how many of Australia's academics have been educated at some stage in the University of Sydney, but the numbers could be quite considerable. A challenge for the University in acknowledging this leadership role is that steps need to be taken to further this and enhance the research learning experiences of future academics even at the undergraduate level.

The ITL Research-led teaching and scholarship of teaching website is currently receiving over 3000 hits a month. However, it is becoming out of date and needs attention. Further examples of inquiry-based learning have been collected but need to be added but there is no capacity at present within the ITL to upload these.

3.3 *Scholarship of learning and teaching: Further develop the capacity of both academics and students to engage in the scholarship of teaching and learning necessary for a reflexive critique of academic practice.*

The University of Sydney has become recognised as a world leader in the development of the scholarship of teaching and learning. However, given that development is uneven across the University there is a need to spread the excellent practices in some faculties more widely through, for example:

a. Investigating the possibility of University or College-wide grant schemes for research on teaching
b. Spreading best practice in existing Faculty teaching research schemes to other faculties
c. Bringing academics engaged in research on their teaching together in seminars and forums
d. Developing research on teaching as a strength of the university
e. Providing student scholarships to undertake research on teaching and learning

There is also a need for more work to articulate the relationship between research-led teaching and the scholarship of teaching.

The Report to Teaching and Learning Committee recommended the need to encourage all departments to have formal or informal teaching benchmarking relationships and/or collaborative curriculum development activities with similar Schools and Departments in other research-intensive universities.

3.4 *Inquiry-based practice: implement inquiry-based approaches to understanding the effects and effectiveness of research-based approaches to learning and teaching.*

There are a number of areas where there is a need for more information. The 2003 report identified the need for more data in relation to: how senior staff with large research roles can further contribute to research-led teaching at first and second year levels, and the effects of casualisation on the University's ability to integrate research and teaching. It

indicated that further consideration of the ways in which research and teaching can be of mutual benefit should be considered by the relevant University groups and Committees. It also identified a need to articulate what is special about research-led teaching in a research-intensive university. This is not obvious and can only be deduced from benchmarking with other universities, for example through comparison of course outlines.

From discussions in the Working Group it is clear that in spite of the strategies that have been put in place and the good work that has been done so far, there is still considerable confusion concerning the term research-led teaching. A number of myths about the university's research in relation to undergraduate students and their perceptions of research still prevail. Further, the development of research-led teaching appears to be seen as a chore rather than an opportunity to improve the environment for learning. If the university is to establish research-based learning as a distinctive feature of the University of Sydney then further impetus needs to be given to the project. There is a need for more information about the effects and the effectiveness of research-enhanced learning and teaching as well as a major staff development initiative to include support for the development of research-based learning.

The need for improvements in students' perceptions of research and its relationship to their courses was also noted. In this regard, a pilot project examining students' perceptions of research was carried out but lack of resources has meant that the data has not yet been analysed. There is a need to build on this with a more extensive study.

4. Operational plan 2006-2010

Focus	Area for development	Key strategies	Implementation	Targets	Responsibility
1. Research-based learning:	**1.1. Extend opportunities for students at all levels to experience and conduct research, learn about research throughout their courses develop the skills of research & inquiry and contribute to the University's research effort.**	1.1.1. Develop and expand opportunities for undergraduate students to participate in summer or winter research programs/schemes	1.1.1a. Carry out investigation of the needs, requirements and capacities of existing schemes	Investigation complete Dec 2006	ITL (AB)
			1.1.1b. Discuss possibilities for coordination and collaborative marketing of schemes with relevant interested bodies (e.g. summer school office, research office etc).	Possibilities discussed by July 2006	ITL (AB)
			1.1.1c. Explore opportunities for funding undergraduate research stipends	Stipend scheme established by End of 2007	ITL (AB)
		1.1.2. Expand opportunities for undergraduates to participate in research within the curriculum		50% Increase in numbers of students who have carried out a research project in their courses by End of 2008	PVC (T&L)
		1.1.3. Publicise undergraduate research opportunities	1.1.3a Publicise University of Sydney undergraduate research opportunities through the media.	At least one major article in a national newspaper by End of 2007	ITL (AB)/ Media office
			1.1.3b. Establish a newsletter to disseminate ideas and good practice in the University in relation to strengthening research-led teaching	Newsletter established by End of 2006	ITL (AB)
		1.1.4. Disseminate undergraduate research outcomes	1.1.4a. Hold an undergraduate research conference in 2007/8.	Undergraduate conference held by December 2009	PVC (T&L)
		1.1.5. Continue to extend opportunities for students to learn about research throughout their courses and develop the skills of research and inquiry	1.1.5a. Refer to continuing plan of Generic Graduate Attributes project		ITL (SB)

