The Research -Teaching Link

at Canterbury

A report prepared for the Teaching and Learning Committee by a joint sub-committee comprising members of the Teaching and Learning Committee and the Research Committee:

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Table of Contents

1. Introduction

This report investigates the research-teaching link at Canterbury University. It has five main objectives:

> to outline the University's obligations and commitments to research-teaching links;
>
> to discuss the mechanisms by which we can monitor policy;
>
> to discuss current practice that fosters the research-teaching link;
>
> to discuss constraints in the maintenance of research-teaching links;
>
> to suggest mechanisms that could strengthen research-teaching links.

1.1 Definitions

In *The Canterbury Way Forward* (1999: 10) **research** is defined as
> "including scholarly activity which critically assesses the theory and practice of a discipline and which leads to the promulgation of results of that enquiry through publication, original creative work, or performance."

Research and teaching may interrelate through:

> "transmission" links;
>   a) teaching is seen as a means of transmitting new knowledge
>   (research/teaching link)
>   b) involvement in teaching informs and enriches the research process
>   (teaching/research link)
>
> the "process" link; teaching model encourages students to engage in a research approach to learning
>
> the "research culture" link; teachers and students work together in a community of inquiry. Learning provides the vital link between research and teaching.

We believe the link between research and teaching is demonstrated in research into pedagogy as well as disciplinary based research.

2. Obligations and commitments of the University to the research-teaching link

Before embarking on an analysis of current practice regarding the research-teaching link, we need to be clear as to the University's stated obligations and commitments in this matter. Thus this section draws upon recent policy from *The Canterbury way forward* (May 1999) and the *University Plan* (May 2000) that pertains to the research-teaching link.

In support of its goal of 'excellence in curriculum, teaching and learning to a standard befitting an international research university', *The Canterbury way forward* (May 1999) includes a number of objectives and strategies that relate to aspects of the research-teaching link. In particular, the policy aims for the provision of courses:

(i)   whose content utilises research carried out in the University (2.1 below),

(ii)   whose content utilises research of the scholars from throughout the world working in the discipline (2.1 below),

(iii)   that involve students in the acquisition of research skills at undergraduate level such that they are well prepared to proceed to postgraduate courses and research (2.2 below).

During 1999 and early 2000, these objectives and strategies have been reviewed, and the *University Plan 2000* - which is a reworking of *The Canterbury way forward* - presents objectives considered more workable by committees responsible for fulfilling the objectives. The boxed text below shows the relevant parts of the *University Plan 2000*.

2.1   Integration of research into curriculum and teaching

Objective 3.3 and its associated strategy 3a (see below) reflect a dual dimension to the research-teaching link. Teaching should utilise the research activity of the university and it should be informed by research from the international sphere.

University Plan 2000

Objective 3.3
To ensure courses and programmes are of international standard and relevance and that curriculum is based on sound principles of course design and integrates research into teaching and learning

Academic Administration Committee:
Academic Programmes Committee
Strategy 3a
Ensure that new and existing programmes are robust, maintain coherence, reflect and are informed by the research activity of the university, are of international standard, satisfy community need (where appropriate) and are adequately resourced.

2.2   Provision of research skills

The *University Plan* also clearly states the need for teaching to provide students with research skills (see box over page).

2.3 Teachers involved in research and the application of educational/ pedagogical research into teaching

In support of its goal of 'developing and maximising the effectiveness of all staff', the *University Plan 2000* includes several objectives (5.1,4.1,4.2 below) that require teachers to be active in research and to engage in enhancing their teaching, and that encourage teachers to study and apply research into teaching and the teaching of their discipline. The Teaching and Learning Committee has appropriate strategies: the Staff Policy Committee has not yet reviewed its strategic plan.

In summary, there are five main areas emerging from the *University Plan* that relate to the research-teaching link. These are:

courses utilising research activity carried out in the University
research-informed teaching
provision of research skills
teachers actively involved in research
engagement in and application of, educational/pedagogical research.

3 Mechanisms to monitor the research- teaching link

This section discusses the mechanisms through which the research- teaching link is monitored. In discussion with many academics (through a research-teaching link seminar run by ERAU, as well as through informal discussions around campus) there is an acknowledgment that research and teaching are inextricably linked. Perhaps because this link is so fundamental in academia and thus is often implicit rather than explicit, obtaining evidence of the link is more difficult.   In order to monitor current practice regarding research-teaching links we sought evidence from a number of sources at three levels:

Institutional level
- staff – appointments, promotion and leave processes
- course approval process
- research courses as listed in the *Calendar* - a search was made to determine
    the number of research method courses at undergraduate and graduate
    level
- ERAU teaching programmes

Departmental level
- statements with reference to research-teaching links in:
    - academic department reviews
    - departmental annual reports
- course outlines - evidence was sought on:
    - courses that involved research activity
    - courses that explicitly had a teacher as a researcher in terms of the
     teacher's own publications being utilised
- field teaching - survey of departments that are the main users of the
    University Field Stations to determine extent of field teaching
- case studies - from interviewing staff in select departments level (Chemistry,
    Electrical Engineering, Geography, History)

Individual level
- staff survey on:
    - the research/teaching link in undergraduate courses
    - the use of student research in teaching
    - the prevalence and nature of pedagogical research
- from research-in-progress on research-teaching links by Jane Robertson in
    ERAU

4. Current practice to foster the research-teaching link

Data from each of the monitoring mechanisms are discussed below (4.1 to 4.3) followed by a discussion of the results of this research in relation to stated policy (4.4), and a summary of current practice regarding research-teaching links at the individual (staff and student), departmental and institutional levels (4.5).

4.1 Institutional practice

4.1.1 Staff

Research performance and teaching ability are central criteria in considering applicants for appointment and promotion. Proposed revisions to the criteria for promotion place more weight than previously on teaching, but it is required that staff be active in research as well. The links between research and teaching are also evident in applications for study leave where applicants must state the relationship between leave plans and research and/or teaching responsibilities.

4.1.2 New course approval

Since 1999, a more rigorous approval procedure was introduced for new programmes and courses. The Faculty template requires the following issues to be addressed under the section 'Purpose' and 'Justification':

'Purpose' includes:
   • matches advances in the discipline
   • makes use of staff specialisation and reinforces the research/teaching nexus

'Justification' includes:
   • in the context of the department's teaching, learning and research plans

In new course proposals considered in 1999 (May June, July, August and September meetings of the Academic Administration Committee's Academic Programmes Committee), nearly all courses - at all levels, not just higher levels - were identified as *either* matching research interests of participating teachers, *or* in an area where staff had published extensively, *or* being able to better deploy the staff expertise or staff specialisation or staff strengths, *or* in the area of expertise of newly appointed staff. There were 36 courses in these categories from 18 departments (see Appendix A). One new course worthy of particular mention is that of GEOG 313 (Geographic Information Systems) which created as a special topic for an Erskine visitor.

It is worth noting that courses were discontinued in 1999 in cases of staff retirements or resignations, which had left the University *without* the expertise/researchers in those course areas.

4.1.3 Research courses

Information on the number of research method courses (both undergraduate and graduate) was gained from a search of the calendar. There are 16 undergraduate courses and 14 postgraduate courses identified by title as being research methods (for details see Appendix B). Thus less than half the departments offer explicit research methods papers. However an alternative approach is to have elements of research methods embedded in other courses hence the small number. There are 52 graduate research/project Honours papers. Graduate students are expected to undertake independent research but in some departments rather than offering an explicit research project paper, students are expected to undertake smaller research projects in other graduate courses. There is known to be a number of courses requiring research methodology but they are not identified explicitly by their titles.

4.1.4 ERAU teaching programmes

All ERAU teaching programmes are underpinned by local, national and international research into teaching and learning in higher education. The impact of current research is particularly evident in the Teaching and Assessment Seminar Series (TASS), the Postgraduate Certificate in Tertiary Teaching (a new initiative for 2000) and the Master of Education courses (to which ERAU staff contribute), where participants are required to apply theoretical perspectives in reflecting on their teaching and their students learning. .

4.1.5 Other

Evidence of research-teaching links also occurs in the publication *UC Teaching* (1999) which has articles on teaching-research links. Also a University Forum on teaching-research links is planned for mid 2000.

4.2 Departmental practice

4.2.1 Academic department annual reports

Two questions in the annual report targeted the fostering of staff and departmental research into the curriculum. These were "Q11: How is staff research fostered into the curriculum?" and "Q12: How do students make contact with departmental and discipline research and research techniques in undergraduate courses and in taught postgraduate courses?" Thirty-four departmental annual reports were analysed (see Appendix C). It is important to note that the results provide a guide only as to the sort of practice that occurs and that a more focussed survey could have provided a more comprehensive view of existing practice. Simply because departments did not report research-teaching activities is not to say they are not occurring! Thus the results must be interpreted with caution since the questions were rather general and the responses had a great range of depth.

From the responses it is clear that staff research is integrated into teaching in nearly all departments (in fact the survey probably underestimated this activity). Many departments (32%) have courses in the teachers' research interests at 400 level and

18% have such courses at undergraduate level. Only 9% indicated they use staff textbooks or publications, yet in surveying course outlines (Section 4.2.3) and in case studies (Section 4.2.5) we found that this figure is much higher. The most frequent ways that undergraduate students make contact with departmental research is through explicit research methods courses, lectures and readings, staff sharing the results of their own research, research projects, laboratories and scholarly debates. For graduate students the main avenues are via research projects, courses in staff specialist areas, research methods courses and research seminars.

4.2.2 Academic department reviews

Reviews of academic departments consider research on the one hand, and programmes and courses/curriculum on the other: there is no requirement to talk directly about research-informed teaching, or the research-teaching nexus, and we would presume that this may be so because it is a 'given'. The University has always expected this link: *The Canterbury way forward* made it explicit, and the *University Plan 2000* carries on this new tradition.

Having said that, however, one does find reference to programmes and courses which are in areas of staff research. General statements (presumably applying to all courses) can be found, for example, in Maori where courses in history and historical Maori language, politics and society are identified as reflecting strongly the research bases within the department.

At honours level (and also 'upper' level courses - 300-level), there is often mention that such courses are in areas of staff research. For example:
> *Philosophy*- courses closely related to current research interests of staff, honours courses develop students; honours courses develop intellectual independence;
> *Religious Studies* - rigorous, research-oriented honours courses; strong research culture among honours students;
> *Geography* - students have the opportunity of in-depth study and research within each subdiscipline; team research is well developed in some areas;
> *History* - research methods in undergraduate courses, involving primary sources, methodology; research interests of staff informs coverage of upper-level courses;
> *Physics*- undergraduate courses in some areas reflect staff interests and expertise.

4.2.3 Course outlines

Approximately 279 course outlines (nearly half of the total number of courses on campus) were examined to identify evidence of a research-teaching link. Two main categories were sought: the teacher as the researcher as evidenced by the use of their own publications and any research activity in a course (including for example, development of critical thinking, research skills, research projects, discussing current developments in the literature etc).

Of the sample 9% gave evidence for the teacher as the researcher (through the use of their own publications) and 18% gave evidence of research activity occurring in the course. This evidence is probably a gross underestimate of the research-teaching link at Canterbury since many course outlines only contain reference to a few texts rather than a complete reading list which may include the teacher's own publications. We suspect that most courses probably contain an element of research activity, but this may not be explicit in the course outline.

4.2.4 Field teaching

Field teaching provides an important link between teaching and research. As well as giving instruction in research techniques, field teaching gives students an opportunity to engage in postgraduate and/or staff research. The University is fortunate to have six field stations that are administered by five departments. These are:

> Cass (Plant and Microbial Science)
> Edward Percival Station at Kaikoura (Zoology)
> Hari Hari (Forestry)
> Mt John and Birdlings Flat (Physics and Astronomy)
> Westport (Geological Sciences)

Each of the departments that regularly conduct field teaching and use one or more of these stations were surveyed to determine their extent of field teaching (see Appendix D). In the annual departmental reports only 6% of departments mentioned fieldwork as a way that undergraduate students make contact with departmental research and research techniques. However the figure is closer to 15% as Forestry, Geography, Geological Sciences, Plant and Microbial Sciences, Physics and Astronomy and Zoology all have substantial field teaching in their curricula.   While most of these departments use the Field Stations (some very heavily), field work at other locations throughout New Zealand also occurs. Field teaching is frequent at both undergraduate and graduate levels and is seen as an invaluable part of the curricula.

4.2.5 Case studies of departments

Staff in four departments (Chemistry, Electrical and Electronic Engineering, Geography and History) were surveyed to determine whether the links between research and teaching in their practice. The full reports form each department are given in Appendix E.

Chemistry

Responses from Chemistry staff indicated that the research-teaching link is clear in the laboratory. Research ensures enthusiasm and insight, and a grasp of the subject and its context, which are vital for teaching excellence; it keeps staff looking for new questions to answer, which leads to new problems to excite students. Research work provides a greater awareness of the recent literature and its implications, keeping staff up to date, and this leads to curriculum changes in line with current understanding. Research activity has facilitated a dynamic approach to development of teaching programmes and laboratory courses. Discovery through research enhances perception of principles that need to be conveyed to students. Critical thinking is a key skill, which is best developed through research so that staff can demonstrate it to others.

On a scale of 1-5 (1=never, 5=very frequently), staff were surveyed on the extent to which they referred to their current or recent research results in their teaching. The following are the averages of the number of responses (in brackets) given for each level of instruction:

100   1.6 (9)
200   2.1 (10)
300   2.7 (10)
400   3.7 (10)

The Erskine fund makes a major contribution. There is a synergy between the Erskine visitors and former students overseas, as many Chemistry PhDs take up postdoctoral positions with former Erskine fellows.

Electrical and Electronic Engineering

The research-teaching link is very strong in Electrical and Electronic Engineering. The most obvious example of the link from the staff's point of view is supervision of Masters and PhD theses. The 24 academic staff supervise an average of 3-4 postgraduate theses each; in 1999 75 EFTS were supplied by Masters and PhD thesis students. In Engineering, as in the Social Sciences and Humanities, the key to the link is the University Library, and enthusiasm derived from engagement in research.

Research skills are taught at all levels. Research informs teaching in a variety of ways: through postgraduate group meetings; seminar series; Masters courses; the Honours programme, with its rigorous selection process; inter-departmental collaboration; networks with local industry; and the Erskine Fellowships scheme. International links are explicit and visible in the Erskine scheme, whose visitors teach in Masters courses and strengthen industry links. Staff utilise international contacts in teaching; all staff are active researchers, and are routinely engaged in cutting-edge technological research.

Geography

It is clear that in the Geography Department research and teaching are inextricably linked. All staff use their own research (although not all are explicit about the source of the research) at undergraduate and graduate levels. However there is more emphasis on the explicit use of staff research at the graduate level. The most common means of using staff research in teaching was through case studies and slides from their own research as well as using their own publications and the use of their data for laboratories and projects. All staff refer to the wider body of international research in their teaching and all staff are actively involved in research. As well as having an explicit undergraduate research methods course (GEOG 309), a range of research skills are taught throughout the curriculum. Although most of the survey questions targeted the links between research and teaching several staff members volunteered information as to the link between teaching and research. They commented that often through their teaching they became aware of "gaps" in knowledge which stimulated them to do research.

Although most staff undertake professional development in terms of teaching, only about a third are involved with pedagogical research. However other staff commented that they would like to undertake this research if time permitted!

