

Associations between research and teaching in Australian higher education

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Abstract. This article describes results of an empirical investigation of the relationship between research and undergraduate teaching in Australian higher education. Two research indexes (weighted number of publications, and number of research activities) were used. Scores on a Likert-type scale of reported commitment to teaching undergraduate students formed the main criterion of teaching effectiveness. This was supplemented by student ratings in one of the aggregate-level analyses. The results revealed typically no relation or a negative relation between teaching and research at the level of the individual and at the level of the department, across all subject areas. The only exceptions concerned one group of former colleges of education. Further analysis by staff self-rating of academic quality showed that there existed one group of staff, mainly in the universities, who were committed to teaching and highly active researchers. However, the data did not support a causal interpretation of the association. It is concluded that there is no evidence in these results to indicate the existence of a simple functional association between high research output and the effectiveness of undergraduate teaching. Some implications for policy and student course choice are discussed.

Introduction

Conceptions of the links between teaching and research

Few beliefs in the academic world command more passionate allegiance than the opinion that teaching and research are harmonious and mutually beneficial activities. Scholars who are energetically occupied in creating or reinterpreting the knowledge of their subjects will be competent lecturers: teaching based solely on the research of other people is dull and fails to inspire students. Students' questions excite new research ideas. Teaching and scholarship are two sides of the same coin.

Ideas of this kind are periodically proclaimed with something close to religious conviction. The Robbins Report, for instance, asserted simply that 'There is no border-line between teaching and research; they are complementary and overlapping activities (Robbins 1963). In the USA, Leary has contended that 'The popular image of the scholar as pedant immersed in library or laboratory has about the same validity as the popular image of Mr Chips, Miss Dove, or Mark Hopkins and his log... The fact is that our best teachers are almost without exception our best scholars... Scholarship is not at a different pole from teaching' (Leary 1959, quoted in Feldman 1987).

More recently, Westergaard (1991) has declared that 'We need, above all, to resist the notion forced on us by administrative formulae that research and teaching are

quite distinct – and therefore institutionally separable – in character and purpose'. In a similar vein, one of the older universities in Australia has reaffirmed that 'We strongly support the concept of all academic staff having the opportunity to pursue research activities as an essential part of maintaining quality education . . . The principle of providing a research environment for all academic staff to complement teaching programs is . . . regarded as fundamental to academic excellence' (University of Melbourne 1991).

The conception that these aspects of academic endeavour are interdependent evidently goes to the heart of our understanding of the university and its mission. A conventional argument for the unity of teaching and research is that the close relation between them is a distinguishing feature of university higher education – one that marks it off both from schools and adult education. In the university, this argument runs, knowledge is uncertain, relative, and provisional; elsewhere, it is generally fixed and absolute. It is therefore maintained that, if high quality education is to be guaranteed, every undergraduate must work in close proximity to teachers who practise enquiry. A similar, but less common argument is that research is better performed by people who are in daily contact with undergraduate students. Good research cannot be planned for; the insights gained from the teaching of undergraduate students may provide fresh stimuli for academic enquiry.

Strong opinions against the existence of an affinity between teaching and research in higher education have been expressed for many years (see Feldman 1987, pp. 274–275). However, the generally accepted 'integrationist' view has come under a more sustained attack in recent times. The alternative conception says that these two crucial activities are essentially separate endeavours that just happen to occur in the same place. As far as the individual academic is concerned, there is no causal relation, no essential congruence: doing research does not make someone's teaching better. The Leverhulme Report embraced a version of this view, describing the relationship as a 'marriage of convenience' (Williams and Blackstone 1983, p. 84). It has since been echoed by many funding bodies and policy-makers.

According to this alternative perspective, university, polytechnic and college staff who are not engaged in scholarly activity can nevertheless be good undergraduate teachers. A high level of research activity may actually divert an academic's attention from his or her students. In response to the argument that higher education cannot be 'higher' unless its teachers are researchers too, this conception questions the validity of the statement that higher education is radically different from the rest of education. Autonomy of enquiry and the recognition of the uncertainty at the heart of knowledge do not, or should not, belong to an exclusive group, its adherents maintain; it follows that it is unnecessary for each academic to be engaged in research in order to inspire students to undertake learning of high quality. If secondary school teachers can encourage independent learning in their pupils without doing research, why cannot university teachers do the same? (see Scott 1991). Proponents of this position point also to the fact that excellent research does take place, in the absence of undergraduate teaching, in research institutions throughout the world; and that first-rate teaching does occur in higher education institutions in which most of the staff pursue little in the way of research at all – as is

still the case in many polytechnics and colleges.