2. Research-enhanced teaching:	**2.1. Enhance academics' understanding and use of inquiry based learning approaches appropriate to higher education in the twenty-first century**	2.1.1. Implement targeted staff development strategy to enable faculties to extend research-based learning	2.1.1a. Investigate the support needs of members of the Research-led Teaching Working group and work alongside them to achieve faculty aims and move to more student centred research-based learning approaches to the curriculum.	Support needs investigated by July 2005. Projects supported in all Faculties by December 2007	ITL (AB)
			2.1.1b. Collate and disseminate best practice through the ITL website and relevant publications.	Further examples of inquiry-based learning added and website updated by December 2006	ITL (AB)
			2.1.1c. Monitor new SCEQ questions to ensure progress in students' awareness of research in their faculties.	New questions added by January 2006. Report on trends to Teaching and Learning Committee by Dec 2007.	ITL (AB/ PG) &EQA WG
3. Scholarship of learning and teaching:	**3.1. Further develop the capacity of both academics and students to engage in the scholarship of teaching and learning necessary for a reflexive critique of academic practice.**		3.1.1a. Investigate the possibility of University or College-wide grant schemes for research on teaching	Investigation completed by December 2007	ITL (AB)
			3.1.1b. Spread best practice in existing Faculty teaching research schemes to other faculties	Information and discussions with Deans by December 2007	PVC (T&L)
			3.1.1c. Bring academics engaged in research on their teaching together in seminars and forums	Forum held and seminar series set up by September 2007	ITL (AB)
			3.1.1d. Develop research on teaching as a strength of the university	20% increase in pedagogical research publications by end 2009	PVC (T&L)
			3.1.1d. Provide student scholarship to undertake research on teaching and learning	At least one scholarship obtained by December 2007	PVC (T&L)
4. Inquiry-based practice:	**4.1. Implement inquiry-based approaches to understanding the effects and effectiveness of research-based approaches to learning and teaching.**	4.1.1. Set up and carry out research projects to fulfill a number of information needs with respect to research-based learning	4.1.1a. Explore the effects of casualisation on the capacity to integrate research and teaching	Report to the Teaching and Learning Committee by December 2007	ITL (AB)
			4.1.1b. Implement evaluations of the effectiveness of research-based learning.	Report to the Teaching and	ITL (AB)

				Learning Committee by December 2007	
			4.1.1c. Analyse pilot study data on students' conceptions of research and extend study in the light of findings	Data analysed, paper prepared for publication and new project established by September 2006.	ITL (AB)
			4.1.1d. Carry out a major investigation of what is distinctive about the University of Sydney learning environment. This is not obvious and can only be deduced from benchmarking with other universities, for example through comparison of course outlines.	Report to the Teaching and Learning Committee and publication for refereed journal prepared by December 2008.	ITL (AB)
			4.1.1e. Set up undergraduate research projects focused on strategic goals for learning and teaching to assist in the expansion of research-based learning opportunities for students.	Increase in number of research projects by 10% each year from 2006-2010	ITL (AB)