History

The research-teaching link is strong in History, and integral to its work. The link flows both ways in this department. Staff emphasised that enthusiasm for a subject is more readily conveyed to students by lecturers who are engaged in research. All staff use research in their teaching – research saturates the department's teaching. The progression of the research-teaching link from 100 level to 400 level is outlined in the department's skills development programme (see Appendix E.4.1), and at postgraduate level in the thesis writers' seminar programme (see Appendix E.4.2). Courses are constantly revised and new courses offered in order to incorporate the latest research. The commonest use of staff research in teaching is through a focus on problems and issues addressed in research, and examples, frameworks and models drawn from their own research and publications. In History there is a two-way link between book writing and course design. Commonly, a book leads to a course, and/or a course to a book.

All staff refer to international research in their teaching, all the time, at all levels. Staff frequently refer to students' research in New Zealand history more than in other areas. A consensus emerged that teaching is a stimulus to research by prompting questions, determining problems, providing the opportunity and framework for the testing of new ideas, communicating ideas and writing about them. In an on-line case study of the research-teaching link, a Pacific History course is being taught simultaneously at three universities both to experiment with pedagogical possibilities and to redefine the concept of Area Studies for our region.

Summary

There is strong evidence of research-teaching links at the departmental level. Each department surveyed commented that research-teaching links were strong and these links were expressed in a variety of ways. Staff enthusiasm for research is central to the research-teaching link and is seen to be vital for teaching excellence. Different teaching methods such as lectures, laboratories, field work and postgraduate supervision provide opportunities to foster the link. The value of the Erskine Fellowships was also commented on by departments as making a major contribution to research-teaching links. Research work also provides a greater awareness of the recent literature and enables courses to be kept up-to-date. In addition, teaching acts as a stimulus to research by prompting questions and providing the opportunity and framework to test new ideas.

4.3 Individual practice

4.3.1 Staff survey on the research/teaching link in undergraduate courses

Academic staff were invited to respond to the following question as part of a larger email survey.

"Outline briefly how you make explicit the research ethos of your discipline in undergraduate courses."

Sixty-four staff responded. Twenty-four indicated that they made a point of drawing on their own research and that of colleagues and graduate students to illustrate lectures. The explicit teaching of research methods, the use of student research projects, field and laboratory work and the reading and critiquing of original research papers, were other commonly used ways of fostering a research ethos. A summary of the responses to this question is given in Appendix F. In addition we received a very detailed account of an individual's practice in fostering research-teaching links – Dr Irene Hudson's account is given in Appendix F.2.

4.3.2 Staff survey on use of student research

Academic staff were surveyed by email regarding their use of research material produced by students, both published and unpublished, for the purposes of teaching in undergraduate and postgraduate courses. Forty-three staff members, drawn from the Faculties of Arts, Commerce, Engineering, Fine Arts, Forestry, Music and Science, have indicated that they integrate considerable amounts of the research undertaken by students into their teaching.

Several respondents commented on the importance they attach to the link between research being conducted by students and teaching within their particular disciplines. "I think it is important," wrote one senior member of the Science Faculty,

> "to draw attention to ongoing research in the University, to questions
> currently being asked, and [to the matter of] whether progress is being
> made. I might say Blank blank is is working on this now and his/her
> results suggest we may need to look at this problem in a different way … I
> think knowing that students only a year or two more advanced than
> themselves are making significant contributions to science is important to
> undergraduates and an indication of what can be achieved. (I would refer
> to the graduate students by name since most are known to the
> undergraduates as demonstrators.)"

Most of the work referred to consisted of postgraduate theses, reports and published papers originating in both. However, strong evidence emerged of material far more diverse in origin being utilised for the purposes of teaching. The nature of the sources in question underlines the point made elsewhere in this report that the connection between research and teaching, though crucial, is principally qualitative and not readily susceptible to quantification. More details on the use of student research in teaching are given in Appendix G.

4.3.3 Staff survey on pedagogical research

Academic staff were invited to respond to the following question as part of a larger email survey.

"Are you undertaking (or have you recently undertaken) research into aspects of teaching in your discipline (ie pedagogical as opposed to disciplinary research)? If so…

a) Briefly describe the nature of the research
b) Give an indication of any reports/publications/other outcomes arising from this research."

Of the 64 staff who responded to the larger survey, 21 indicated that they were undertaking such research with a range of outcomes that included publications (many staff had published several papers), conference presentations, technical reports and seminars. Two pedagogical research projects are currently being supported by means of a TLC Teaching Development Grant. More detail on the types of research being done is given in Appendix H.

4.3.4 Research-in-progress on research-teaching links

The full report on this research-in-progress is given in Appendix I. The aim of the study is *to identify the qualitatively different ways in which academic staff experience the relationship between their research and their teaching and to investigate the pedagogical implications of this variation.* In a pilot study in 1998 seven staff members were interviewed, while the main body of interviews (a further 18 staff) were undertaken in 1999. While an in-depth analysis of the main body of interviews is yet to be undertaken, several emerging themes were identified:

> The pilot interviews revealed considerable variation in experiences of the research/teaching relationship. At one extreme the two were seen to be mutually incompatible while at the other extreme they were seen to be inextricably intertwined
> The degree of variation in experience revealed in the pilot study has not been borne out in the main body of interviews
> All eighteen participants in the main interviews experienced significant links between their research and their teaching
> For some participants the link is experienced and fostered at both undergraduate and postgraduate levels; for others it is experienced primarily at postgraduate level. The nature of the discipline appears to be the determining factor
> Students are an important part of the research communication network; they are also potential future researchers
> Despite acknowledging the difficulties in apportioning adequate time to both teaching and research, most participants regard the teaching-research nexus as central to their academic practice; few would seek a research only or a teaching only position
> The positive impact of teaching on research is acknowledged by all participants. While some qualitative studies indicate little flow in this direction, the current study suggests that it is a significant factor in the research/teaching link.
> The significance of the relationship between research and teaching is often expressed in emotional, affective terms

The 25 interviews now completed at Canterbury University indicate a strong awareness of and commitment to a positive, bi-directional relationship between research and teaching. While it was anticipated that gender and career stage might impact on experiences of the relationship, this has not proved to be the case. It would seem that the nature of the discipline and the level of teaching exert a greater influence on the nature of the link.

The significance of the affective dimension in experiences of the research/teaching relationship (as illustrated in the following quotation) cannot be overemphasised.

> *Subjective, emotional link. I enjoy doing research, it enhances my enthusiasm for my subject, it helps me feel that I am contributing to knowledge in my area. All these help me feel part of a community which is doing something positive. This 'feel good' factor helps me be enthusiastic about my teaching and, hopefully makes my teaching more effective. It helps me feel that my teaching is more 'alive', that I am discussing something that is out there happening of which I am a part.*

In an environment which favours tangible evidence and measurable outcomes, this manifestation of the experienced relationship between research and teaching remains impossible to quantify. However the largely qualitative nature of the link should not detract from the recognition of its significance or from the recognition of its cumulative contribution to the overall research/inquiry ethos of the university.

4.4 Practice in relation to policy

This section summarises the results of our research on research-teaching links by presenting in tabular form a statement of what we proclaim to do (through University policy) against what we can be seen to be doing (through the monitoring mechanisms). It is clear we are delivering on University policy on all accounts (Table 1). Certainly there is clear evidence of: courses utilising research activity carried out in the University; research-informed teaching; the provision of research skills, teachers being actively involved in research and to a lesser extent, teachers involved in educational/pedagogical research into teaching.

It is clear that there is some inequality in the usefulness of the monitoring mechanisms employed here. Because research and teaching are so inextricably linked the expression of the link may not be explicit, particularly in mechanisms at the departmental level such as course outlines, departmental review reports and departmental annual reports. If we are to continue monitoring research-teaching links we suggest that the most useful monitoring mechanisms are case studies where we can gain information at the individual level or departmental annual reports if more focussed questions are formulated. However on a philosophical level we could argue that because research and teaching are so intimately related we should not be trying to establish a "spurious dichotomy" of teaching and research (as one staff member suggested).

Table 1: Summary of policy and practice regarding the research-teaching link

Source	Research activity (of Uni)	Research informed teaching	Research skills	Teachers involved in research	Educ/Ped-agogical research into teaching
Institutional					
Staff	✓	✓		✓	
New Course approval	✓	✓		✓	
Research courses			✓		
ERAU teaching programmes					✓
Departmental					
Annual reports	✓	✓	✓	✓	
Deptal reviews	✓	✓	✓	✓	
Course outlines	✓	✓	✓	✓	
Field teaching	✓		✓	✓	
Case studies:					
CHEM	✓	✓	✓	✓	✓
ELEC	✓	✓	✓	✓	✓
GEOG	✓	✓	✓	✓	✓
HIST	✓	✓	✓	✓	✓
Individual					
Staff survey					
- T/R link	✓	✓	✓	✓	
- student res	✓				
- pedagog res					✓
Research in Progress*	✓	✓	✓	✓	

16

* This is from the Research-in-progress report by Jane Robertson

4.5 Summary of the expressions of the research-teaching link

This section summarises the mechanisms through which the research-teaching link is expressed at Canterbury. It is broken down according to practice at the institutional level, the departmental level and the individual level (both staff and student).

4.5.1 At the institutional level

While there is clear guidance in terms of policy at the institutional level, there is less evidence of the teaching-research link. Perhaps this because it is assumed that mechanisms will be more effective at the individual and departmental levels. However some evidence was found as listed below:
- staff appointment, promotion and leave processes
- new course approval process
- ERAU teaching programmes (e.g. training of postgraduate supervisors; workshops on the research-teaching links)
- University Forum on teaching-research links
- *UC Teaching* articles on teaching-research links

4.5.2 At the departmental level

At the departmental level there are several mechanisms to ensure the research-teaching link. However it is fair to say that the emphasis on this link is more evident at the graduate level. Nevertheless there are several ways the link is expressed in the undergraduate curriculum.

The following mechanisms were found to be in practice:
- courses in teachers research interest (undergraduate and graduate)
- through the provision of research methods courses
- through laboratories
- through field teaching
- research seminars in which students are encouraged to attend regularly and occasionally participate
- departmental publications in course outlines
- use of visitors (from Erskines, research, industry)
- postgraduate supervision is often into areas which are part of larger research programmes, often with external funding
- through the employment of research assistants
- through group research
- through publications in UC Teaching on research-teaching links
- through departmental policy on professional development with respect to teaching
- course revision is often driven by evolution of research development

4.5.3 At the individual level

As suspected there is an implicit understanding by academics that research and teaching are closely related. Listings below demonstrate a range of ways in which staff can and do foster research-teaching links as well as the ways that students can recognise these links.

Staff
> demonstrating an enthusiasm for research
> integration of research into teaching
> introducing students to their research interests
> engaging undergrads (and graduates) in research teams
> use of staff publications in teaching
> updating of curriculum to follow research trends
> modelling an inquiry approach to learning
> making explicit the impact of teaching on research
> including items of assessment with a research component/activity

Students
> graduate profile that values research
> student portfolio that includes research
> engaging in staff research e.g. in research teams or as research assistants
> undergraduate research "peak" – production of a research project that draws
> on all skills acquired through their degree
> joint publications with staff
> participation at conferences

5. Constraints in maintaining research-teaching links

Although there is plenty of evidence regarding a strong research-teaching link at Canterbury, there are several factors that should be kept in mind when endeavouring to maintain this link. These include:
> *the lack of time for research as well as teaching* which is seen as a major obstacle in achieving balance of research and teaching
> *teaching buy-out* whereby staff are freed from teaching for a while so as to concentrate on research, potentially posing a problem to the maintenance of a balanced research-teaching link, especially in the case of eminent researchers who buy-out time from their teaching
> *quality versus quantity* in course presentation in which research-informed teaching implies quality rather than quantity
> *mismatch of students' expectations and what we offer*; teachers wanting to encourage critical inquiry; students looking for a "package"
> *expectations of staff – to be good at everything –* ie teachers *and* researchers. How can we (or should we strive to) achieve this ideal?
> *cancellation of journal subscriptions due to limited library budget –* loss of journals used heavily in teaching

6. Proposed mechanisms to strengthen the research-teaching link

Ways to express the research-teaching link are operative mainly at the individual and departmental levels. However even at the individual level many lecturers are not explicit about their research in undergraduate teaching. We feel that staff should be encouraged to be more explicit about their research so that their students are made more aware of the research activity in the University.

At the institutional level there are several initiatives that could strengthen the research-teaching link. These include:

> evidence of links to teaching in research proposals as appropriate
> evidence of teaching/research links in new initiatives as appropriate
> include questions relating to the research-teaching link in student evaluations
> encouraging staff to become actively involved in the scholarship of teaching and making funding applications for research in this area
> foster links between the Teaching and Learning Committee and the Research Committee
> ERAU workshop on good teaching practice (that discusses the role of research (both discipline and pedagogy based) in teaching)
> raising awareness amongst students of University research
> further integration of research and postgraduate areas of study
> reward the integration of teaching and research
> require staff appraisals to include comment on efforts made to enhance research/teaching links
> require departmental self-audit in preparation for department reviews to explain the quality assurance process with respect to ensuring a research-teaching link.

APPENDIX A: New Course Approval Process

Since 1999, a more rigorous approval procedure was introduced for new programmes and courses. The Faculty template requires the following issues to be addressed under the section 'Purpose' and 'Justification':

'Purpose' includes:
  • matches advances in the discipline
  • makes use of staff specialisation and reinforces the research/teaching nexus

'Justification' includes:
  • in the context of the department's teaching, learning and research plans

In new course proposals considered in 1999 (May June, July, August and September meetings of the Academic Administration Committee's Academic Programmes Committee), nearly all courses - at all levels, not just higher levels - were identified as *either* matching research interests of participating teachers, *or* in an area where staff had published extensively, *or* being able to better deploy the staff expertise or staff specialisation or staff strengths, *or* in the area of expertise of newly appointed staff. Courses in these categories included:
  AFIS 251, 335
  AMST 108, 230
  ANTH 202
  ARTH 106, 323
  CLAS 104, 105
  COMS 101
  COSC 225
  ECON 314
  FORE/ENCH 429
  FREN 215, 306
  GEOG 310-313 (special topics for Erskines!)
  HIST 130, 253, 364, 365, 444
  JAPA 108
  MATH 101/171, 301, 302, 326, 335
  MUSI 217, 317
  PHIL 317,
  PSYC 211
  SOCI 242, 342.

It is worth noting that courses were discontinued in 1999 in cases of the staff retirements or resignations, which had left the University *without* the expertise/researchers in those course areas.

APPENDIX B: Research Courses

Entries in the *University of Canterbury 2000 Calendar* were examined to determine the number of research courses. Only some Engineering research courses were included (possibly an underestimate) due to the difficulty in determining whether they would be classified as a research methods course. Masters and PhD theses were not included.

1.   U/G Research Methods Papers

There are 16 undergraduate research methods papers: AMST 327: theories and methods, BCHM 381: biomedical techniques, EDUC 320: research methods in education, EDUC 324: Learning theory, ENCH 359: process analysis, FMST 301: feminist research, GEOG 309 research methods in geography, JAPA 303: biography and research methods, LAWS 386: legal research and writing, MAOR 323: research in Maori society, MUSI 318: studies in music research, PHYS 381: advanced experiments in physics, POLS 306: political behaviour: methods, PSYC 206: research, design and statistics, SOWK 302: research methods in social work, SOCI 341: survey methods.