In a world of higher education dominated increasingly by economic imperatives, it is not unexpected that the most recent criticisms of the complementarity between teaching and research have acquired a sharp utilitarian flavour. Demands for increased selectivity of funding in order to increase the rate of return to the investment in higher education; the British and Australian governments' view that there exists a substantial number of underperforming staff who cannot possibly be good at both functions; and the gradual movement to widen student access to relatively *élite* systems of higher education: all these exert additional pressures to sever the traditional links between teaching and research. The continuation of a system where, in universities, promotions and salary levels are chiefly determined by research success – perhaps because it is thought to be impossible to identify excellent teaching *per se* – has also increasingly been questioned.

Varying views of the teaching-research nexus

The truth or otherwise of the idea that teaching proficiency is a function of research and scholarly activity is crucial to the issue of resource allocation and the structure of higher education. In considering structural implications, it is important to distinguish two basic forms of the argument that research and teaching are interlinked. The 'strong integrationist' view holds that to be a good university teacher one must be active in research. This is still a very common belief in British, American, and Australian universities (Williams 1991; see also Abrahamson 1991). From it seems to follow the assumption that every member of academic staff should be jointly funded for research and teaching, along the lines of the British Dual Support System, where universities receive block grants for teaching and research. This conception would also appear to imply that there is no need separately to measure, or reward, teaching effectiveness. Research prowess can stand as a valid proxy for teaching quality.

The weaker version of the teaching-research hypothesis is that there is a relationship between research and teaching at the level of the department or institution, but not necessarily at the level of the individual academic. It is maintained that, through various (usually unspecified) functional mechanisms, undergraduate teaching is enhanced if it occurs in a context of research activity. It is then argued that all staff need to work in a research environment in order to ensure academic excellence, even though they may not all be engaged in research to the same extent. The Leverhulme Report, and many other authorities (see, for example, Elton 1986), have adopted this more resilient position. If it is true that a relationship at this level exists, then it seems to follow that every higher education institution should be funded for both activities, with extra resources for the areas where it has a research (and a teaching?) advantage over others. All institutions might receive baseline funding for some research, but only a few would continue to be comprehensively funded for international-standard research across all their faculties. Within academic departments greater flexibility in staffing would become

the rule. And, presumably, systems of promotion linked explicitly to teaching as well as research performance would become desirable.

If research and undergraduate teaching are in reality quite independent, in the sense that *no causal relation* between them either at the level of the individual or at the level of the aggregate exists, then more radical funding and structural solutions immediately come into consideration. There might be separation of institutions into distinct types, perhaps with a quite separate research and doctoral studies sector, with the great majority of current universities and polytechnics concentrating on undergraduate teaching and taught masters' programmes. Within these institutions, the promotion (and probably appointment) of academic staff would be determined largely by teaching qualifications and performance; research and scholarship would be minor events in the lives of most of their academics. Institutions of this type would not be universities in the sense in which the term is currently understood in the United Kingdom and Australia.

The implications of these different models and the strong feelings aroused by an issue that touches on the very nature of higher education have led to the debate about teaching and research becoming a conflict between those who see themselves as the defenders of the true purpose of a university and those who seek to reform higher education. It seems an appropriate moment to consider the truth or otherwise of the existence of a relationship, and the purpose of this paper is to present some empirical results that bear on this question.

Investigations of the links between teaching and research

Given the major policy implications of the different models, it is lamentable that nearly every conclusion about the compatibility between research and teaching within the British and Australian systems has been reached entirely through anecdote and informal observation (see Moses (1989, 1990) for some exceptions). It is not easy to reach a more definite answer if we examine the extensive empirical research on the topic which has been undertaken in the United States. The systems are not directly comparable in any case; almost every one of the US studies has looked *only* at individual level associations (the 'strong' version of the teaching-research hypothesis); only one criterion of teaching effectiveness (student ratings) has generally been used. Moreover, these American results, though generally consistent, remain puzzling in their practical implications.