5. Timeline

Actions **Achieved by →**	Jan 2006	July 2006	Dec 2006	Jan 2007	July 2007	Dec 2007	Jan 2008	July 2008	Dec 2008	Jan 2009	July 2009	Dec 2009	2010
Monitor new SCEQ questions to ensure progress in students' awareness of research in their faculties. New questions to be added are already in train.													
Investigate the support needs of members of the Research-led Teaching Working Group													
Establish a newsletter to disseminate ideas and good practice in the University in relation to strengthening research-led teaching.													
Carry out investigation of the needs, requirements and capacities of existing summer/winter scholarship schemes. Investigation complete Dec													
Discuss possibilities for coordination and collaborative marketing of summer/winter scholarship schemes with relevant interested bodies (e.g. summer school office, research office etc).													
Analyse pilot study data on students' conceptions of research and extend study in the light of findings. Data analysed, paper prepared for publication and new project established													
Collate and disseminate best practice in research-based learning through the ITL website and relevant publications. Further examples of inquiry-based learning added and website updated													
Publicise University of Sydney undergraduate research opportunities through the media. At least one major article in a national newspaper by End of 2007													
Explore opportunities for funding undergraduate research stipends. With a view to establishing a stipend scheme													
Work alongside members of the Research-led Teaching Working group to achieve faculty aims and move to more student centred research-based learning approaches to the curriculum with a view to projects being supported in all Faculties													
Provide At least one student scholarship to undertake research on teaching and learning													
Explore the effects of casualisation on the capacity to integrate research and teaching and Report to the Teaching and Learning Committee													
Implement evaluations of the effectiveness of research-based learning and report to the Teaching and Learning Committee													
Carry out a major investigation of what is distinctive about the University of Sydney learning environment. This is not obvious and can													

only be deduced from benchmarking with other universities, for example through comparison of course outlines. Report to the Teaching and Learning Committee and publication for refereed journal													
Develop research on teaching as a strength of the university to achieve 20% increase in pedagogical research publications													
Complete investigation of the possibility of University or College-wide grant schemes for research on teaching													
Spread best practice in existing Faculty teaching research schemes to other faculties including providing information and having discussions with Deans													
Bring academics engaged in research on their teaching together in seminars and forums. Forum held and seminar series set up													
Begin planning an undergraduate research conference Hold an undergraduate research conference by December 2008.													
Carry out new project on students' conceptions of research to build on pilot study.													
Set up undergraduate research projects focused on strategic goals for learning and teaching to assist in the expansion of research-based learning opportunities for students.													
50% Increase in numbers of students who have carried out a research project in their courses													
Actions **Achieved by →**	Jan 2006	July 2006	Dec 2006	Jan 2007	July 2007	Dec 2007	Jan 2008	July 2008	Dec 2008	Jan 2009	July 2009	Dec 2009	2010

Key:

Heavy shading indicates substantial time commitment in ITL.
Lighter shading indicates ongoing lighter commitment by ITL

Appendix 1

The University of Sydney and Monash University: Summary of Research-led Teaching Benchmarking Ratings July 2004

Comparison	Low level	Medium level	High level	Monash University	The University of Sydney
Compare Monash and Sydney terms and definition.	No identification of teaching-research nexus.	Coordinated discussions on the teaching research nexus taking place.	Clear institutional definition.	Medium level, but moving towards high level	High level
Compare Monash and Sydney processes for teaching-research nexus identified in strategic planning.	No systematic institutional strategic planning of teaching and/or research.	Institutional strategic planning of teaching and research conducted independently.	Integrated approach to institutional strategic planning of teaching, research and the teaching- research nexus.	Upper medium level	Medium level
Compare Monash and Sydney identification of teaching-research nexus in planning documents including, for example, Learning and Teaching Plans, Support Services Plans, Research & Research Training Management Plans, Campus Plans, and Faculty Operational Plans.	Planning documents indicate distinct teaching and research activities with no concept of link.	Teaching-research nexus reflected in Learning and Teaching Plans.	Teaching-research nexus cascades into all relevant plans.	Medium level	Medium level
Compare Monash and Sydney processes for teaching-research nexus in terms of course: approval, monitoring and review.	Approval not related to teaching-research nexus, monitoring, review.	Approval documents mention the teaching-research nexus, monitoring, review.	Approval dependant on clear demonstration of teaching-research nexus, monitoring, review.	Low level	Medium level moving to high