2.   P/G Research Methods Papers

Postgraduate research methods papers (Hons level) of which there are 14:
AFIS 614: Research methodology and epistemology, AMST 440: interdisciplinary research, EDUC 644: research on teaching, EDUC 659: research methods in education, ENGE 461 philosophy and methods of engineering geology, FMST 401: advanced feminist research, FORE 511/611: research methods, GEOL 451: history, philosophy and methods of geoscience, GEOL 471: research methods of geoscience, HIST 450: history as a discipline, LING 407: field methods, MGMT 401: research methods, POLS 412: research methods, SOWK 423: research methods in social work. Note that in some departments all postgraduate papers are in essence "research papers".

3.   Honours Research Methods Papers

Postgraduate research/project etc Hons papers. There are 52 of these. Most of these courses have 470/480 numbers. The odd one may have something different. Whatever the number they are all described as research project, extended essay, research paper, research exercise, supervised research etc. The only variation in numbers occurs when Hons comes in the fifth year (after a 4-year degree) or where a Masters degree is done by project and papers. These courses are: EDUC 685/686: research project, ENMG 680: project, MBAD 647: marketing research, **or** FILM 550: research paper, DESI 550: research paper, PAIN 550: research paper, PHOT 550: research paper, PRIN 550: research paper, SCUL 550: research paper, FHRP 550: research paper and LAWS 501: honours research paper. The following departments have research papers: ANTA, ANPH, ASPY, ARTH, ARTT, ASTR, BCHM, CHEM, CLAS, COSC, ECON, EDUC, ENCH, ENEN, ENME, ENGL, ENVR, FMST, GEOL, ENGE, GRMN, HIST, JOUR, LING, MGMT, MSCI, MAOR, MAPH, MATH, MBIO, MUSI, PHIL, PHYS, PLBT, POLS, PSYC, RELS, SOCI, STAT, DRAM, ZOOL.

APPENDIX C: Academic Department Annual Reports

Two questions in the annual report targeted the fostering of staff and departmental research into the curriculum. These were "Q11: How is staff research fostered into the curriculum?" and "Q12: How do students make contact with departmental and discipline research and research techniques in undergraduate courses and in taught postgraduate courses?" Thirty-four departmental annual reports were analysed and the responses are summarised in Tables 1 and 2. It is important to note that the results provide a guide only as to the sort of practice that occurs and that a more focussed survey could have provided a more comprehensive view of existing practice. Simply because departments didn't report research-teaching activities is not to say they are not occurring! Thus the results must be interpreted with caution since the questions were rather general and the responses had a great range of depth.

Q11: How is staff research fostered into the curriculum?

Table 1 shows that there was a considerable range of responses. Furthermore there was varying depth of answers with some departments giving a very detailed answer (for example Education gave a very detailed list of staff research contributions to courses) while others gave a one line answer.

Table 1: Summary of departmental responses to question on the fostering of staff research into the curriculum.

Response	Frequency (%)
Integration of research into teaching through lectures	71
Courses in teachers research interest at 400 level	32
Courses in teachers research interest at undergraduate level	18
Curriculum updated to follow research trends	9
Use of staff publications in course	9
Undergraduate research projects	9
Use of visitors in lectures/seminars (from industry and/or research)	6
Personal initiative and enthusiasm	3

As well as the above results, some departments had quite useful and insightful responses. For example "within Zoology, staff are encouraged to emphasise this [research-teaching] link" and from Chemistry "no specific policy for this as it happens already through the enthusiasm of the staff, and their desire to communicate this enthusiasm through their formal teaching." Similarly in Chemical Engineering "staff research is fostered into the curriculum through personal initiative and enthusiasm. This is a natural process for staff…" Accountancy, Finance and Information Systems responded "Annual review of all courses by course supervisors and sub-discipline groups consider how current research may be reflected in current graduate and undergraduate courses. An additional major source of staff research being reflected in the curriculum is the wide range of textbooks written by members of staff being used in departmental courses."

Q12: How do students make contact with departmental and discipline research and research techniques in undergraduate courses and in taught postgraduate courses?

Again a range of responses of varying depth were given. These are tabulated in Table 2.

Table 2: Summary of departmental responses to question on student contact with research for (a) undergraduates and (b) graduates.

(a) Undergraduates

Response	Frequency (%)
Research methods course	26
Through lectures and readings	21
Staff sharing results of own research	21
Research projects	15
Through laboratories	12
In 300 level courses	9
Through teacher's enthusiasm	9
Through scholarly debates	12
Through acquisition of research techniques	9
Through fieldwork	6
Through acting as research assistants	3
Through group research with postgraduate students and postdoctoral workers	3

(b) Graduates

Response	Frequency (%)
Research projects	35
Courses in staff specialist	21
Research methods course	18
Research seminars	12
Recent developments in research (including staff's own research if applicable)	6
Joint publications (staff/student)	3
Use of Erskine visitors	3
Through seminar/discussion groups	3
Encouraged to discuss research interests with staff	3
Research method seminars for new thesis students	3

Zoology reported that "all undergraduates are encouraged to attend the weekly research seminars" and that "staff are encouraged to display posters [of their research] around the department". Linguistics commented that "all the courses of the Department benefit from, rely on, and are informed by the research undertaken in the Department." Theatre and Film Studies report that "in addition to discussing drafts of student work in detail, we also circulate drafts of our own work and make it available to students for criticism, and their contributions (if substantial) are acknowledged in publications which emerge." In Chemical Engineering student projects are conducted "within existing research groups in laboratories where there are postgraduate research students and postdoctoral workers."

In the Forestry report they admitted that they are bad at exposing their students to staff research and commented that "Often our students are surprised when they find

out that high quality research is being undertaken by their lecturers in the same environment as they have in their lectures." This department has pledged to remedy this in 2000 since they recognise that an unfortunate consequence is that few of their best students are motivated to research and do not want to undertake postgraduate research.

Summary

From the responses it is clear that staff research is integrated into teaching in nearly all departments (in fact the survey probably underestimated this activity). Many departments (32%) have courses in the teachers research interests at 400 level and 18% have such courses at undergraduate level. Only 9% of departments indicated they use staff textbooks or publications in their courses although 21% indicated they shared the results of their own research with their students. The most frequent ways that undergraduate students make contact with departmental research is through explicit research methods courses, lectures and readings, staff sharing the results of their own research, research projects, laboratories and scholarly debates. For graduate students the main avenues are via research projects, courses in staff specialist areas, research methods courses and research seminars.

APPENDIX D: Field Teaching

Field teaching provides an important link between teaching and research as students are given instruction in research techniques and often work alongside staff and/or postgraduate students conducting research. The University is fortunate to have six field stations that are administered by four departments. These are:

> Mt John and Birdlings Flat (Physics and Astronomy)
> Westport and Hari Hari (Geology)
> Kaikoura (Zoology)
> Cass (Plant and Microbial Science)

Each of the departments that regularly conduct field teaching and use one or more of these stations were surveyed to determine their extent of field teaching. In the annual departmental reports only 6% of departments mentioned fieldwork as a way that undergraduate students make contact with departmental research and research techniques. However the figure is closer to 15% as Forestry, Geography, Geology, Plant and Microbial Sciences, Physics and Astronomy and Zoology all have substantial field teaching in their curricula. The survey results for each department are given below (D.1 to D.6) with a summary in D.7.

D.1 Forestry

Three days at Hanmer springs for practical skills in forest measurement for second years, 30 - 35 students

FORE 202 Forest Ecology trip to Cass, 4 days for second year students, 30 -35 students

5 days field trip to west coast and stopping at Hari Hari Field Station for third year students, 30 to 35 students

5 days field trip to North Island staying on a marae at Rotorua for fourth year students, 30 - 35 students

2 days field trip for FORE 419 to various sites (changes yearly) 30 - 35 students

4 days trip to Southland for FORE 440 for fourth years (also some third years and postgraduates), 20 students

3 day trip to Hari Hari for postgraduate students, 10 students.

Additionally we have approximately 20 one day field trips spread over second to fourth years. 10 staff are involved in the field trips. Student numbers vary from year to year. Rough averages of student numbers are given.

D.2 Geography

The courses and field teaching below relate to the 2000 programme.

GEOG 106   154 students; one day fieldtrip to Birdlings Flat and Summit Road.

GEOG 108   210 students; field trail, about a day's work.

GEOG 201   109 students; one day fieldtrip round Christchurch; one day fieldtrip to Orton Bradley Park (Banks Peninsula); four day residential trip to Cass Field Station.

GEOG 202   100 students; geographical expedition – self-organised fieldwork with staff assistance; 3-4 days work.

GEOG 309   65 students, 6 day residential trip to Oamaru.

GEOG 311   61 students; half-day fieldtrip to South Brighton beach

GEOG 312   41 students; Franz Josef Glacier

GEOG 403   4 students; one day trip in Christchurch to partake in staff and postgraduate research on Christchurch Air Pollution Study)

GEOG 404   7 students; three day trip to St Mary's Range

GEOG 405   17 students; two day trip to South Canterbury/MacKenzie Country; four day trip to Kaikoura Field Station

GEOG 411   5 students; one day trip to Banks Peninsula; half-day trip to Botanical Gardens; one-two days on local landscape (in teams)

GEOG 412   4 students; one-two days in Marae workshops

GEOG 424   4 students; two and a half days in Franz Josef; two days in Craigieburn Range

D.3 Geological Sciences

FIELD TRIPS 2000

Course	No. of Students	Field Trip
GEOL 111 Planet Earth	126	Port Hills North Canterbury
GEOL 112 Understanding Earth History	99	Castle Hill Basin (Optional)
GEOL 113 Environmental Geohazard	73	Christchurch/North Canterbury
GEOL 229 Field Studies	43	Castle Hill/Waimak Gorge Island Hills, North Canterbury Westport/West Coast
GEOL 224 Earth Processes and History	50	Lower Waipara Strat. Logging Local modern depositional environm
GEOL 329 Advanced GEOLogy Field Studies	53	Castle Hill Mapping West Coast Oamaru Esk Head Melange
GEOL 471 Research Method of Geoscience	3	Cobb Valley mapping, NW Nelson
GEOL 473 Structural GEOLogy	6	N. Canterbury Field Mapping
GEOL 476 Physical Volcnology	5	Banks Peninsula
ENGE 462 Geomechanics Engineering Geology	9	North half of South Island
ENGE 476 Earthquake and Volcanic Hazards	10	Canterbury
ENGE 477 Ground Failure Hazards	5	Christchurch
ENGE 478 Applied Hydrogeology	5	Christchurch
ENGE 480 Environmental and Engineering Geophysics	11	North Canterbury/Christchurch
ENCI 271 Engineering Geology 1	98	Christchurch Castle Hill Basin/ Canterbury Plains
ENCI 472 Engineering Geology 2	59	Otago

D.4 Plant and Microbial Science

All of the courses below conduct fieldwork and most use the Cass Field Station.

40 students - BIOL 103
86 students - PAMS 204/FORE 202
18 students - PAMS 205
44 students - PAMS 304/ZOOL 304
10 students - PAMS 306
10 students - PAMS 454
10 students - PAMS 462
 3 students - PAMS 456

D.5 Physics and Astronomy

The use of Field Stations in 2000 is listed below:

Mt John University Observatory:
ASTR112	*Day trip arranged for entire class (~50)*
ASTR321	*Visit (2 nights) by 10 students*
ASTR 381	*Visit (2 nights) by 7 students*.
400-level	Project students (~2/year) visits and use of MJUO data

Cashmere Cavern (Ring Laser):
PHYS381	*1 day (~25 students)*
400-level	Project students (~2/year) visits and use of facility

Birldlings Flat (Atmospheric):
PHYS381	Day visits (~25 students)
400-level	Project students (~2/year) visits and use of MJUO data

D.6 Zoology

BIOL 112   240 students have 3 afternoon local trips; Jellie Park duck pond, Port Hills/Victoria Park/Deans Bush, campus streams.

ZOOL 202   92 students, afternoon trip to Canterbury Museum.

ZOOL 204   64 students, 5-day residential field trip (3 streams) at Edward Percival Field Station at Kaikoura; Easter Break.

ZOOL 205   65 students, 4 afternoon lab sessions allocated for insect collections, mostly local sites, plus Banks Peninsula, Burwood Forest, Travis Swamp.

ZOOL 307   50 students, 4 afternoon sessions to Orana Park and Hagley Park.

ZOOL 311   60 students, 5 day residential field course at Edward Percival Field Station, Kaikoura; August break.

ZOOL 455   8 students, 3-day residential field trip, Cass Field Station.

ZOOL 456   5 students, full day field trip to the Estuary.

ZOOL 468   3 students, two afternoons of fieldwork, Port Hills.

ZOOL 475   4 students, four-day residential field course, Edward Percival Field Station, Kaikoura.

ZOOL 488   15 students, 5-day residential field course, Edward Percival Field Station, Kaikoura.

ENVR 401   18 students, one day field trip, several local sites.

D.7 Summary

All of the departments surveyed have substantial field teaching. While most departments use the Field Stations (some very heavily), field work at other locations throughout New Zealand also occurs. Field teaching is frequent at both undergraduate and graduate levels and is seen as an invaluable part of the curricula. As well as teaching research techniques, field teaching frequently gives students an opportunity to engage in postgraduate and /or staff research.

APPENDIX E: Case Studies of Research-Teaching Links in Departments

Staff in four departments (Chemistry, Electrical Engineering, Geography and History) were surveyed to determine how research and teaching are linked. The results are given below (E.1 to E.4) with a summary in E.5.

E.1 Case study - Research-teaching links in the Chemistry Department

The following is a summary of responses from 13 staff members

1.   In one or two sentences state what you believe to be the most important factor(s) describing the links between your teaching and your research.

The closest links are to be found in labs. In these we are teaching basic research techniques and reinforcing lecture material. The research aspect, however, at the 200 and 300 level is not oriented towards my specific research interests in any way. However at the 400 level laboratory instruction is normally exclusively oriented towards my own research interests.

Without the research I wouldn't be here. However, I would not like to work in a research-only institution either. Education is a two-way process etc. Research keeps me looking for new questions to answer, and that leads to new things to try to get students excited about.

Enthusiasm for the subjects I teach. Awareness of how the information/skills I'm trying to impart came about through research.

Without this link we are simply school teachers with no real insight into the problem.

The research ethos drives me to want to understand fully all that I teach, as opposed to lazily accepting the superficial explanations of textbooks.

The broader knowledge which comes from teaching can be useful in research.

If I had no research I would have nothing to teach.....I would not know what the subject was about, where it might go, who were the players, what were there personalitites, what drove the subject...what drove the players...I would not be a university teacher. I would not feel the subject. I would not know where it fitted in the economy of the world, in the social fabric, in the intellectual fabric.

As researchers in chemistry we mix internationally with the best. Outstanding researchers sense how the subject develops, how it feels and how it is to evolve.

Research enables one to provide a new and up to date perspective on the subject and mention of this in lectures or lab. classes generally fascinates and excites undergraduates.

Enthusiasm for the subject is vital for teaching well and is greatly increased by conducting research in an area. Research work leads to a greater awareness of the

recent literature and its implications, and this leads to changes in curriculum, particularly at advanced levels. Critical thinking is a key skill that we wish to develop in our students and research is one of the best ways to develop it in ourselves (and our research students) so that we can better demonstrate it to others.

Being actively involved in research requires that I keep up to date in several broad research areas. This enables me to teach material, even at a low level, which is in line with current thinking/understanding in those fields. In addition, for advanced courses (particularly 400 level) the depth of understanding and knowledge of detail required for teaching is gained from research in that field (and the associated interactions with the international research community).