A definitive review by Feldman (1987) of studies of the research productivity and perceived instructional effectiveness of faculty members concluded that the average correlation between the two variables was +0.12. The substantive importance of so weak an association is impossible to determine. A relationship as small as this offers little backing for either of the two extreme arguments for and against the teaching-research nexus; it suggests at best that while the two activities are essentially unrelated, they are probably not in conflict with each other. Feldman found that the association existed when research was measured by publication counts, indicators of research support (e.g. grants) and colleague ratings, but not when it was

measured by citation counts, which some authorities have argued are the best index of research quality. Controlling for career stage and age of the faculty member, personality, courses assigned, general ability, and time spent on research did not seem to strengthen or weaken the association very much. There was some slight evidence that positive associations between teaching and research were more likely to occur among humanities and social science staff than among natural scientists, 'although this conclusion remains extremely tentative' (Feldman, 1987, p. 279). Feldman also surmised that in certain departmental contexts, research productivity may affect teaching negatively.

In a separate review, White (1986) examined empirical findings from reports on US academics' productivity published between 1949 and 1984 in the context of promotions and salary decisions. Her conclusion was that the predictability of teaching effectiveness from knowledge of scholarly activity was so small as to be useless in making a decision about an academic's career. It is significant, in view of our earlier discussion, that White says that 55 per cent of the studies she looked at contained 'irregular' remarks – statements which overemphasised the importance of the relationship between research productivity and teaching effectiveness, even when the results did not indicate such an association.

Recent interview studies of academic research and teaching offer scant support for the teaching-research hypothesis at the level of the individual academic. Jenssen (1988) found that Danish academics believed in a fruitful interplay between the two activities, and that few of them would like to work in 'research only' institutions. However, there was almost no evidence of a causal connection at undergraduate level, and the strength of the association in any case varied a good deal between disciplines. Shore, Pinker and Bates (1990) similarly report that, for the majority of the 89 Canadian academics they interviewed, there was little correspondence between teaching and research. Teaching could be a source of inspiration for research, and vice versa – a few professors in this study described explicit links between the activities – but in practice, it rarely was. It could not be established that teaching methods were functionally related to research processes: 'The evidence we have collected largely contradicts the belief that research and teaching inform directly upon each other' (Shore *et al.* 1990, p. 34).

Background to the present study

The aim of the study reported in this article was to examine associations between research and undergraduate teaching among Australian academics. It was conducted in 1989, as part of a larger survey of academic staff attitudes and behaviours. At the time of this survey, the previously clear distinctions between different sectors of the Australian system were being eroded by amalgamations and other structural changes. Australian higher education prior to 1987 was divided into the advanced education sector, which contained a mixture of large technological institutions (similar in some ways to Britain's technological universities) and smaller colleges which had concentrated initially on teacher education but in later years moved

towards the provision of a broader variety of courses. The research output of the advanced education sector, especially its smaller colleges, was tiny in comparison to that of the university sector.

This 'binary system' (which bore a superficial resemblance to the British system of the same title) was abolished in 1987. Most of the smaller advanced education colleges have since amalgamated with pre-1987 universities, while most of the larger colleges have changed their names to incorporate the 'university' title; they have sometimes amalgamated with other former colleges as well. The present study included in its sample academic staff from both the two main sectors, and, in the case of the advanced education sector, from the large technological institutions as well as the other colleges of advanced education. In this paper, the three groups will be referred to as universities, large technological colleges, and CAEs respectively.

The questions addressed by the investigation reported here were as follows:

1. Is there evidence of any association, at the level of the individual member of academic staff, between the effectiveness of teaching (as indicated by self-reported commitment to teaching) and research activity or productivity? (This is a test of the 'strong' teaching-research hypothesis.)
2. Is there evidence of any association, at the level of the academic department, between teaching and research? In other words, are *departments* that are relatively active and productive research units also effective (in terms of staff and student perceptions) at teaching undergraduates? (This question, together with the next one, tests the 'weak' version of the hypothesis.)
3. Is there evidence of any association at the level of the individual staff member within the academic department? For example, is a member of staff who works in a department that produces much research output more likely to describe himself or herself as a committed undergraduate teacher?
4. Are the associations affected by subject area, type of institution, or academic interests? Is there, for example, a positive association in universities, but not in colleges? Is there, for example, a positive association in arts subjects, but not in science ones? Are there groups of academic staff who see themselves as good teachers and good researchers, while others regard themselves as effective in only one of these areas?

Method

Method of measurement

Academic staff were asked to complete a questionnaire developed from previous instruments used by Moses (1989) and Ramsden (1991b) and refined during the course of two preliminary studies in 1987 and 1988. The instrument contained four sections. The first asked respondents to provide details of their appointment, interests, qualifications and previous experience, and to assess their own capacity separately as a teacher and as a researcher on a scale of 1 to 5 (from 'below average'

quality to 'outstanding' quality). The main use to which responses to these self-rating of academic proficiency items was put was the construction of a typology of perceived academic quality (described later in this paper).