Compare Monash and Sydney identification of research skills and the ability to undertake research in graduate attributes.	No identification of research skills as desired graduate attribute.	Statements concerning importance of research as a graduate attribute.	Systematic mapping and development of research skills progressively through the curriculum.	Medium level with high level in some areas/faculties	Medium level with high level in some areas/faculties
Compare Monash and Sydney performance of staff in terms of teaching and research.	High proportion of teaching staff are not research active.	High proportion of teaching staff are research active.	High proportion of teaching staff are research active & the proportion of senior staff teaching at 1st & 2nd year levels is at least commensurate with numbers of senior staff in the total teaching staff profile.	Medium level	Medium level
Compare Monash and Sydney strategies for inclusion of teaching-research nexus in performance management	No recognition of link between teaching and research in performance management documentation.	Performance management documentation acknowledges teaching-research nexus.	Performance management practice recognizes and takes account of teaching-research nexus.	Low level	Low level
Compare Monash and Sydney recognition and rewarding of teaching-research nexus (eg University Awards).	No teaching and research awards.	Separate teaching awards and research grants.	Awards and grants require demonstration of teaching-research nexus.	Medium to high level	High level
Compare Monash and Sydney strategies for inclusion of teaching-research nexus in recruitment documentation and probationary reports and promotion documentation.	Teaching-research nexus not mentioned in recruitment, probation and promotion documentation.	Teaching-research nexus mentioned in recruitment probation and promotion documentation.	Teaching-research nexus demonstrated in recruitment, probation and promotion practice.	Low level	Low to medium level

Compare Monash and Sydney staff development opportunities in terms of teaching-research nexus.	No staff development available on teaching-research nexus.	One-off, ad hoc seminars on teaching-research nexus.	Teaching-research nexus a strategic priority in staff development.	Medium to high level	High level
Compare Monash and Sydney reference to teaching-research nexus in internal and external communications.	Not mentioned in external communications.	Ad hoc, occasional reference to teaching-research nexus in external communications.	Frequent and systematic reference to teaching-research nexus in external communication.	Medium level	Medium level
Compare Sydney and Monash practices and mechanisms to improve the extent to which teachers bring research into the classroom.	Individuals incorporate research ideas into lectures and there are no faculty mechanisms to improve or evaluate practice.	Research ideas are incorporated in student activities/assessment and/or there are ad hoc faculty mechanisms to improve or evaluate practice.	Student learning is organised so as to engage students in research projects and/or there are systematic faculty mechanisms to improve and evaluate practice.	Medium level	High level
Compare Sydney and Monash faculty policy and incentives for curriculum development to be informed by internationally based disciplinary and pedagogical research.	Curriculum development may be informed by internationally based disciplinary and/or pedagogical research but there are no faculty mechanisms to encourage this.	Faculty policies provide encouragement for curriculum development to be informed by internationally based disciplinary and pedagogical research, but there are no strategies and incentives to facilitate this.	Systematic faculty encouragement and incentives for curriculum development to be informed by internationally based disciplinary and pedagogical research.	Medium level with high level in some faculties	Medium level with high level in some faculties
Compare Sydney and Monash faculty policies and strategies to build students research and inquiry capabilities.	There are no faculty policies or strategies to ensure that research and inquiry capabilities are taught.	There are strategies to build students' research & inquiry capabilities but they are not taught as an integral part of a systematic approach to the development of generic attributes of graduates & not monitored on a regular basis.	There are faculty policies and strategies to ensure that research and inquiry capabilities are taught as an integral part of a systematic approach to the development of generic attributes of graduates and these are monitored on a regular basis.	Medium level with high level in some faculties	Medium level with high level in some faculties