Research activity has facilitated a 'dynamic' approach to development of teaching programs and laboratory courses. 'Discovery through research' enhances one's own perception of principles that need to be conveyed to students. It broadens the scope of practical examples that can be included in lectures. The writing of research papers hones one's communication skills. Research experience is essential in creating meaningful laboratory courses that develop relevant practical and theoretical skills.

In CHEM466 a lot of the material is based on my interest in EPR. A lot of time has to be spent on getting the students to a suitable theoretical level before discussing the latest literature. Our work is mentioned as examples along with the most recent work. The intimate knowledge of the subject is important in choosing the material for the course. A knowledge of what you don't know about the subject is also important. This is often lacking in people who teach only from a textbook.

2.   On a scale of 1-5 (1=never, 5=very frequently) indicate the extent to which you refer to your current or recent research results in your teaching at the following levels (enter n/a if you are not involved at any particular level).

The following are the averages of the number of responses (in brackets) given for each level of instruction.

100   1.6 (9)
200   2.1 (10)
300   2.7 (10)
400   3.7 (10)

The following comments were appended in two responses to Question 2.

NB this includes indirect reference to my research such as the skills and experiences that I have acquired. This make me appreciate the research of others. This is a very important point that many people seem unaware of.

It is not about referring to specific experiments...its about knowing the subject the players what drives them...what they are thinking...where it came from....this is what doing research gives one.

A quote: " I don't see how I could "teach" at the University if I wasn't a researcher. The exercise reflected in these questions seems to me to follow a very typical pattern

of establishing a spurious dichotomy (teaching/research) and then tautologically attempting to resolve the question of their relationship- i.e. because they're separated this poses the immediate problem of how they are "related". If they're not considered to be so distinct, the question of their "link" becomes less intelligible."

3.   Give an example of your use of your current or recent research results in your teaching at each of the following levels (where applicable). (I am assuming that 'your' results are very likely to be those of your research students.)

100
- The question is too narrow. I usually mention interstellar clouds somewhere (CGF/MJM), also the atmosphere of Venus (my own stuff), modern quantum chemistry (RGARM), maybe polymer research (GR). These topics are not covered in any detail but they are mentioned in order to illustrate how points of theory are applied in practice.
- NMR of compounds that we have made
- When I teach material in which I have a research interest, I mention this.

200
- At this level I tend to refer less to results than to techniques I have used and experiences I have had with particular reactions.
- As for 100, with likely addition of electrode kinetics (AJD), flames (my own past research), maybe oriented molecules (PWH)
- treatment of aids
- Fast flow reactors and/or uv or electron pulse techniques in kinetics (CHEM 263).
- Use of recently characterised complexes as examples.
- Development of new laboratory experiments.
- Mention of radical-radical reaction rate constants when describing diffusion controlled second order reactions. I don't claim results as mine nor do I mention my compilations of data on this subject in the literature.
- CHEM 255 (as it was when I last taught it) spectroscopy of matrix-isolated benzene used to illustrate vibrational progressions in electronic spectra

300
- Some topics I teach are in areas I have worked in. I occasionally discuss reactions or compounds I have utilised as examples illustrating lecture material.
- As for 200, with the addition of matrix isolation spectroscopy (BEW), lasers (my own work), esr spectroscopy (RFCC), fast-flow kinetics (CGF/MJM), kinetic modelling (my own programs), flash photolysis (my own stuff again).
- CHEM 363 Spectroscopy of NH, TiO radicals as illustrative examples
- CHEM325 is based on my experiences and knowledge about medicinal chemistry. The course would not exist without my research experiences and interests. This makes me aware of, and appreciate the research of others.
- As for '100' above, except that I also mention that the "textbook" description is an oversimplification, and the real situation is more complex (and therefore more interesting!).
- The use of SIFT technique to study very rapid processes (ion-molecule rns) (CHEM 313).

- Use of a recently isolated peroxodicobalt complex in an exam question relating to binding of dioxygen (hemoglobin models) and then discussing it in following years as an example of some classic cobalt chemistry.
- In CHEM324 I describe and discuss the indirect voltammetric determination of Al using methods research by Kip and myself. (Downard, A.J., Powell, H.K.J. & Xu, S. Voltammetric determination of aluminium(III) using a chemically modified electrode. Anal. Chim. Acta, 1991, 251: 157-163; Downard, A.J., Powell, H.K.J. & Xu, S. Flow injection analysis of aluminium(III) using indirect amperometric detection. Anal. Chim. Acta, 1992, 256: 117-123; Downard, A.J., O'Sullivan, B. & Powell, K. J. A voltammetric study of the aluminium complexes of catechol and 1,2-dihydroxy-anthraquinone-3-sulfonic acid; Downard, A.J., Lenihan, R.J., Simpson, S.L., O'Sullivan, B. & Powell, K.J. The aluminium(III)-4-nitrocatechol system: potentiometry, voltammetry and application to the determination of reactive aluminium. Anal. Chim. Acta, 1997, 345: 5-15.)
- Development of new laboratory experiments. Class tutorial exercises on Speciation, using locally produced programs.

400
- As with 300, but the topics lectured are closer to my interests and the opportunities are greater.
- As for 300. Also I use my own programs to illustrate applications of statistical mechanics, sometimes talk about my own calculations to illustrate phase space theory, mention applications to my colleagues' research wherever possible.
- CHEM 466 two lecture section of MCD spectroscopy
- Biosynthesis of vitamin B12. This course is totally research based – the work of others but without my research experiences it would mean nothing!
- The application of SIFT technology to trace gas analysis (CHEM464)
- As an example of the use of radical clocks (in relation to mechanistic studies on cyctchrome P450 where radical clocks have been employed).
- In CHEM464 describe and discuss the screen printed electrode/portable fractionation device developed by Kip and myself (Akhtar, P., Devereaux, H.A., Downard, A.J., O'Sullivan, B. & Powell, K.J. A portable fractionation device and screen-printed electrode for measurement of reactive aluminium in environmental samples. Anal. Chim. Acta, 1999, 381: 49-60) as an example of portable electrochemical systems for field work.
- Many aspects of analysis in the natural environment - experience with voltammetry, humic substances, speciation modelling .
- Much of the material in the latter half of CHEM466, is based on material we have produced or that produced by colleagues working in similar areas. The discussion of the determination of precise parameters for defect centres is based on our work, especially the measurement of high-spin terms arising from time reversal. As above, I do not mention that the numbers theory is ours. The students can find that out themselves if they look at the literature quoted.
- In CHEM467 the NMR spectra used to illustrate the various techniques are always ones which have recently been acquired in the Department.

4.   On a scale of 1-5 (1=never, 5=very frequently) indicate the extent to which you refer to results (not in text books) from the international research

community in your teaching at the following levels (enter n/a if you are not involved at any particular level).

The following are the averages of the number of responses (in brackets) given for each level of instruction.

100   1.6 (7)
200   2.3 (9)
300   2.9 (9)
400   3.2 (9)

The following comments were appended in one response to Question 4.

This is what my lectures are about.   Besides I wrote the books! that form my lectures. I put them in the international arena, and I worked with the best in doing so. The book I did with Sir Richard Norman took perhaps 5000 hours of my time and at least the same amount of his. Bloody near killed me! He had been chief scientific advisor to the UK government on defence and on energy and rector of Exeter college Oxford. He knew stuff! The interaction with such a great mind constitutes research in communication in any one's book. This is what university teaching is about

 5.   Give one example of how you teach research skills in any course you are involved with.

Until recently I have been extensively involved in teaching library skills. The choice of problems assigned are usually heavily based on past research experience, usually my own, but sometimes that of colleagues.

Only in the course of supervising final honours-year projects. The students at lower levels are seldom capable of doing original research in physical chemistry - the gulf is too great.

Combination of group theory, quantum mechanics and spectroscopy used to understand the vibronic spectra of benzene. Shows very elegantly how these techniques dovetail in research

Research and teaching are very different: teaching is about answers, research is about asking questions; teaching involves a limited amount of time, research about unlimited time (because the answers are unknown). So it's almost impossible, by definition, to "teach" research skills in undergraduate courses. Such as one can manoeuvre students in the direction of research, it is by doing things like mentioning that all the answers aren't known, raising perplexing questions which lie tantalizingly beyond course curricula, and giving problems where the answers aren't obvious and require lateral thinking.

Application of scientific method and the need to obtain reproducibility in measurement (CHEM 282).

I am introducing critical discussions of research papers (and the experiments therein - why they were done, what they may or may not tell us, alternatives) as part of the tutorials that we have introduced at third year, and I am trialling it in my 4th year class this year with a view to using this kind of thing as a form of in term assessment next year.

In the lab component of CHEM314 (and now undoubtedly in Chem 382) I use a problem solving approach to experimental work attempting to teach the concepts of: formulating a problem, developing an experimental strategy, analysing results, interpreting results etc. Many of the analytical experiments are designed to promote this approach. The experimental techniques taught in this and all labs can be viewed as practical research skills.

In a lecture and tutorial context, students learn the theory of speciation in natural waters and then have practical experience in 'computer labs' in solving relevant problems.

6. Indicate any recent participation in the professional development of your teaching (other than ERAU organised sessions - ERAU will provide that information).

Does 40 years' experience count for anything? If I had time to spare I could prepare fantastic Powerpoint presentations and handouts for every class. But at some stage the students would still have to learn to work on their own, unsupervised, with no assignments or grades.

"Buddying" with ****** in Physics. Does that count?

Attendance at international conferences and meetings.

None (apart from constant discussion with fellow academics about how courses can be improved!).

Member of international committee that is advising IUPAC on development of a strategy for supporting delivery of chemistry education. Attended library courses on use of the web and on use of Science Citation Index.

7. Make any additional comments which you think may be helpful in establishing the importance of the link between teaching and research, and which are not related to the above questions.

Research tends to involve the use of state-of-the-art technology not widely available to students when they take up employment. However it subsequently becomes available, and if we did not have an active research program, we would not have these facilities available, as their cost could not be justified on a teaching-only basis.

Teaching which is not informed by research soon gets into a rut. Experimental work is best for keeping a lively and skeptical outlook, theoretical work is better than

nothing, it is possible to maintain a decent standard for a limited time purely on the basis of reading Nature and Science and Accounts of Chemical Research and The New Scientist, etc., but eventually this reduces to teaching science as a dead language, which it is not.

Without research we are simply school teachers. Most of my teaching is based on my experiences and knowledge about my discipline. Many of my courses would not be meaningful without my research experiences. My research makes me aware of, and appreciate the research of others.

I'm actually a bit of a maverick when it comes to the link between teaching and research: I don't believe there are any important links. The best researchers are often atrocious teachers, and the best teachers often are inactive in research. Turning it around, it is a proven fact that the best research is done in non-teaching research institutions (the German government formally established this through long-term analysis of Germany's universities and Max Planck Institutes; also, consider the RSC ANU, a non-teaching research organization which is in the top 50 chemistry research institutes in the world, with no other southern hemisphere institute in the top 300). So this is actually evidence that teaching duties diminish the quality of research that is possible. The above is not to say that teaching and research should not exist together; it's just that I believe that neither particularly helps the other, and they can exist independently.

Most of the questions relate to the importance of research in improving teaching. There is also an important (but often overlooked) role of teaching in improving research. The act of teaching something properly involves presenting the different ways of looking at a topic, and being able to see things from a different point of view is often critical to understanding the questions that students ask us in our courses. Major steps in research can result from looking at a problem from a different point of view, so that the practise that we get from teaching may improve us as researchers.

We should not overlook the teaching we do one-on-one with research students - sometimes at a very basic level when a hole in their academic background is revealed.

Subjects with a laboratory component are particularly dependent on a research ethic. Neither the selection and design of user-friendly laboratory experiments nor the delivery of the course by informed and experienced staff and demonstrators would be possible without in-house research experience.

8.   (This question is not directly related to the issue of the teaching-research link, but answers might be very useful at this stage in describing the research ethos of the Chemistry Department.) Give the two or three most important reasons why this Department has such a strong research reputation.

The reputation of a department comes primarily via word of mouth, i.e. is unsolicited. Outside New Zealand this is primarily a consequence of the quality of our post-docs. This is the fortuitous result of a system where virtually all our good students are retained rather than being lost to institutions with higher reputations, as is common overseas, coupled with a shortage of resources that prevents us offering financial support to less well qualified ones.

The Erskine fund also makes a major contribution. It does this in two ways. Firstly it reinforces the word of mouth process, in that we have an increasing number of fellows in various parts of the world who are familiar with our department. Secondly, it has, more recently, by taking pressure off our own resources for travel, permitted more members of our department to travel to conferences, and discuss their work.

There is also a synergy between the Erskine visitors and our former students travelling abroad. Currently many of our Ph.D.s take up postdoctoral positions with former Erskine fellows, and in the past, many of our former Erskine fellows came here as a result of having our students as post-docs.

Vaughan, Parton and Packer. If allowed a few more, I would add Metcalf, Christensen, and Wilkins. They had the right attitude to science and valued the right things, and the first three were in a position to appoint people who would produce the kind of department that they wanted.

We've appointed people with a strong research ethos and with evidence of their ability.

Honours program brings through students who have interest in research ingrained in them. This gives us plenty of "good" research students.

Perhaps most important, it's the well established norm of the department to be an active researcher.

Hardwork, dedication and work ethic (staff and student) - under some threat however! Smart people (staff and students) internationally mobile staff, cohesive environment.

The most important reason, by a considerable margin, is the quality and quantity of the research students. (This is, in fact, the strongest argument for teaching and research coexisting - to ensure a supply of quality research students.)

The research ethos: mutual encouragement, the fact that research has been held in higher esteem than teaching (see comments above), taking sabbaticals, and so on.

The international contacts and outlook, fuelled by the research ethos, and facilitated by departmental policy (e.g. subsidizing conference attendance and promoting the taking of sabbaticals) and the Erskine fund.

The value for money provided by the technical staff.

Because we have hired some good people, put them in a competitive environment, put them in a university that wasn't plagued by the present sort of crap and let them get on with it.

Past tradition; the quality of appointments; the worldwide "culture" of strong research programmes in virtually all Chem. Depts.

A collegial, collaborative atmosphere. An organisational system which allows everyone to do research - particularly from a funding point of view. So far we have dodged becoming a department of the haves and the have nots (those with outside money and those without) which means that everyone gets a go. This one may be at risk if, for example, the ability to fund an open store were to be compromised, or use of instruments and other facilities were to be charged to all users.

Active and excellent researchers are appointed to academic positions; a department-wide belief that research is important; equitable distribution of teaching/admin workloads and funds ensures everyone has some time/money for research; excellent support staff; ...

E.1.1 Summary

Responses from Chemistry staff indicated that the research-teaching link is clear in the laboratory. Research ensures enthusiasm and insight, and a grasp of the subject and its context, which are vital for teaching excellence; it keeps staff looking for new questions to answer, which leads to new problems to excite students. Research work provides a greater awareness of the recent literature and its implications, keeping staff up to date, and this leads to curriculum changes in line with current understanding. Research activity has facilitated a dynamic approach to development of teaching programmes and laboratory courses. Discovery through research enhances perception of principles that need to be conveyed to students. Critical thinking is a key skill, which is best developed through research so that staff can demonstrate it to others.

On a scale of 1-5 (1=never, 5=very frequently), staff were surveyed on the extent to which they referred to their current or recent research results in their teaching. The following are the averages of the number of responses (in brackets) given for each level of instruction:

101   1.6 (9)
201   2.1 (10)
301   2.7 (10)
401   3.7 (10)

The Erskine fund makes a major contribution. There is a synergy between the Erskine visitors and former students overseas, as many Chemistry PhDs take up postdoctoral positions with former Erskine fellows.