The second section was concerned with recent academic and professional activities, and as it provided the key data for the indicators of research performance used in this paper, it is described here in some detail. Respondents were asked to indicate the total number of articles, books, conference papers and reports they had produced in the last five years. From these answers an *index of research productivity (IP)*, incorporating a weighting to compensate for different publication models, was derived as follows:

$$IP = 3b + p + e + c,$$

where b is the number of single- or multi- authored books

p is the number of papers published in refereed journals

e is the number of edited books

c is the number of chapters in edited books.

The next question in this section of the questionnaire invited staff to show whether or not they had been involved in 18 different academic activities during the previous two years. These ranged from developing a new method of teaching a subject or receiving competitive research grants and carrying out consultancy. Item analysis procedures were used to help form an internally consistent scale focused on mainstream research activity. This scale (Cronbach alpha = 0.81) contained the following items:

- received an external, competitive research grant;
- received an internal, competitive research grant;
- supervised one or more honours/masters students;
- supervised one or more PhD students;
- had informal discussions with departmental colleagues about common research interests;
- participated in one or more joint research projects with colleagues;
- served as editor or on the editorial board of an academic journal;
- reviewed one or more proposals for a funding agency;
- refereed one or more articles for a journal;
- delivered one or more conference papers in my research area;
- maintained professional contact with colleagues overseas.

Each affirmative reply to an item was given a score of one point. The total score represented the staff member's score on the *index of research activity, IA*.

The third section of the questionnaire contained items concerned with attitudes to promotion and tenure, whose results are not reported here (see Moses and Ramsden 1991, for a summary). The final section was a list of statements concerning academics' attitudes to teaching and students, their perceptions of the departmental

environment, their commitment to academic work, and their opinions about research and consultancy. The items were grouped into 5 scales, following previous analyses of the pilot study questionnaires. The two scales of interest in this article are:

1. 'Commitment to teaching' (Cronbach alpha = 0.81), whose scores were used in this study as the criterion of an academic staff member's teaching effectiveness. The meaning of the commitment to teaching scale is best made clear by reference to its individual items, which are listed in Table 1.
2. 'Teaching-research nexus' (Cronbach alpha = 0.76), a scale which attempts to measure the degree to which a member of staff believes in the existence of a complementary relation between research and teaching activity in higher education. The items forming this scale are shown in Table 2.

Validity of indicators of research and teaching

The persuasiveness of the conclusions reached in this study stands or falls by the accuracy of the indicators of teaching and research. No single indicator of these complex academic activities is likely to be acceptable to everyone, and it is important to point out the weaknesses of the criteria selected for this investigation. For example, the research productivity index does not take into account unpublished consultancy reports for external clients, and the relative weighting of books and papers it employs is capable of being questioned. The commitment to teaching scale consists of self-reports of attitudes and processes, and includes no objective information about whether (for example) the teacher concerned selects appropriate and up-to-date content, or returns written work promptly with pertinent and helpful

Table 1. Items forming the commitment to teaching scale

Item	Correlation with scale total
Teaching undergraduate students is an activity that gives me a great deal of satisfaction	0.35
I use the results of examinations and student assignments to amend my subsequent teaching of a topic	0.45
I make use of assessment material to diagnose what my students understand and do not understand	0.54
When I revise a course, I always examine teaching and assessment methods to see if they are appropriate	0.55
I go out of my way to help students with their study problems	0.50
I regularly consult books and articles on teaching methods	0.40
I try hard to understand the difficulties students may be experiencing with their work	0.50
I make time to discuss my students' progress with them regularly	0.46
When I revise a course, I do library research to make the content up to date	0.33

Table 2. Items forming the teaching-research nexus scale.

Item	Correlation with scale total
My research is enhanced by my undergraduate teaching	0.60
Having to teach something helps me clarify my ideas in my research work on it	0.56
I share ideas from my research with my undergraduate classes	0.42
Doing good research enhances an academic's teaching	0.35
Students' questions can help me elucidate issues in my research	0.61
I feel I have something to learn from my undergraduate students in my subject area	0.44

comments. And it should also be remarked that student ratings similar to those used in one part of this investigation have often been criticised for bias and subjectivity (see Marsh 1987, for a review of the most common criticisms).