Compare Sydney and Monash strategies to encourage students and staff to participate in a variety of scholarly communities.	There are no faculty strategies to encourage students and staff to participate in scholarly communities.	There are faculty strategies to encourage students and staff to participate in a variety of scholarly communities.	There are faculty strategies to ensure undergraduate and postgraduate students participate with staff in a variety of scholarly communities.	Medium level	Medium level
Compare the extent to which Sydney and Monash strategies encourage students and staff to engage in discussions about the nature of the disciplinary area, the nature of research and what it means to study the subject.	Students and staff engage in discussions about the nature of the disciplinary area, the nature of research and what it means to study the subject on an ad hoc and infrequent basis.	Staff engage in discussions about the nature of the disciplinary area, the nature of research and what it means to study the subject, but there are no strategies to encourage students to participate in such discussions.	There are strategies to encourage students and staff to engage in discussions about the nature of the disciplinary area, the nature of research and what it means to study the subject.	Medium level	Medium level
Compare the extent to which faculties at Sydney and Monash implement a systematic and integrated approach to the teaching of research skills across the undergraduate curriculum and how faculties monitor this.	Research skills are taught across the undergraduate curriculum on an ad hoc basis.	Research skills are taught across the undergraduate curriculum and there is a spasmodic attempt to integrate, but faculties do not monitor this.	There is a systematic and integrated approach to the teaching of research skills across the undergraduate curriculum and faculties monitor this on a regular basis.	Medium level with high level in some faculties	Medium level with high level in some faculties
Compare the existence of strategies to encourage research on teaching and to use this in curriculum development at Sydney and Monash.	Research on teaching is not valued and/or does not take place.	Research on teaching is carried out, but there are no or ad hoc faculty strategies to encourage this and it is only used spasmodically in curriculum developments.	There is an integrated and systematic program of research on teaching in faculties which is used to inform curriculum developments.	Medium level with high level in some faculties	Medium level with high level in some faculties

Compare Sydney and Monash strategies to encourage and reward disciplinary research projects that result from teaching.	There is no formal recognition in faculties that teaching generates or influences research.	There is formal recognition in faculties that teaching generates or influences research, but no strategies to encourage and reward this.	There are faculty strategies to encourage and reward disciplinary research projects that result from teaching, including critical questioning by students.	Medium level	Low level

Appendix 2

Why students need research

Angela Brew
(Based on Brew, A. (in press). *Research and Teaching: Beyond the Divide*, London PalgraveMacmillan)

It has now almost become a cliché to say that we live in a society characterized by uncertainty, uncontrollability and unpredictability. It is a world that we cannot at any particular time fully understand. Barnett (2000) suggests that the world is not only complex, but super-complex. We can cope with complexity, or we could if we had enough time and resources to put behind complex problems. But supercomplexity arises when the very frameworks we have for making sense of complexity are in dispute. We have no idea how to solve super-complex problems (Barnett, 2003b). Barnett argues that the personal and professional studies in which the student of the future will be engaged will take place in the context of this uncertainty and super-complexity. So questions about the nature of higher education and about the role of research and science, and questions about the kinds of education appropriate for students are intimately related to questions about how we are to live in such a society. The students of tomorrow's society are going to face huge numbers of complex and important decisions throughout their lives. Higher education needs to teach them how to do this.

The more complex and important choices that are facing people daily, the more they need to have developed the skills of critical analysis, gathering evidence, making judgments on a rational basis, and reflecting on what they are doing and why. These are the skills of inquiry. Inquiry is central to a super-complex society. Vital elements of a university education thus need to become focused on preparing students to solve a range of interconnected, frequently unforeseen problems which are going to continue especially when the student leaves university. 'What is required' says Ron Barnett, 'is not that students become masters of bodies of thought, but that they are enabled to begin to experience the space and challenge of open, critical inquiry (in all its personal and interpersonal aspects)' (Barnett 1997: 110).

It is not only a super-complex world, it is an uncertain world. We have no idea what is going to happen to us next. It is a world of acute ambivalence. Barnett argues that in an unknown world, questions of identity are central. We are constantly asking who am I and how can I make sense of the world in which I find myself? Wenger (1998) provides a framework for understanding that it is useful to employ here. He describes the concept of identity formation and learning within a site of social practice as constituted of three distinct modes of belonging: engagement, imagination and alignment. Engagement, for Wenger is the 'active involvement in mutual processes of negotiation of meaning' (p173). Imagination is ' creating images of the world and seeing connections through time and space by extrapolating from our own experience' Alignment, according to Wenger is 'coordinating our energy and activities in order to fit within broader structures and contribute to broader enterprises' (Wenger, 1998). Engagement, imagination and alignment, Wenger argues, each 'create relationships of belonging that expand identity through space and time in different ways' (p181).