E.2 Case study – Research-teaching links in the Department of Electrical and Electronic Engineering

Prof. Richard Duke (HOD) was interviewed by Dr Philippa Mein Smith and Mr Geoffrey Vincent on 10 May 2000. The following summary is a report of that interview.

The research-teaching link is very strong in Electrical and Electronic Engineering, and integral to its work. The most obvious example of the link from the staff's point of view is supervision of Masters and PhD theses. The 24 academic staff supervise an

average of 3-4 postgraduate theses each; in 1999 75 EFTS were supplied by Masters and PhD thesis students.

In Engineering, as in the Social Sciences and Humanities, the key to the link is the University Library (see 6 below).

1. How do you use research in your teaching?

2. **Groups**: At the postgraduate level students have their own formal and informal group meetings where *s*enior students act as mentors to students who are beginning thesis research.

1.2 Formal seminars: A number of seminar series run in the Department. The departmental seminar series includes visitors who can provide overviews which are not overly technical and attract a wider audience. Specialised areas, such as Power Engineering, Information Engineering and Communications, have their own seminar series, where students present to their groups and staff present to their peers.

1.3 Masters courses: There are over 20 Masters courses (see attached list). All are directly informed by research. Students learn from the research of staff and from outside experts in industry and other fields, for example Tait Electronics, Trimble, Swichtec, Canterbury Health.

1.4 Honours programme: There is no 100-level course in Electrical Engineering because of the requirements of the Engineering Intermediate. About 50% of students attempting Intermediate succeed in gaining entry to engineering. Accordingly, there is a rigorous selection programme for Electrical Engineering which itself strengthens the research-teaching link. Electrical and Electronic Engineering is an all-Honours programme. Research informs teaching at all levels, generally through the Department's research ethos, and specifically because staff refer directly to their research in their teaching.

1.5 Inter-departmental collaboration: At the 100 level, collaboration in teaching with the Department of Physics is also steeped in both departments' research ethos. (See electric car, below.)

1.6 Enthusiasm – at all levels - is a key ingredient of the research-teaching link. This enthusiasm for a subject or problem derives from engagement in research activity. Research-informed teaching by staff who are pushing at the boundaries of their respective fields is infectious for the students and shows in the quality of the students' work. This enthusiasm contributes to a high retention rate of students entering the postgraduate programme.

1.7 Specific Examples: The Department's electric car exemplifies the research-teaching link. The car (recently photographed in the *Press*) features in lectures, even at 100 level. After a 6-8 lecture block in PHYS 114/115, students are shown the car and asked how they would design an electric car themselves. The car is used to convey basic principles in mechanics and electricity.

At the 200-400 levels, especially the 400 level, postgraduate students sometimes participate in interactive teaching. After a block of relevant lectures, they may enter the lecture theatre and demonstrate hardware/software which they have developed, show the undergraduate students the research they are doing and link it to the undergraduate lecture material.

At 400 level, as well as Masters level, guest lecturers from local companies such as Tait Electronics – the researchers doing the technology development – give lectures, as do visitors from other organisations such as Medical Physics and Bioengineering at Christchurch Hospital (in Bioengineering).

Students at 200 level encounter a new prototype for an electric wheelchair every year and, through this research exposure, learn about the application of electronics to wheelchair design. An annual solar car race is held at 400 level. Students are given a problem as part of an assignment that they can solve only through electronics. They must do their own research to solve the problem. Another annual project at the 300 level is to build an AM radio, for which they are given a default design; the top 50% of students enhance the default design with their own ideas.

Engineering Design courses from 200-400 level include a range of design tasks. One of the basic design tasks for the 200 level design class in 2000 was to provide electrical systems for a kitchen. This requires visits to kitchen design centres to learn about kitchens. The students make electrical drawings and learn the necessary building regulations through their own research.

3. Do you refer to the international research community in your teaching? How?

International connections are explicit and visible in Electrical Engineering, via the **Erskine Fellowships** scheme. The Department hosts four Erskine visitors on average a year, all eminent international scholars. The Erskine contribution is also relevant to question 1 (above). Erskine visitors give Masters courses or contribute to them, and strengthen industry links, because industry representatives attend seminars to hear these overseas experts.

Another example of explicit international links in the area of microelectronics technology is the Department's ability to utilise staff contacts in California. Every year student design projects involving microelectronic circuits are sent to Silicon Valley where the circuits are realised as hardware chips and returned to Canterbury for testing by the same students involved in the original design process (see *UC Teaching*, October 1999, 6).

4. Do you teach research skills in your courses?

Yes, at all levels. Examples are outlined above.

5. Are you actively involved in research?

The entire Department is actively involved in research. Staff are routinely engaged in cutting-edge research. The endowed Tait Chair in Communications itself is an example of a direct link between research in technology and university teaching.

6. Have you undertaken professional development in your teaching?

This question was not traversed directly in the interview. However it was clear to the interviewers that staff in Electrical and Electronic Engineering are engaged in a continual process of peer review and student review of their teaching, and review by overseas academic and local industry experts.

7. How does teaching inform your research?

In Electrical Engineering, given the nature of the discipline, the link is more the other way round. An excellent example of the teaching-research link, however, is nanotechnology, which features in the first issue of *UC Teaching*.

The resources available by way of the **University Library** are central to the research-teaching link and its strength in Electrical and Electronic Engineering at Canterbury. It is important that the Library continues to be properly resourced.

E.2.1 Summary

The research-teaching link is very strong in Electrical and Electronic Engineering. The most obvious example of the link from the staff's point of view is supervision of Masters and PhD theses. The 24 academic staff supervise an average of 3-4 postgraduate theses each; in 1999 75 EFTS were supplied by Masters and PhD thesis students. In Engineering, as in the Social Sciences and Humanities, the key to the link is the University Library, and enthusiasm derived from engagement in research.

Research skills are taught at all levels. Research informs teaching in a variety of ways: through postgraduate group meetings; seminar series; Masters courses; the Honours programme, with its rigorous selection process; inter-departmental collaboration; networks with local industry; and the Erskine Fellowships scheme. International links are explicit and visible in the Erskine scheme, whose visitors teach in Masters courses and strengthen industry links. Staff utilise international contacts in teaching; all staff are active researchers, and are routinely engaged in cutting-edge technological research.

E.3 Case study – Research-teaching links in the Geography Department

The links between research and teaching were discussed with most staff members. The questions were structured around the policy areas. The questions and a summary of the responses are given below.

1. Do you use your own research in teaching?

All staff responded that they do use research in their teaching. All staff see this as integral part of graduate courses and all staff use elements of their research at undergraduate level (see examples below). However while all staff were explicit about the research being their own at graduate level, not everyone was explicit at the undergraduate level. One staff member who was explicit said that they used their own research to "tickle the fancy" of students and to try and get them interested in research by working with unpublished data.

The links between research and teaching were found in every course and examples for most undergraduate courses are given below. Note that this list is by no means exhaustive – it simply gives evidence of some of the practice by staff in fostering research-teaching links.

GEOG 107 The Restless City
- students are given a laboratory exercise that uses data collected by third year students as part of staff research
- use of slides from own research and case studies from own research

GEOG 108 Resources and Sustainability
- use of slides from own research and case studies from own research

GEOG 201 Physical Geography
- use of slides from own research and case studies from own research
- use of own publications

GEOG 202 Human Geography
- use of slides from own research and use of own data for laboratory work
- use of own publications

GEOG 203 Geography of a Selected Region
- use of slides from own research and case studies from own research

GEOG 205 Introduction to Geographic Information Systems
-use of slides from own research and case studies from own research

GEOG 304 Geography of a Selected Region
- use of slides from own research and use of own data for project and
 laboratory work

GEOG 305 Environment and Society
- use of students in staff research
- use of slides from own research and case studies from own research

GEOG 309 Research Methods in Geography
- use of case studies from own research
- refer students to work in progress (own drafts of papers)

GEOG 310 Climatology
       - use of own publications

GEOG 312 Glacial Processes
       - use of own data for laboratories
       - use of own publications

GEOG 316 Geography and Social Policy
       - use of case studies from own research
       - use of own publications

2. Do you refer to the international research community in your teaching?

All staff members replied in the affirmative and many said they would be concerned if somebody didn't!

3. Do you teach research skills in your courses?

Again all staff replied that they did and a range of transferable research skills were identified. Skills taught include research design, techniques in data collection and analysis, reading, reviewing the literature, writing, critical thinking and developing and presenting posters.

4. Are you actively involved in research?

Again all staff confirmed that they are actively involved in research.

5. Have you undertaken research into the scholarship of teaching or any professional development?

Only a few staff are involved in pedagogical research. Three members were doing such research in relation to new forms of assessment in the department (self-guided trails and geographical expeditions). One other member had done pedagogical research into teaching in their particular discipline when developing a keynote conference presentation on trends in education in that subdiscipline. Finally another staff member had done pedagogical research in the past (more than 15 years ago) but had had difficulty gaining any funding for such research at that time. Two other staff members indicated they would like to undertake this research if time permitted!

Most staff had undertaken professional development through either conference workshops on education or ERAU courses. The Geography Department has in their Triennial Plan, a target of each staff member attending at least one ERAU seminar each year. Furthermore, in the same Plan, there is a target of providing at least one staff contribution into the *University of Canterbury Teaching* publication each year. Two staff members contributed to this publication last year and one article had a theme on research-teaching links!

E.3.1 Summary

It is clear that in the Geography Department research and teaching are inextricably linked. All staff use their own research (although not all are explicit about the source of the research) at undergraduate and graduate levels. However there is more emphasis on the explicit use of staff research at the graduate level. The most common means of using staff research in teaching was through case studies and slides from their own research as well as using their own publications and the use of their data for laboratories and projects. All staff refer to the wider body of international research in their teaching and all staff are actively involved in research. As well as having an explicit undergraduate research methods course (GEOG 309), a range of research skills are taught throughout the curriculum. Although most of the survey questions targeted the links between research and teaching several staff members volunteered information as to the link between teaching and research. They commented that often through their teaching they became aware of "gaps" in knowledge which stimulated them to do research.

Although most staff undertake professional development in terms of teaching, only about a third are involved with pedagogical research. However other staff commented that they would like to undertake this research if time permitted!

E.4 Case study – Research-teaching links in the Department of History

Two-thirds of the permanent academic staff, including Prof. Miles Fairburn (HOD), responded to questions about the research-teaching link. Key findings are, first, that the research-teaching link is strong in History, as in other departments, and integral to its work. Second, the link flows both ways in this department. Third, enthusiasm for a subject is more readily conveyed to students by staff who are engaged in the excitement and complexities of research. A summary of responses is given below.

1. How do you use research in your teaching?

1.1 All levels: Prof. Fairburn responded that `It saturates all my teaching', and other staff members agreed. All use research in their teaching, in undergraduate as well as graduate courses. The progression of the research-teaching link from 100 level to 400 level (Honours) can be seen in the Department of History's *skills development programme*. (See document, `Moving Towards a Skills Development Programme Unique to Canterbury.) At the Masters and PhD level, the Department runs a special *thesis writers' seminar programme*. This series of weekly seminars engages postgraduate students in discussions about issues encountered in the thesis writing process. (See seminar outline.)

1.2 Undergraduate: Contributions to the team-taught undergraduate New Zealand history courses are based on the team members' research. Staff use their own publications judiciously, mindful that students must always have access to alternatives – given the goal is to promote critical inquiry. Across the department, courses are constantly revised and new courses offered in order to incorporate the latest research. Examples are given below.

HIST 126 Migration and Identity in the Pacific Islands
- Research into the nature of colonial empires and settler societies forms a platform and determines the model for teaching students about the historical patterns of migration and identity formation in the Pacific region.

HIST 128 Warriors, Maidens, Sheilas and Jokers: An Introduction to New Zealand History
- A historiographically-driven, new course (unique to Canterbury), based on the latest published research.
- Title from seminar paper by the convenor on the resettlement of New Zealand as colonial space. Lecture themes from books, articles and chapters by team members, eg the nature of 19th century settler society and its atomised character – from M. Fairburn, *The Ideal Society and its Enemies*; soldiers and mothers from P. Mein Smith, *Maternity in Dispute*, and D. Denoon and P. Mein Smith, with M. Wyndham, *A History of Australia, New Zealand and the Pacific*; state and citizenship – from G. Dunstall, *A Policeman's Paradise?* Maori – from A. Parsonson in *Oxford History of New Zealand*, articles, and iwi research (Treaty claims and settlements).

HIST 129 Our Nation our Past
- another new course in 2000, which focuses on the dramatic changes of the last 30 years and puts them in historical context. Use of staff research, as above.

HIST 130 Medieval Europe
- topics shaped by staff research interests, eg convenor's interest in epidemic disease has led him to delve beyond secondary sources on the Black Death.

HIST 242 Histories of Aotearoa me te Waipounamu
- designed to familiarise students with a rapidly developing body of research (some published, much unpublished) in the field of iwi/Crown relations over the past 160 years. Draws on lecturer's primary research.
- The convenor (course designer) has written a number of major unpublished reports in respect of iwi claims against the Crown, drawn on in courses in New Zealand history, Aotearoa (over the past decade), and at Honours.

HIST 243 Inventing Kiwi Culture
- Introduced in 1993, it remains unique among History courses nationally.
- Shaped by staff research interests; includes research-based guest lectures.

HIST 247 Emancipations
- Draws on convenor's research on democratization and on Marxism.
- In turn, lectures will lead to publications.

HIST 237 Old Europe and Revolution 1750-1870
HIST 357 The French Revolution 1789-1799
- PhD on eighteenth century British foreign policy used as a springboard for teaching.

HIST 334 Modern Australia and New Zealand
- Draws on one lecturer's research into race relations and racially exclusive forms of democracy, and the other's into comparative and interactive Australian and New Zealand history.
- Has contributed to a new book in the Blackwell History of the World series, *A History of Australia, New Zealand and the Pacific*, which in turn will provide a reference text for the course. This new work will then provide a base for course revision.

HIST 362 20th century New Zealand Social History
- almost entirely focused on the problems tackled in a related Marsden project.

HIST 332 Asian Empires
- Students use some of the convenor's publications as an introduction to issues of periodization in Asian history.
- Students are introduced to the comparative analysis of Asian and European historical issues, such as state formation, through direct references to his research.

HIST 364 America and the Cold War
- uses convenor's book, *Destroying the Village.*

1.3 Honours:

All 400 level courses are based on the historiography in their respective fields, and within these on staff areas of research expertise.

HIST 450 History as a Discipline – staff draw on their research experience.

HIST 443 Issues in New Zealand History – directed to determining the major frontiers of future research in New Zealand history, some of which staff are working on or intend to work on.

HIST 424 Rangatiratanga and Sovereignty: The Interface – draws on the convenor's research for iwi claims before the Waitangi Tribunal and iwi settlements with the Crown. Teaching is shared with an expert negotiator who directly contributes his research and experience in Treaty issues. Working with iwi claims has facilitated access to other primary research material completed by iwi, Crown and Tribunal staff in respect of many claims over recent years, which has enabled the convenor to draw on new research in much of her teaching, often highlighting different ways of interpreting the past. Students gain insights into the Waitangi Tribunal's processes from direct participants.

HIST 429 Social History of Medicine – convenor is on the Editorial Board of the journal, *Social History of Medicine*. The course draws on her books *Maternity in Dispute* and *Mothers and King Baby*, as well as the wider historiography in the field and where this overlaps with other areas relating to health and history.