The present indicators may nevertheless be defended in terms of previous work and by evidence of their concurrent and external validity. The research criteria, especially IP, are at least as satisfactory as those used in most of the studies summarised in the major review referred to above (Feldman 1987). Changes to the weightings (multiplying books by 10 instead of 3, for example) and the deletion or inclusion of individual items in the IA index had little impact on the main findings to be described. Some critics have argued that 'real' research effectiveness cannot be assessed in terms of conventional output indicators (see, for example, Rudd 1988; Smith 1988). The intercorrelations between IP, IA, and the staff members' own ratings of their research quality ($IA \times \text{self-rating} = 0.53$, for example) gave little support to this proposition.

There are many difficulties in constructing an acceptable index of teaching effectiveness in higher education. In the present study, it was impracticable to collect information about the quality or up-to-dateness of subject content; nor was it feasible to visit classes and observe teaching. Instead, we decided to use indicators that could be justified on theoretical grounds and which have been shown to provide data that are correlated with external criteria such as students' approaches to studying and achievement.

The use of a self-report attitude and behaviour scale as the main teaching criterion may appear at first sight to be unsatisfactory, but there is reason to believe that it is a valid indicator of quality. Several items used in this scale (see Table 1) were chosen to reflect the kinds of comments frequently made by students about more and less effective teachers, and which have been found to be endorsed by lecturers whose teaching may be described from observation and from interview data as exemplary (see Ramsden 1992). Items from a previous instrument for grade 12 (sixth form) teachers that had been shown to correlate strongly with their students' perceptions of teaching effectiveness, and their approaches to learning (Ramsden 1991b), were included. Certain items were identical with those in another instrument specially developed to assess the validity of the student rating questionnaire described in Ramsden (1991a) (see Bowden and Martin 1990). The results from that validity

study showed that students' ratings corresponded quite closely to their lecturers' self-reports, despite the obvious incentive for lecturers to present a favourable image of themselves. In fact, although staff generally did rate themselves higher than their students did, the *pattern* of differences between different subject areas was similar.

These varied sources of evidence all support the validity of the commitment to teaching scale. Especially when combined with the supplementary external evidence derived from student ratings obtained in the additional study described below, they justify its use in the present investigation as a criterion variable for assessing teaching effectiveness.

The student data were collected using the Course Experience Questionnaire, an instrument developed as a performance indicator of teaching in Australian higher education. Marsh (1987) has provided a comprehensive critique of the assertions that student ratings are subjective and biased which need not be restated in detail here. We should simply point out that the evidence shows clearly that correctly-collected student ratings are accurate reflections of important aspects of teaching quality. More specifically, the validity and reliability of the Course Experience Questionnaire has since been established in a national survey (Ramsden 1991a). The responses used for the present investigation were obtained during the course of a national discipline review (Matthews, Brown and Jackson 1990). The results reported here consist of students' ratings of the effectiveness of instruction at course level, which was one of the five dimensions used in the Course Experience Questionnaire. Matthews and his colleagues provide forceful evidence, drawing on interview, observation, and graduate survey data, of the validity of the differences between departments which these student ratings identify.

The items forming the student 'good teaching' rating scale used in the present study (Cronbach alpha = 0.87) are shown in Table 3. By correlating these results with data on staff publications in the same departments, an estimate of accuracy of the relation between teaching and research activities established from the analysis of the self-report scale (commitment to teaching) in the main study was obtained.

Table 3. Items forming the student rating of teaching scale ('Good teaching')

Item	Correlation with scale total
The teaching staff of this course motivate students to do their best work	0.64
Staff here put a lot of time into commenting on students' work	0.62
The staff make a real effort to understand difficulties students may be having with their work	0.66
Teaching staff here normally give helpful feedback on how you are going	0.66
Our lecturers are extremely good at explaining things to us	0.63
Teaching staff here work hard to make their subjects interesting to students	0.66
This course really tries to get the best out of all its students	0.57
Staff here show no real interest in what students have to say (reverse scored)	0.54

Sample and response. Questionnaires were mailed in 1989 to full time staff working in 18 Australian higher education institutions. Eight of these institutions were pre-1987 universities; the remainder were part of the former advanced education sector. The latter group comprised 4 large technological institutions and 6 CAEs. The sample was drawn from the following subject areas: health sciences (excluding medicine); science, mathematics and computing; engineering; humanities; social sciences; economics and commerce; and law. One follow-up questionnaire was sent to non-respondents. These procedures led to usable responses being obtained from 890 staff, representing a total response rate of approximately 50 per cent. This rate, while it is an average one for surveys of academic staff, leaves open the possibility of a systematically biased sample. We found that senior staff (senior lecturers and above) were somewhat overrepresented in comparison with published data on the population. It seems probable that members of staff with low publication and research activity rates, and/or little interest in teaching, are underrepresented in the sample.