Individuals' personal and professional identities are bound up in that sense of belonging to a group of people they know well. Teachers and students develop their personal identities within the teaching and learning encounter; their view of themselves changes. Developing

our identities, Wenger reminds us, may challenge our pre-conceptions; our prior understandings. Hopefully, if learning is to take place, it will challenge and change the ways we view reality, or at least some aspects of it. Research, teaching and learning may also go further and challenge our basic beliefs and values.

Acting within a context of confusion and ambivalence is an important task facing the higher education of the future and its students. It will be important to encourage students to be open to new problems and new questions and finding new ways of searching for new solutions. The purpose of teaching thus becomes to induct students into various forms of inquiry so that individuals are able to live in a complex, uncertain world where knowing how to inquire is a key to survival. We are looking towards a higher education where inquiry is becoming centre stage for both academics and students. 'Inquiry, investigation, and discovery', says the Boyer Commission on reinventing undergraduate education in the US, 'are the heart of the enterprise, whether in funded research projects or in undergraduate classrooms or graduate apprenticeships. Everyone at a university should be a discoverer, a learner' (Boyer Commission, 1999).

An improved understanding of how students learn in higher education contexts has shifted attention away from the lecture as the predominant form of university teaching to a more diverse diet of course offerings. Moves to evidence-based teaching and learning including problem based learning, increasing development and use of research-based curricula as well as changes in research activity to include a greater involvement of students are indications that cultures of inquiry in the teaching and the research domains may be being integrated.

In order to educate students for a society such as Barnett suggests, we need to work with students to develop approaches to learning which teach them and us how to live. This suggests a need to move to more inclusive, collaborative, inquiry based models of research, teaching and learning. The distinction between teaching and learning breaks down if this happens because both teachers and students explore the issues that confront them. This is not just for those students who are likely to engage in further study or become academics in the future. Neither is it just for students in small elite research based institutions. Rather, it is important to develop the ability to engage in a rigorous systematic process of inquiry in whatever field or institution they are engaged.

Students need to be fully inducted into the culture and community of researchers. They need to develop a knowledge of what it is to engage in the subject in a research-based way, to understand the key issues and debates in the subject area and know what researchers in the subject do in general and specifically. They need to engage in activities which mirror the research processes that their teachers are otherwise engaged in. They need to learn methods and techniques used in research in the subject and have opportunities to practice such methods and techniques and they need to become involved as participants in ongoing research programs with a sense of belonging to a community of researchers. This all implies that during their studies they should engage in building knowledge just like researchers. Bereiter (2002) describes knowledge building as starting with the questions that one wants to ask about the world as we perceive it. We build knowledge from that starting point. As we develop knowledge in relation to that aspect of the world so we learn about the knowledge that others are building, and in this way knowledge-building becomes a shared and collective, collaborative process. In this context we need to see teaching and learning as a shared encounter between individual human beings. Whether they are defined as 'academics',

'teachers', 'students', or 'participants', individuals come into a relationship within our higher education institutions.

References

Barnett, R. (1997). *Higher education: a critical business*. Buckingham: Open University Press and Society for Research in Higher Education.

Barnett, R. (2000). *Realizing the University: in an age of super-complexity*. Buckingham, UK: Society for Research into Higher Education and the Open University Press.

Barnett, R. (2003). Learning for an unknown future. Keynote address to Learning for an unknown future: Annual Conference of the Higher Education Research and Development Society of Australasia .

Bereiter, C. (2002). *Education and the mind in the knowledge age.* Mahwah, NJ: Lawrence Erlbaum Associates.

Boyer Commission. (1999). *Reinventing Undergraduate Education: A blueprint for America's Research Universities.* Stony Brook, NY: Carnegie Foundation for University Teaching.

Brew, A., & Prosser, M. (2003). Integrating quality practices in research-led teaching and institutional priorities. In *National Quality in a Global Context: Proceedings of the Australian Universities Quality Forum* (pp. 113-116). Melbourne, VIC: Australian Universities Quality Agency.

Wenger, E. (1998*). Communities of Practice: Learning, meaning and identity*. Cambridge: Cambridge University Press.