HIST 436 Public and Applied History – is based on the convenor's expertise in the area. Eg research for over a dozen entries in the *Dictionary of New Zealand Biography* has enabled him to direct students to local sources for biographical

exercises. Supervision of the major research essay – the major piece of coursework – is enriched by research from local sources for his books *Black November* (on the 1918 flu), on St John Ambulance, the new illustrated history *Christchurch Changing*, and a forthcoming biography of Heaton Rhodes. His involvement with the DNZB, ARANZ, PHANZA and the NZ Historic Places Trust helps introduce Honours students to the full range of historical research being conducted outside the universities.

HIST 440 Constructing Feminist History – introduces students to the historiography of the field. The course is focused on the convenor's areas of expertise, addressing themes from her PhD, of gender, race and empire, which inform her publications.

HIST 442 History and Nature of Biography – is based entirely on the convenor's 15 years of research and writing of historical biography and his experiments with forms of historical analysis as biography.

HIST 444 International Politics during the Nuclear Age – convenor uses his book and refers to his current book project.

HIST 400 (new course in 2001) Frontiers in Chinese History – relates directly to a book in progress co-edited by the convenor, *Political Borders, Cultural Frontiers and Ethnic Boundaries in Chinese History*.

1.4 Students' research:

Staff frequently refer students to research papers and theses written by past students. This extends to reports in the area of Treaty claims. There is a greater need for reference to students' research in New Zealand history than in most other areas since the published secondary literature on New Zealand is not as rich.

Staff teaching and research benefits from student research, which in turn benefits from staff supervision.

2. Do you refer to the international research community in your teaching? How?

All staff refer to international research in their teaching, all the time, and at all levels. They refer where appropriate to the different sub-disciplines of History, and to the individuals and groups who are associated with important ideas, approaches, and innovations. Lecturers in New Zealand history also refer to international work on comparative themes such as indigenous rights.

International connections are made explicit to students via the **Canterbury Fellowships** scheme, international visitors to the Department, and guest speakers. In HIST 252, a survey course of Chinese history, the convenor uses material from the recently published *Cambridge History of Ancient China*. Since he is also a contributor, this publication represents not only a direct link between his own research and teaching, but also a vehicle to introduce students to an international research community to which he is connected.

3. Do you teach research skills in your courses?

Yes, at all levels. Staff share the view that it is impossible to teach our knowledge and notions of the past without referring to the procedures used by historians who have produced the knowledge and the notions. See the Department's *skills development programme* and *thesis writers' seminar programme*. See also the Department's own *Guide to Writing History Essays*.

At the upper levels, the HOD teaches the methodological capacities and procedures discussed at length in his book, *Social History: Problems, Methods and Strategies*. The Chinese specialist teaches students to interpret Chinese history on its own terms. Only after careful evaluation of traditional explanations and available evidence are students invited to raise the level of analysis to a comparative level. HIST 424 Rangatiratanga and Sovereignty classes are taken to a Ngai Tahu marae, where they give presentations.

Most Honours courses involve research essays in which the students select their own research topic and research design, and convenors comment on drafts.

4. Are you actively involved in research?

All academic staff in History are actively involved in research.

5. Have you undertaken professional development in your teaching?

Staff are engaged in a continual process of self-evaluation, peer review and student review of their teaching. It is common for colleagues to attend and comment on lectures, especially in team-taught courses. Senior staff act as mentors for new and less experienced staff. Since the Departmental Review in 1998, the Department has undertaken a comprehensive curriculum review.

An on-line case study of the research-teaching link: The convenor of HIST 363 Pacific History has received a $5000 teaching grant from the University of Canterbury to develop and teach an on-line module within this course in second semester. It is designed both to experiment with contemporary pedagogical possibilities and to redefine the concept of Area Studies for the Pacific through the questions and debates that are being formulated for this module. These questions have been devised through a series of planning meetings in Hawaii and Fiji (one of which he attended) and will be reviewed in a debriefing meeting in Hawaii early in 2001 after the course has been taught on all three campuses.

6. How does teaching inform your research?

6.1 Designing new courses, or redesigning existing ones, is a stimulus to research by prompting questions.

6.2 Teaching provides the self-discipline and rationale to grasp an area of historiography; comprehending the literature in the field allows staff to establish whether interesting problems remain to address in that area; and determining

whether there are such problems, and if so, what, is an essential preliminary to research.

6.3 Teaching provides the opportunity and framework for the trialling, development refinement and testing of new ideas. The whole exercise of presenting and communicating them to students obliges staff to think them through, to look closely at their supporting arguments, to reflect on their architecture and substance, and ascertain where they need to be modified. By encouraging students to ask questions about these ideas, staff are often better able to see where weaknesses lie and even whether proposals should be rejected.

6.4 The process of communicating new ideas to students helps staff become more familiar with them and thus aids the whole business of writing about them.

6.5 Examples:
Staff have produced articles and chapters from lectures. The co-authored book, *A History of Australia, New Zealand and the Pacific* (Oxford: Blackwell, 2000) was greatly influenced by teaching in undergraduate courses in Australian and New Zealand history and in turn provides a resource for teaching. (On the related research project, see *UC Research*, Dec 1999/Jan 2000, 55.) A book for HIST 361 Heroines in History is under construction by the convenor. The convenor of Chinese history is writing a textbook for courses that incorporate Asian history (like HIST 123 Global History), which places medieval Asian history within a world history context. This kind of research does not merely fill a gap, but opens up new areas of research by responding to new teaching areas. The production of pedagogical tools is a valuable way in which teaching can inform active research.

E.4.1 Skills Development Programme in History

This section describes the Skills Development Programme in History.

A. The nature of the skills
1. information gathering
2. basic scholarly conventions
3. comprehension and precis writing
4. analysis
5. evaluating arguments (critical reasoning)
6. writing
7. presentations
8. historiography (concepts, theories, traditions in the historical literature)
9 handling primary sources

B. The shape of the programme

YEAR ONE
managing your work and time
locating information (using the library, electronic finding aids etc)
comprehension and precis writing (i.e. based on a mix of primary and secondary sources)
 - note-taking

- how to make sense of difficult texts

analysis
   - identifying the component parts of an argument and how they fit together
   (i.e. its design, composition, structure)
   - identifying its theoretical assumptions [?]

the elements of the historian's craft
   a. recognising the different modes of historical writing
   b. basic scholarly conventions (referencing, bibliographies, plagiarism, and
    quotations)
   c. understanding historical debates
   - debate as a central part of the discipline; specifying where rival
    interpretations crucially agree and disagree.
   d. concepts and theories
   - terms more or less specific to the discipline

essay writing

<u>Practice</u>

Small written exercises and oral presentations in tutorials; essays later in the course.

YEAR TWO

   continuation of yr one skills
   critical reasoning I

Evaluation of the argument applying the criteria of
   - adequacy of the empirical evidence (as given in the text itself)
   - adequacy of the logical reasoning

   historiography I
   - basic concepts and theories
   - locating historical issues in the context of the historical literature

   handling primary sources I
   - matching the claims in secondary sources against the primary

<u>Practice:</u>

Small written and oral exercises in tutorials; essays

YEAR THREE

   continuation of yr one and two skills
   presentations: introduction to seminars
   critical reasoning II

Evaluation of the argument by applying the criteria of

- explanatory power/coverage
- testability
- sensitivity to the cultural context of the time

   historiography II

- detailed familiarity with classic or landmark texts (i.e. those germane to the course)

   handling primary sources II
      - historical imagination : creating interpretations from primary documents and
      avoiding arbitrary interpretations
      - exploring and assessing non-written primary sources

<u>Practice:</u>

The same as for year two

HONOURS

continuation of skills in previous levels
gathering information
        - basic research techniques
critical reasoning III
        - comparatively appraising rival accounts
historiography III
        - in-depth study of particular historical genres relevant to the course (eg
        microhistory, Annales history, psychohistory, biography, etc)
handling primary sources III
        - external methods of textual scholarship (assessing the reliability of
        observations in primary sources)
    career implications (e.g. scholarships)
Practice:
major research exercise based on primary sources or historiographical in nature

E.4.2 Thesis Seminar Writers Programme

<div style="border:1px solid black;">

**DEPARTMENT OF HISTORY
SEMINAR PROGRAMME FOR ALL NEW
M.A. AND PH.D. THESIS STUDENTS
- A PRELIMINARY OUTLINE**

</div>

1.   **Introduction:** how to **present seminars**; **supervisors,** regulations, department facilities – 28 February – **Philippa**

2.   **Finding sources** and acquiring background knowledge – 6 March – **Philippa**

3.   **Note-taking** and organization - advice and strategies – 13 March – **Philippa** Includes session in **Library – using the Web – Max Podstolski**

4.   **Basic scholarly conventions** – 20 March – **Nicola**

5.   **Compiling electronic data bases** – 27 March – **Anna**

6.   **Interview methods** (doing oral history) – 3 April – **Katie**

7.   **Using non-verbal** primary sources (eg photographs) – 1 May – **Geoff**

8.   **How methodology** can go badly **wrong** – 8 May - **Miles**

9.   **Introduction to sampling** – 15 May – **Irene Hudson**

10.   **Reliability of sources in cross-cultural research** – 22 May – **Peter**

11.   **Qualitative** methods of **confirmation** – 29 May - **Miles**

12.   A guide to **varieties of explanation** – 10 July - **Miles**

13.   Methods for **comparatively appraising rival theories** – 17 July - **Miles**

14.	Methods for **interpreting primary sources** – 24 July – **Miles, Nicola**

15.	**Personal accounts** of the **research experience** – 31 July – **Philippa, Vincent**

16.	**Writing** the **thesis** – 7 August – **Philippa, Vincent**

17.	**How** to **obtain publications** – 14 August – **Philippa, Vincent**

NOTE:

(i)	All new M.A. and Ph.D. thesis students are expected to attend.

(ii)	The weekly seminar will be on **Mondays, 10 a.m. - 12 noon,** in **Room 212**.

(iii)	Inquiries to **Philippa Mein Smith**, Room 211, ext 6462; email: p.meinsmith@hist.

E.4.3 Summary

The research-teaching link is strong in History, and integral to its work. The link flows both ways in this department. Staff emphasised that enthusiasm for a subject is more readily conveyed to students by lecturers who are engaged in research. All staff use research in their teaching – research saturates the department's teaching. The progression of the research-teaching link from 100 level to 400 level is outlined in the department's skills development programme, and at postgraduate level in the thesis writers' seminar programme. Courses are constantly revised and new courses offered in order to incorporate the latest research. The commonest use of staff research in teaching is through a focus on problems and issues addressed in research, and examples, frameworks and models drawn from their own research and publications. In History there is a two-way link between book writing and course design. Commonly, a book leads to a course, and/or a course to a book.

All staff refer to international research in their teaching, all the time, at all levels. Staff frequently refer to students' research in New Zealand history more than in other areas. A consensus emerged that teaching is a stimulus to research by prompting questions, determining problems, providing the opportunity and framework for the testing of new ideas, communicating ideas and writing about them. In an on-line case study of the research-teaching link, a Pacific History course is being taught simultaneously at three universities both to experiment with pedagogical possibilities and to redefine the concept of Area Studies for our region.

E.5 Summary of departmental case studies

There is strong evidence of research-teaching links at the departmental level. Each department surveyed commented that research-teaching links were strong and these links were expressed in a variety of ways. Staff enthusiasm for research is central to the research-teaching link and is seen to be vital for teaching excellence. Different

teaching methods such as lectures, laboratories, field work and postgraduate supervision provide opportunities to foster the link. The value of the Erskine Fellowships was also commented on by departments as making a major contribution to research-teaching links. Research work also provides a greater awareness of the recent literature and enables courses to be kept up-to-date. In addition, teaching acts as a stimulus to research by prompting questions and providing the opportunity and framework to test new ideas.

APPENDIX F: Staff Survey on the Research/Teaching Link in Undergraduate Courses

F.1 Summary of staff responses

On the 8th May an e-mail questionnaire relating to aspects of the research/teaching link was sent to all academic staff at Canterbury. Section three of the questionnaire sought information on the nature of the link in undergraduate courses. By 23th May 71 responses had been received. Staff were asked:

Outline briefly how you make explicit the research ethos of your discipline in undergraduate courses (we have some evidence of this from departmental reports but would value individual responses).

Responses are summarised below.

Illustrative use of research in teaching

Illustrating lectures with results from/methodology of own research & other cutting edge research at Canterbury & elsewhere (some explicitly include graduate students here). Use of real world research 'stories'	29
Using examples from research literature to illustrate importance of basic concepts & to introduce students to way in which research is communicated	6
Demonstrating the value of interdisciplinary research in teaching	1
Use of displays of original data, sometimes from local unpublished research to illustrate teaching; use of case studies from research projects	2
Draw explicitly on own published research on research design issues	1
Teaching draws on archival material which is communicated to students through researcher's translations	1
Using a computer based teaching system (the result of own research) in courses	1
Read widely in current literature to convey up-to-date information	
	1
Comparing research findings (eg, NZ/USA)where they may differ/conflict Introducing 100 level students to relationship between theory & application	1
Personalising research by showing slides of local students/staff engaged in research or naming postgraduate research students (recognition of peers & role models)	2
Emphasising importance of sound research, using egs of where common sense/opinion & research deviate	
	2
Critiquing of all research methods designed to discover 'Truth'	
	1

Explicit teaching of research methods/involving students in research processes

Explicit teaching of research methods; discussion of role of research & appropriate research design, developing research question, lit review, practical research tasks, ethics	10
Student research projects	7
Students expected to read & critique original research papers (300, 400)	4
Programme of graduated skills instruction from first year to Hons	1
Directing students to primary source material, encouraging students to work from primary sources & use them in written & oral presentations	1
Material from student projects becomes part of the Canterbury Corpus database & is available to students in the course from year to year	1
Student exhibitions & associated publications	1
Reading of secondary material with a view to students locating themselves as apprentice researchers	1

Laboratory and Field Work

Field projects – discussing field process on-site & engaging in field work	6
Student involvement in laboratory classes	4
In discussions regarding conduct of lab & field experiments & preparation of this material for reports/assignments	1
Nature of course content – introduction to key concepts, methodology & current issues	1

Encouraging a critical inquiry approach to learning

Introducing students to theory comparison	3
Expectation that students will demonstrate independent thought, sourcing of knowledge & application in assignments	2
By teaching science as on-going process of idea testing rather than a bunch of facts	2
Foster a course culture of inquisitiveness and scientific inquiry – students encouraged to critique lecturer's rationale	1
Close scrutiny of experimental research results where interpretation is controversial; close examination of process of drawing inferences from research	1
Introduce students (200level) to areas where theory is not fully developed – look at alternative analyses	1
Studying literature involves always asking questions of that literature, seeing it through new eyes	1
All teaching historiographically driven	1
Compare published interpretations with own (teacher & student) observations & data from additional sources	1
	1

Assessment

Assignment – students review, critique & evaluate a manuscript submitted for publication – including research methodologies	1
Constructing oral presentation & essay assignments around the development of individual research topics	1

Contextualising research

Putting subject in context of its historical development – scientific knowledge not fixed & received but evolving over time	3
Linking lecture topics to real issues in the world where current research is making a contribution; demonstrating application	2
Research related to students' own lives (application of theory to real world)	1

F.2 A personal account of research –teaching links

This section gives a detailed account of the way in which Dr Irene Hudson in the Department of Mathematics and Statistics views and practices research –teaching links. It is reproduced here by permission.