The student ratings of teaching were obtained from the Review of the Accounting Discipline's student survey, which took place in 1989. A total of 51 Australian accounting departments was surveyed. These included departments in institutions described as pre-1987 universities (N = 20), CAEs (N = 23), and large technological colleges (N = 8) in this article. Further details of the sample and response may be found in the Accounting Review's final report (see Matthews *et al.* 1990), where a description of the results by department also appears. Data on staff publications were collected by the Review's staff questionnaire, and averaged to produce an index of the number of refereed publications per staff member per year in each department.

Results

Research and teaching: individual level analysis

Tables 4 and 5 show the average values and standard deviations of the three main variables by type of institution and subject area. In Table 4, the large differences in

Table 4. Means and standard deviations of the three main variables by type of institution

	Pre-1987 University		CAE		Large tech		Whole sample	
	Mean	SD	Mcan	SD	Mean	SD	Mcan	SD
Commitment to teaching	3.78	0.55	4.07	0.51	3.85	0.47	3.84	0.52
IA	7.17	2.75	3.77	2.12	4.59	2.36	6.18	2.85
IP	11.54	12.53	3.64	6.29	4.76	7.50	8.98	10.93
(N)	565		119		185		869	

Table 5. Means and standard deviations of the three main variables by subject area

	Social Science		Arts		Science/ Maths		Engineering		Commerce/ Law		Health Sciences	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Commitment to teaching	3.87	0.58	4.01	0.56	3.80	0.50	3.73	0.50	3.70	0.53	4.09	0.44
IA	6.84	3.15	5.75	2.53	6.99	3.01	6.07	2.78	5.48	2.87	4.80	2.43
IP	11.04	12.36	6.32	6.69	13.02	14.65	5.77	8.65	8.43	9.32	4.69	8.77
(N)	122		124		237		132		145		78	

the research indicators both within and between type of institution are notable features. The large variances, especially on IP, occur because a relatively small number of staff in this sample produce most of the output. At the same time, many staff produce little or nothing. The average IP score for a university staff member is more than three times that of a CAE staff member, and two and a half times that of an academic from one of the large technological colleges. The differences between the sectors on the commitment to teaching scale are smaller and they run in the opposite direction, with the CAE staff reporting the highest level of commitment.

In Table 5, we see that there are also substantial differences between subject areas. The pattern of mean scores on the commitment to teaching scale is similar to that reported in a recent study of student ratings of Australian higher education courses (Ramsden 1991a). This provides further support for the scale's validity. We also see that IA and IP vary substantially by subject area. Science staff, for example, produce twice as many publication units as the arts specialists. The differences are compatible with the results of previous studies.

Tables 6 and 7 show the product-moment correlations between the research productivity and activity indexes and the commitment to teaching scale scores. Results for the entire sample and for each type of institution are provided in Table 6. There is a small (non-significant) positive association between research and teaching among the college staff. All the other signs are negative, and there are statistically

Table 6. Correlations between the research indexes and commitment to teaching by type of institution

	Pre-1987 university	CAE	Large tech	Whole sample
Commitment to teaching x IA	-.10	.08	-.04	-.14
Commitment to teaching x IP	-.11	.09	-.11	-.13
(N)	561	116	180	857

Note 1: Coefficients have been multiplied by 100.

Note 2: Total includes a number of staff in subject areas other than the six listed in Tables 5 and 7.

Table 7. Correlations between the research indexes and commitment to teaching by subject area

	Social Science	Arts	Science/ Maths	Engincer- ing	Com- merce/ Law	Health Sciences
Commitment to teaching x IA	-.33	-.02	-.16	-.07	-.08	-.10
Commitment to teaching x IP	-.23	-.03	-.23	-.01	-.13	-.08
(N)	121	125	238	131	79	145

Note: Coefficients have been multiplied by 100.

significant inverse relationships ($P < 0.0001$) across the whole sample. The larger absolute values for the entire sample suggest that the negative association is caused partly by differences in the typical pattern of academic work in the different sectors. As we saw in Table 4, the CAE staff tend to concentrate more on teaching, and do little research, while the university academics are orientated towards research, and are less committed to teaching. The staff in the large technological institutions fall somewhere in between these extremes.