I use research in my teaching at the undergraduate and postgraduate level both within the Mathematics and Statistics department and also in outside departments such as History, Forestry and Engineering where I present postgraduate seminars and lectures on research methods and design.

The relevant external programs are:

♦ ENEL 514, 614 BIOMEDICAL ENGINEERING (P.Bodger@elec - Electrical Engineering)
♦ SEMINAR PROGRAM for MA & PhD thesis students in History department (P MeinSmith@hist)
♦ Wood Technology Group Workshop (J Walker PAMS) and Forestry (R.Sands@fore)

Whilst I concentrate on statistical foundation and methods, in my departmental teaching, I attempt to show all students the relevance of real world statistical application. I find using published literature of my own, across medicine, forestry, psychometry and epidemiology; and of others from international journals; and also illustrations from in-house Honours and PhD theses (usually on-going here at UC) gets student interest. I tend to name the postgraduate students writing up theses, so that there is some recognition of peers and role models.

I also find that providing copies of the actual published paper helps to consolidate the wider research-view. In my teaching I make students aware that I, as their teacher, have worked in many disciplines as a researcher, consultant and also a combination of the latter. I think this provides a role model and assists students to think about the career potential of both statistical research and consulting. I guess my philosophy and

message to students is that good statistics and design are integral to both research and consulting.

Using research in teaching in my opinion, helps motivate the students to critique statistical methods, highlight application, develop their research design skills and develop their awareness of research across disciplines.

I have used my own research at the 3rd and 4th year levels as follows. Research on:

> **Latent trait modelling** in paediatrics and psychiatry to develop and motivate methods for STAT 321 and STAT 315 Multivariate Methods.
> **Empirical methods** to develop modelling methods in STAT 441 (Counting processes).
> **Longitudinal methods** for STAT 321, STAT 315, STAT444 (Longitudinal data analysis) and STAT 441 (Counting processes).
> **Stochastic systems and transient states in weight and lung function** in cystic fibrosis patients for ENEL 514, 614 BIOMEDICAL ENGINEERING (Pat Bodger - Electrical Engineering) and also STAT 441.

Since 1997 I have used my own research and design knowledge in the development of and teaching in postgraduate courses respectively in the History, Forestry and Electrical Engineering departments.

In September 2000 I shall link in with a joint Erskine between Maths/Stats and the Psychology department (J Dalrymple-Alford & Hudson I L) for research and a component teaching link into two 3rd year courses in statistics.

I use **others' published papers** in 3rd and 4th year courses as follows:

> Research design methods in a **Forestry** course at the 3rd year level;
> and also in STAT 312, STAT311, STAT315; and 4th year courses STAT 441 and STAT 444.
> Rank and distribution methods applicable to all *small sample research* in STAT 311 and STAT 313 (Distribution free methods).

I have used **PhD** students' projects at the 3rd and 4th year levels as follows. Use of on-going projects on:

> **Brain maps and depression** (current PhD 1998 -) as an example of multiple mapping in STAT 314 and STAT 321.
> **Epidemiology of dive profiles** (current PhD 1999-) for transient and survival systems by way of an example in STAT 315, STAT 441 and STAT444.

I have used **Honours** students' projects at the 3rd and 4th year levels as follows.

> **Time series methods in the analysis of the incidence of sudden infant death (SIDS) incidence and climate** (completed 1999) in a teaching component of longitudinal methods for STAT 444 and STAT311 and STAT 313.

> ➢ This Honours student went on to pursue a PhD under my supervision and has presented her work at the CSM and prepared one paper from the Honours thesis (Am. Journal of Epidemiology).
>
> ➢ The SIDS Honours project has also motivated a new Honours project in 2000 on inflated count data models with application to medicine and economics.

Non proportional hazards methods in cystic fibrosis (completed 1998) to develop survival methods in STAT 441 and develop computer package utility.

> ➢ This Honours project (1998) lead to a recent Conference Proceedings joint paper and is currently being refereed for journal publication; Hudson, IL and Le Fevre, A (1999). *In: Proceedings* of the first Western Pacific and third Australia-Japan Workshop on Stochastic Models in Engineering, Technology and Management. pp 154 – 165. Sept 23-25, Christchurch NZ.

Stochastic systems and transient states in lung function decline in cystic fibrosis patients (Honours completed 1998) for ENEL 514, 614 BIOMEDICAL ENGINEERING and also STAT 441.

I do teach research skills in all components except for STAT 314 (Theory of inference). I teach students the relevance of proper inference and estimation as applied to AIDS and other disease modelling and ethical issues for randomised controlled trials.

I am actively involved in research with 6 PhD's students in the following areas, as principal(*) or joint supervisor;

       1. Flowering quantification* – forestry and ecology
       2. SIDS* – Maths/Stats and Christchurch School of Medicine(CSM)
       3 Constructs and mapping algorithms* – Maths/Stats, Physics and CSM
       4 Epidemiology and risk analysis – Maths/Stats
       5 Traffic and self similar systems – Electrical Engineering
       6 Mixtures & Flow - simulations – Maths/Stats

I am actively involved in research with 1 MA student in the following area

       7. Voting and women a historical view - History department; joint supervisor with M Fairburn.

My own research on wood anatomy, time series, spatial mapping, longitudinal methods, bio-climatology and forestry provide some impetus for new projects for both postgraduate teaching and also for postgraduate supervision. Possession of real data sets for teaching and supervision is a real plus.

I am also keen to link in students with the Forest Research Institute and other Health NZ centres.

It is my firm belief, based on experience here and at the Universities of Melbourne and ANU that, the integration and consolidation of research and teaching links across departments will prove to add value to both academics and students.

In June I am assisting 2 PhD students financially (sourced from my internal UC grants) to travel to Australia to present papers at the International Australian Statistical Conference July, 2000 . I believe that more financial support should be given departmentally or from registry to assist new PhDs to travel to overseas conferences. As we integrate research and teaching, I believe more research students will present and need this support.

I have obtained professional development for teaching at the Australian National University and the University of Melbourne.

The philosophy and goals of the ENEL 514, 614 BIOMEDICAL ENGINEERING course (Pat Bodger - Electrical Engineering) are;
"to cover fundamental concepts in the application of electromagnetics to medical and biological systems; and their understanding and analysis through physics and mathematics'.

I believe that this sort of multi-disciplinary teaching integrated with research best suits the need to drive both the fundamentals, the applications and the career potential of our students.

I attended the initial 1999 working party meetings for Health studies (J Cameron et al) and I am keen to integrate my health expertise in possible Health Studies teaching, given its benefit and potential to UC and the Canterbury area. This seems a particularly fruitful area for the research-teaching link.

Irene L Hudson

APPENDIX G: Use of Student Research in Teaching

Academic staff were surveyed by email regarding their use of research material produced by students, both published and unpublished, for the purposes of teaching in undergraduate and postgraduate courses. The question asked was:

Are you using material produced by students, published or unpublished, for teaching purposes in any of the postgraduate or undergraduate courses in which you are involved? If yes ...
a) Is the research in question a thesis, or published material taken from a thesis?
b) Please provide details of the paper(s) in which the item(s) is/are being used

Forty-three staff members, drawn from the Faculties of Arts, Commerce, Engineering, Fine Arts, Forestry, Music and Science, have indicated that they integrate considerable amounts of the research undertaken by students into their teaching.

Several respondents commented on the importance they attach to the link between research being conducted by students and teaching within their particular disciplines. "I think it is important," wrote one senior member of the Science Faculty,

> "to draw attention to ongoing research in the University, to questions currently being asked, and [to the matter of] whether progress is being made. I might say Blank blank is is working on this now and his/her results suggest we may need to look at this problem in a different way … I think knowing that students only a year or two more advanced than themselves are making significant contributions to science is important to undergraduates and an indication of what can be achieved. (I would refer to the graduate students by name since most are known to the undergraduates as demonstrators.)"

Most of the work referred to consisted of postgraduate theses, reports and published papers originating in both. However, strong evidence emerged of material far more diverse in origin being utilised for the purposes of teaching. The nature of the sources in question underlines the point made elsewhere in this report that the connection between research and teaching, though crucial, is principally qualitative and not readily susceptible to quantification. More details on the use of student research in teaching are given in Table G.1.

Table G.1 Summary of responses on use of student research in teaching.

DEPT	COURSES	ORIGIN OF RESEARCH	REMARKS
AFIS	AFIS322 AFIS606	Published papers, Theses, Honours projects	2. The 'pedagogical approach' taken in the Honours courses offered by this Department is 'research focussed,' 'as compared to a more practice-based approach at undergraduate level'.
AMST	AMST321 AMST217	Thesis	1. Thesis writers present results of completed and ongoing research in lectures to undergraduate classes.
CHEM	N/a	Various	1. No specific sources, 'though a lot of material (too numerous to list) creeps in.' 2. Use of students' material: 'Of course … always have, always will … how else do experiments for our labs develop and how else does the content of our lectures arrive[?]' 3. Students' research 'material (examples and results from experiments) in lecture courses and laboratory courses I am involved in, but the material is quite varied, both in terms of the quantity that is used at any one time and its origin.'
COSC	COSC401	See Remarks	1. 'I do use material produced by my postgraduate students in a postgraduate course.'
EDUC	N/a Various	PhD research See Remarks	1. 'Guest lectures in my Graduate Adolescence and Counselling classes: Three PhD students will contribute from their doctoral research.' 2. 'Material taken from a PhD student's field data [is] being used as the basis for a practical class assignment in EDUC621'. 3. 'Most of my 200 Level, 300 Level and postgraduate courses involve some kind of practical project in human learning. For many years students have been required to submit two copies of their report … The copy is retained by the Department, catalogued and filed so that future students can refer to it. The aim was that later students could build upon the research of earlier students. However ... Most students are so busy trying to complete their own assignment that they do not have time to reflect upon how it might fit into a larger corpus of work. Also, some of the handouts which I use are edited versions of student research reports.'
ENCH	N/a	See Remarks	1. 'Hard to be specific, but over the years student projects have contributed a number of ideas to flesh out aspects of my Process Economics course in particular (we have a final year (3rd professional) research project as part of our B.E. (Chem)). So there are connections, which these students can observe.'

DEPT	COURSES	ORIGINS OF RESEARCH	REMARKS
ENCI	Various	See Remarks	1. 'I use material one finds in these, journal papers, conference papers and conference posters, a lot of which is done by students. Equally, a lot of it is done by academic staff and often the distinction is blurred.'
ENEL	N/a	Various	1. 'Papers that have resulted from Postgraduate work. Too many to list.'
ENME	ENME531 Various N/a ENME440 ENME441	Various See Remarks Published material	2. See www.mech.canterbury.ac.nz/courses/enme531.htm 3. 'I have [used] and will use material from student theses, especially those I have supervised. (e.g. numerical techniques in ENCI444 in 1999; ethics material in ENGR110 in 2000.) 4 'Some use of collaborative research between staff and PhD students.
ENGL	ENGL427	Theses, research projects	1. 'In my Honours course I have sometimes asked students to read thesis work done in earlier years by English Dept students; I have also cited one thesis in particular on reading lists at 200 and 300 level. In my Honours course I always refer to research projects completed by students in earlier years as a model for the work that I expect them to do. I am in the process of archiving a collection of this work in the MacMillan Brown Library to make this easier.'
FINA	N/a	See Remarks	1. 'We work as a group, share research and workshop, and critique each other's practices.'
FORE	N/a FORE 214 FORE 615 FORE604	Published papers and theses Theses, reports	1. [38 papers/articles, 3 pieces of software and 1 thesis listed in email.] 'I also illustrate my lectures with results from my students.' 2. 'I incorporate my personal research and that of my postgraduate students into my teaching … particularly [in] FORE 615. My research is so intimately tied up with that of my postgraduates that it is impossible to separate.' [6 articles listed, with reference to 'others'.] 3. 'My research team includes students – their work is used by other members of the team, staff and students.'
GEOG	GEOG201 GEOG415	Published papers, theses	
HIST	HIST442 HIST243 HIST424	N/a Published articles, theses	1. 'I encourage students to formulate one of their course research projects in their own terms. I then use these both as instruments to refine the class's research methods, and as exemplary models for succeeding courses (the best ones anyway).
JOUR	N/a	4 Theses, 1 article	'I draw on several theses and a research paper co-written with one of our students.'

DEPT	COURSES	ORIGINS OF RESEARCH	REMARKS
GEOL	GEOL113 GEOL337 ENCI472 ENGE480 GEOL335 GEOL475 GEOL112 GEOL224 GEOL225 GEOL229 GEOL331 GEOL334 GEOL451 GEOL480	Various	1. ENGE 480: 'results from ongoing research used as examples.' 2. 'I routinely refer to postgraduate student work which is either still in progress or written up in these or Honours project reports.' 3. 'current research within the department, including my own as yet unpublished ideas, makes its way into everything I teach. Only a little at 100 level, and progressively more at senior levels until students become research partners.'
LING	LING402	Published papers	1. 'In my Honours class … a reader is used which contains research work done by a number of my former students, all of it in published form, most of it co-authored with me. Some papers came from undergraduate research projects, others from grad projects and a couple from theses.'
MATH	STAT311 STAT313 STAT314 STAT321 STAT315 STAT441 STAT444 ENEL514 BIOT614	See Remarks	1. 'I have used PhD students' projects [and Honours students' projects at the 3rd and 4th year levels'.
MGMT	MSCI454	Published papers based on, or developed from, thesis work.	
MUSIC	N/a MUSI235 MUSI464	See Remarks Thesis (in preparation.)	1. 'The material is a bibliography on writings about Maori music, together with definitions of types and uses of Maori chant as accompaniment to transcriptions of waiata. Title: V. Simmons, 'An Introduction to Maori Chant,' unpublished. 2. 'PhD student researching music education in primary schools lectures/tutors in this at 200 and post-grad levels.'
PAMS	PAMS204 PAMS304 PAMS454 ENVR401 BIOL301 N/a PAMS202 PAMS204 PAMS304 PAMS456	Theses and published papers See Remarks Thesis	1. '[I] use thesis work (actually start using it even before the thesis is finished in some cases) and once the papers come out I start using [them]. But the very recent stuff is the most exciting.' 2. 'I mention [to undergraduates] the type of work my research students are doing/have done when appropriate in order to indicate that things go on here beyond the lecture hall and teaching lab and try to grab their interest. Also, my research students demonstrate in my labs.' 3. 'Thesis – to be published soon.'

DEPT	COURSES	ORIGINS OF RESEARCH	REMARKS
PHYS	ASTR112 and others.	Theses	
PSYC	PSYC412 PSYC338 PSYC339 PSYC424 PSYC208	These and Honours projects, some published material therefrom. Various Classwork	1. 'Some is from unpublished theses, other material is from publications arising from theses.' 2. 'Students in PSYC208 complete a research project as part of their course assessment.'
SOCI	SOCI429	Theses	
SPTH	SPTH221 SPTH321 LING303 ENGL326	See Remarks	1. 'In LING303/ENGL326 we get students to do two research projects. The material from each project (together with other material) becomes part of the Canterbury Corpus data base and is available to the students in the course. Each year students refer to the work that has already been done, both in choosing their own projects (for project 2) and in analysing the data they collect. In SPTH221 and SPTH321 I am about to use material prepared by an undergraduate student as an explanation for a computer programme that other students will be able to use for analysis of clinical data they collect.' [Note from Annual Report from Department, 1999: 'All post-graduate students undertake research with members of the staff. This is a departmental expectation.' (List of recent collaborative publications resulting therefrom provided by Dr Harfield.) See author of table for details.]
ZOOL	ANTA101 ZOOL202 ZOOL301 ZOOL464 ZOOL465 ZOOL477	See Remarks	1. ' The student work is all from Hons, MSc or PhD work and has been written up as theses and reports. Some … has been published in peer reviewed international journals.'

APPENDIX H: Pedagogical Research by Staff

On the 8th May an e-mail questionnaire relating to aspects of the research/teaching link was sent to all academic staff at Canterbury. Section one of the questionnaire sought information on the involvement of staff in pedagogical research. Twenty-five (of the 71 respondents) indicated involvement in research into teaching/learning. Staff were asked:

Are you undertaking (or have you recently undertaken) research into aspects of teaching in your discipline (ie pedagogical as opposed to disciplinary research)? If so ...
a) Briefly describe the nature of the research
b) Give an indication of any reports/publications/other outcomes arising from this research

Responses are summarised below.

Department	Nature of research	Outcomes
Computer Science	'Digital lectures' 'Unplugged project' (see www.unplugged.canterbury.ac.nz)	7 publications
Fine Arts	Involvement in experimental research forum into questions on the epistemology of art (involves 6 international scholars in the field of art education theory	3 meetings in open forums Papers being prepared for publication
Geological Sciences	Investigation of patterns of student cooperation in group work	Publication planned
Asian Langs.	Chinese language teaching materials for mature students	Chinese textbook published
Chemistry	Co-supervised M.Sc.Ed. thesis on Effects of Unit Standards & NZ Curriculum changes on teaching of Chemistry in secondary schools Co-editor of CHEM NZ – chemical education publication	3 publications (one from supervisor) Covers a range of pedagogical issues at secondary & tertiary
Chemical & Process Engineering	Lecture feedback, assignment feedback, short surveys, liaison with schools re content	2 publications in submission (Int. Journal of Eng. Ed.)
Music	Member of panel writing music tasks for national monitoring of children in music in years 4 & 8 Survey of music students	Postgraduate students have written critiques of this research for U of Otago as part of course work – results published Being used as a basis for work by 2 students at 300 level
Plant & Microbial Sciences	Informal survey of student response to new labs	Copy forwarded to ERAU

Department	Nature of research	Outcomes
Plant & Microbial Sciences	Peer assessment of student talks as an experimental method (PAMS/ZOO 304)	
Management	Investigated relative importance managers place on various skills when hiring management graduates & compared these to staff & student perceptions of the relative importance of these skills	Article in Journal of marketing Education
History	On-going reflection on teaching – not quantifiable	
History	Collaborative research with colleagues from 2 Pacific universities into feasibility & planning for an on-line course in Pacific Studies	Major reports anticipated out of the University of Hawaii Internal reports to PVC and TLC
ERAU	Student transition from school to university Student learning support Academic experience of the relationship between teaching and research	1 conference paper 2 conference papers
ERAU	Institutional information on student performance which enables lecturers to place student achievement in a university wide context Departmental use of standard surveys Collaborative research into the student experience at Canterbury	Regular reports ERAU report 3 conference papers ERAU seminar
Mechanical Engineering	The effect of using interactive multi-media technology in teaching	Research in progress ERAU seminar
Mechanical Engineering	Research into the teaching of design and design methodology	
Mechanical Engineering	Investigation into time students are spending on assignments in order to develop a more effective relationship between time spent and outcomes achieved	Information on workload management for department
Mechanical Engineering	The experience of engineering students (particularly women) at Canterbury University Problem based learning in engineering Group learning in an engineering design class (collaborative)	3 conference papers 2 journal papers under review Literature review Book chapter
Computer Science	Investigation into the teaching of the SQL database & the typical problems experienced by students	A computer based teaching system developed Modification of teaching approach ERAU seminar
Political Science	The discourse of citizenship education: a 'compassionate' approach to the teaching of social studies	Conference paper
AFIS	Learning styles & attitude towards subject matter	Previous (related) research under review

Department	Nature of research	Outcomes
AFIS	Assessing the development of essential skills through case study	Paper under revision for Journal of Accounting Education
American Studies	Pedagogical aspects of practice based learning; pilot project established	2 conference papers
English	Reflection on the teaching of New Zealand literature – discussion of rationale & outcomes	Commissioned paper for publication in July
Education	Personally designed & more detailed course evaluations Student monitoring of own learning during the completion of practical projects	 Conference papers utilising student collected data

APPENDIX I: A Report on Research-in-Progress
Jane Robertson (ERAU)

Introduction

This paper reports on a qualitative study-in-progress at the University of Canterbury. The aim of the study is *to identify the qualitatively different ways in which academic staff experience the relationship between their research and their teaching and to investigate the pedagogical implications of this variation.* The research constitutes part of a doctoral thesis being carried out by an academic staff member of the Educational Research and Advisory Unit.

Background

In July 1997 the Educational Research and Advisory Unit (ERAU) at the University of Canterbury published a short review of a recently published article by Hattie and Marsh (1996), *The relationship between research and teaching: a meta-analysis*[1] The meta-analysis found a zero relationship between measures of research productivity and student evaluations of teaching. The ERAU review generated a vigorous response from a number of academic staff, most, though not all, responses expressing strong disagreement with the findings. This 'incident' prompted a decision to investigate further academic staff experiences of the relation between teaching and research.

Pilot Study

In 1998 a pilot study was undertaken involving in-depth interviews with seven of the nine staff members who responded to the review of the Hattie and Marsh article. The seven male participants were drawn from three faculties and ranged from a new lecturer to a very senior academic. Data were analysed to identify the *qualitatively different ways* in which academic staff experience the relation between teaching and research. The findings of the pilot[2], summarised below, suggested considerable variation in this experience.

1. *Research and teaching are mutually incompatible activities*
    - time devoted to one reduces the attention that can be given to the other
    - current reward structures privilege research and encourage an investment of time in research at the expense of teaching
    - engagement in cutting-edge research can detract from the ability of a teacher to communicate ideas at the basic level

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[1] Hattie, J. & Marsh, H.W. (1996). The relationship between teaching and research: a meta-analysis. *Review of Educational Research*, 66, 4, 507 – 542.
[2] Findings are discussed in Robertson, J. (1999). What do academics value? Experiences of the relation between teaching and research. Paper presented at the Higher Education Research and Development Society of Australasia, Melbourne, July 1999.

2. *There is little or no connection between research and teaching at undergraduate level*
   - in disciplines with a very hierarchical structure the relationship can only be activated effectively at postgraduate level
   - there is little or no impact of research on teaching (or vice versa) with service teaching to large first-year classes
   - effective teaching with large undergraduate classes requires a high level of communication skill rather than research expertise
   - the effective relationship is between scholarship and teaching rather than research and teaching

3. *Teaching is a means of transmitting new research knowledge*
   - staff involved in research are more in touch with current research/literature/other researchers, more aware of current questions/hypotheses and therefore better able to feed back this new information to students
   - researchers enthusiastically want to tell students about their discoveries, share as yet uncodified knowledge

4. *Teachers model and encourage a research/critical inquiry approach to learning*
   - academic staff model a questioning/research approach to learning which 'rubs off' on the students
   - knowledge is contested and because researchers are engaged in a process of critical inquiry they are better able to model it for their students
   - postgraduate research students undertake a research 'apprenticeship'
   - students are exposed to conflicting points of view and encouraged to think critically for themselves

5. *Teaching and research share a symbiotic relationship in a learning community*
   - a worldview in which the process of learning connects and subsumes teaching, research and scholarship
   - research informs teaching and teaching impacts on research
   - the individual tuition of research students combines teaching and research so intimately that they are indistinguishable
   - working at the frontiers of a subject and explaining the fundamentals are seen to be highly connected
   - teaching links researchers to a community of learners, provides the stimulation of contact and the seeding of new ideas
   - academics feel better about teaching for being engaged in research and better about research for being engaged in teaching

Further Interviews

Towards the end of 1999 a further eighteen interviews, ranging between 30 and 80 minutes in length, were carried out with academic staff. Whereas participants in the pilot were 'self-selected' in the sense that they had already indicated strong opinions on the topic, the participants in the second round of interviews were selected with a

view to achieving a more representative sample of academic staff in terms of gender, faculty and career stage.

Emerging themes

An in-depth analysis of the main body of interviews is yet to be undertaken. However a preliminary analysis suggests the following themes/trends.

The extreme variation in experience of the relationship between research and teaching revealed in the pilot study has not been borne out in the main body of interviews

All eighteen participants in the main interviews experienced significant links between their research and their teaching as identified in categories 3, 4 and 5 above

For some participants the link is experienced and fostered at both undergraduate and postgraduate levels; for others it is experienced primarily at postgraduate level. The nature of the discipline appears to be the determining factor

Students are an important part of the research communication network; they are also potential future researchers

Despite acknowledging the difficulties in apportioning adequate time to both teaching and research, most participants regard the teaching-research nexus as central to their academic practice; few would seek a research only or a teaching only position

The positive impact of teaching on research is acknowledged by all participants. While some qualitative studies indicate little flow in this direction, the current study suggests that it is a significant factor in the research/teaching link.

The significance of the relationship between research and teaching is often expressed in emotional, affective terms

Illustrative quotations

Teaching is a means of transmitting new research knowledge

… let's say for a four-hundred level course that I teach—it would be impossible to teach that course if I wasn't - wasn't doing research in that area … I'm using the most up-to-date work and, you know, if you're not doing research in that area we wouldn't be reading that literature and we haven't got time to read the literature …

… I think that it's really hard to put your finger on it, but I can talk - I talk about— I think what it does is enables engagement for the students, because I have very direct experience of these things, I've got very direct experience of these places that I'm talking about, I can talk about the papers that I've published, which I think means that they have: 'Oh, she wrote that paper—that means that there's another human being who wrote those other papers.'

When you say this is - this is research I'm currently doing on Hector's dolphins and that - they all wake up. Yeah and then they see you as a real person.

Well, I suppose you could do it [teaching without research), but, one, I don't think - I wouldn't enjoy it, for one thing. Secondly, I wouldn't do a very good job, because it's not my stories I'd be telling—it's the other people's stories.

Teachers model and encourage a research/critical inquiry approach to learning

… on a very direct level, you know, I use the results of research to set assignments and, you know, stuff that's not necessarily published and I tell them there's no right answers to this because this is new data …

I add new papers onto reading lists as they come out and I can say this would apply even if I didn't research in the area, but I can read a paper and I can say, this is OK. And I couldn't - I wouldn't be in a position to make such a - a good critical evaluation if I wasn't a researcher in that area, I think. So I sort of say to them oh, this paper's - this bit's really good and that's not so good.

From my perspective … the role of a university is to support … the endless asking of questions and the looking for answers and … the people who are engaged in that kind of research should model that kind of adventure, or for their students and through their teaching …

Teaching and research share a symbiotic relationship in a learning community

I don't see it as two separate processes … well, for me, I can't separate them out because when I am teaching, I'm actively thinking about a certain kind of problem that's in the text. I can read the same passage out five years running and I'll guarantee I do not say the same thing about it each year.

Interviewer: Yes. What would happen to you if you were researching only or if you were teaching only.
Subject: I couldn't do it.
Interviewer: OK. Right.
Subject: I couldn't do it. I realise - increasingly I - I feel more alive. I have more ideas when I'm teaching. That when I'm just sitting down with a book, I really have to pretend that I'm trying to explain it to somebody else—physically—orally.

… so there's discussion about whether or not lecturers are incorporating the results of their research in their lectures. Well, sure, , but the connection between teaching and research seems to me to go much wider than that, and particularly in subjects like mine where we have students involved in inquiry mode and - and research experiences right from stage one, and many of those experiences occur in the field so things are happening in - in the lecture room, sometimes in a

didactic way, sometimes in an inquiry-based way, but in the field they're almost entirely inquiry based or research oriented and the - the students are having these quite contrasting experiences of - of learning quite deliberately.

… it's not that everything that you're churning out in your research comes right back into the classroom—it's a - it's a way of thinking and being and living …

I see it [the university] as a place of learning and that's learning for students and learning for staff, I guess, and that's what—research to me comes under the broad heading of learning. We are learn— the reason we do research is because we want to learn about this problem here. So, I guess that's what I see it as. The students come here to learn from the staff in a way and the staff are learning from their own activities.

Discussion

Recent qualitative studies (Neumann, 1992; Rowland, 1996; Jensen, 1988; Smeby, 1998) in Australia, England, Denmark and Norway respectively, in which academic staff understandings of the relation between teaching and research have been explored through in-depth, semi-structured interviews, indicate that experiences of the relationship vary according to discipline and level of teaching, but that there is overwhelming support for the existence of a teaching-research "nexus" (Neumann, 1992). Although the findings of the pilot interviews initially suggested otherwise, the full 25 interviews now completed at Canterbury University also indicate a strong awareness of and commitment to a positive, bi-directional relationship between research and teaching. While it was anticipated that gender and career stage might impact on experiences of the relationship, this has not proved to be the case. It would seem that the nature of the discipline and the level of teaching exert a greater influence the nature of the link. In disciplines where there is a large body of technical knowledge organised hierarchically and being taught in huge lecture theatres to students from a range of disciplines (referred to as 'service courses'), the notion of a nexus becomes difficult to sustain or nurture. However it should be pointed out that some quite different experiences have been signalled by academics teaching in the same discipline to similar levels.

The affective dimension to the link (as illustrated in the following quotation) cannot be overemphasised.

Subjective, emotional link. I enjoy doing research, it enhances my enthusiasm for my subject, it helps me feel that I am contributing to knowledge in my area. All these help me feel part of a community which is doing something positive. This 'feel good' factor helps me be enthusiastic about my teaching and, hopefully makes my teaching more effective. It helps me feel that my teaching is more 'alive', that I am discussing something that is out there happening of which I am a part.

In an environment which favours tangible evidence and measurable outcomes, this manifestation of the experienced relationship between research and teaching remains impossible to quantify. However the largely qualitative nature of the link should not detract from the recognition of its significance or from the recognition of its cumulative contribution to the overall research/inquiry ethos of the university.

Ultimately the pedagogical value of the research-teaching link lies in its contribution to student learning. There have been few systematic investigations of student perceptions of the research-teaching relationship (Neumann, 1994; Jenkins et al, 1998). It is hoped that this current research project will be followed by a related study focusing on student experiences of learning in an inquiry-oriented institution.

References

Clark, B. (1997). The modern integration of research activities with teaching and learning. *Journal of Higher Education*, 68(3).

Hattie, J. and Marsh, H. (1996). The relationship between research and teaching: a meta-analysis. *Review of Educational Research*, 66(4), 507-542.

Jenkins, A., Blackman, T., Lindsay, R & Paton-Saltzberg, R. (1998). Teaching and research: student perspectives and policy implications. *Studies in Higher Education*, 23 (2), 127-141.

Jensen, J. (1988). Research and teaching in the universities of Denmark: does such an interplay really exist?. Higher Education 17, 17-26.

Neumann, R. (1992). Perceptions of the teaching-research nexus: a framework for analysis. *Higher Education*, 23, 159-171.

Neumann, R. (1994). The teaching-research nexus: applying a framework to university students' learning experiences. *European Journal of Education*, 29 (3), 323-338.

Rowland, S. (1996). Relationships between teaching and research. *Teaching in Higher Education,* 1(1), 7-20.

Smeby, J. (1998). Knowledge production and knowledge transmission. The interaction between research and teaching at universities. *Teaching in Higher Education*, 3(1), 5-20.