The relationship between teaching and research for the whole sample is illustrated in Figure 1. The two research indexes are shown on the same scale: 'low' is defined as more than half a standard deviation below the mean, and 'high' as more than half a standard deviation above it. The commitment to teaching scale scores are shown in their original units (scale 1–5, mean for entire sample = 3.84).

This graph illustrates a general trend across the whole group of respondents, but it overstates the magnitude of the association between teaching and research within

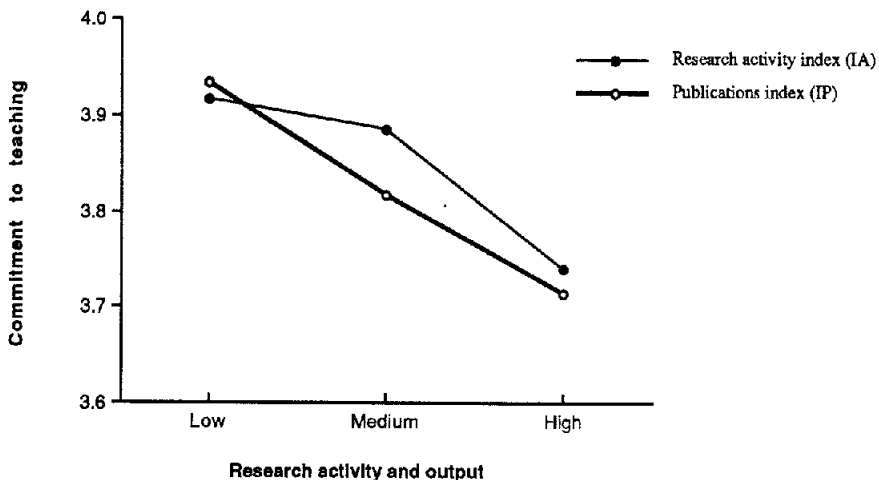


Fig. 1. Association between research and teaching at individual level.

the CAE and technological college sub-samples. Within these sub-samples, as we have seen, the association is not significantly different from zero. Part of the negative effect illustrated in Figure 1 is attributable to the characteristically different types of academic activity in the different sectors.

Table 7 shows the effects within each subject area. There is no evidence of a positive association between teaching and research in any subject area. On the contrary, there is a clear indication of a negative association: although not all coefficients are statistically significant, every sign is negative. The weakest of the associations occurs in humanities subjects, and the strongest in the sciences and social science, a finding which concurs with the studies reviewed by Feldman (Feldman 1987).

Tables 8 and 9 summarise the results of two separate analyses of variance designed to establish whether the relationship between research output and commitment to teaching is significantly different in different subject areas and types of institution. It is apparent that commitment to teaching is a function of both subject area and IP, but that the two effects operate independently of each other (Table 8). Similarly, IP and institution type exert independent effects on commitment to teaching (Table 9). The sample size did not permit the effects of subject area, institution type, and research productivity on commitment to teaching to be examined in a single analysis.

Research and teaching: aggregate level analysis

The hypothesis that research and teaching are mutually reinforcing activities at departmental level was examined by calculating the average IA and IP, and the equivalent commitment to teaching score, of each department in the sample from which more than 10 responses were received. The results for the whole sample showed a negative association between research and teaching. The CAE sub-sample was an exception. A small positive association existed; this, however, was based on only 8 pairs of observations, and must be treated with particular caution.

Figure 2 plots commitment to teaching scores aggregated to departmental level against aggregated IP. Each data point represents one academic department. There

Table 8. Analysis of variance summary: effects of IP and subject area on commitment to teaching

Dependent variable: commitment to teaching		
	F	P<
Main effects		
IP	9.33	0.000
Subject area	9.22	0.000
Interaction		
IP × Subject area	1.27	n.s.

Table 9. Analysis of variance summary: effects of IP and institution type on commitment to teaching

Dependent variable: commitment to teaching		
	F	P<
Main effects		
IP	5.71	0.01
Institution type	8.49	0.000
Interaction		
IP \times Institution type	1.38	n.s.

is a modest inverse relationship between the two variables, suggesting that highly productive departments are populated by staff who are on average less effective teachers – and vice versa. A similar relationship was observed when IA was used as the independent variable. These results are compatible with the finding of generally negative associations between research and teaching at individual level and with the between-sector differences in commitment to teaching, research activity, and research output.

The conclusion that good teaching and research output at departmental level are inversely related is strengthened when data from the Australian Review of the Accounting Discipline in Higher Education are examined (see Mathews *et al.* 1990). In this case, student ratings of each accountancy department's teaching effectiveness, rather than aggregated staff reports of their teaching behaviours and

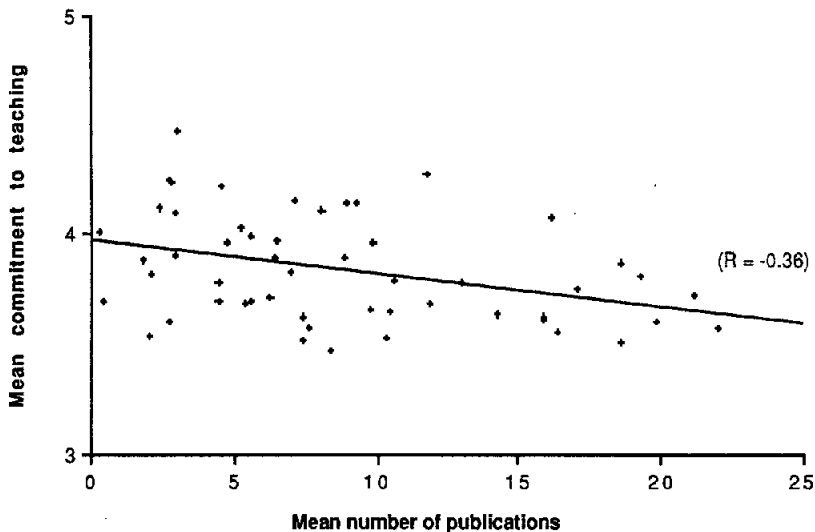


Fig. 2. Commitment to teaching by research productivity at aggregate level.

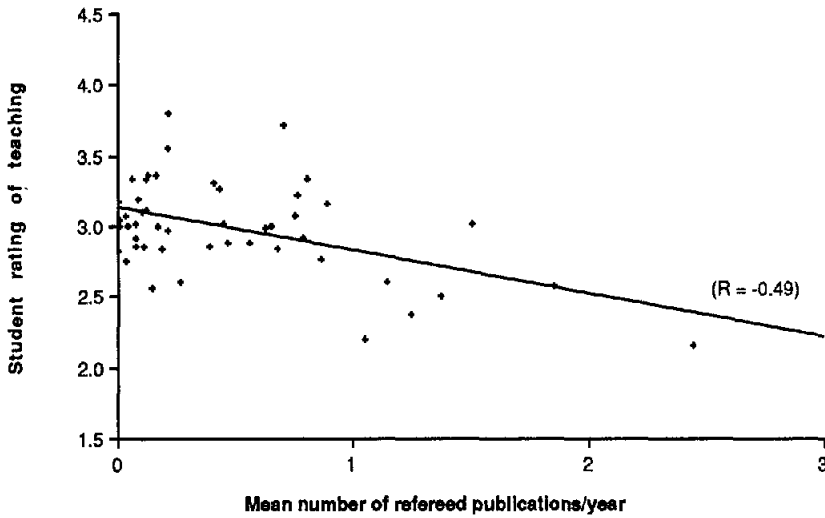


Fig. 3. Mean student ratings of teaching by staff research productivity: Australian accountancy departments.

attitudes, were used as the criterion variable. Table 3 shows the items used to examine students' perceptions of teaching. (It must be noted that the research productivity indicator employed in this investigation was not directly comparable with our own IP indicator.)

The results are shown in Figure 3, where a negative association between students' perceptions of the quality of teaching and research productivity at the level of the academic department is evident. It is remarkable that, while the more prolific research departments in this study were usually situated in the older universities, the CAEs and the large technological institutions generally received higher student ratings of teaching. The fact that graduates generally rated the quality of the teaching which they had experienced in their courses in a similar way to current students adds credibility to the indicator of teaching used. These results led to authors of the Review to question 'the traditional view of excellence in higher education [that] asserts a positive, indeed imperative, relationship between research and scholarship by academic staff on the one hand and the quality of undergraduate teaching on the other' (Matthews *et al.* 1990, p. 52).

Research and teaching: multi-level analysis

The relationship between an individual member of staff's teaching and the research output of the department in which he or she worked was explored in the main survey by correlating the commitment to teaching scores of each individual with the average research activity and productivity of department. When this multi-level

analysis was carried out, the same generally negative findings emerged for the sample as a whole, for the university sub-sample, and for the large technological college sub-sample; once more, however, a small positive association was observed for the CAE sub-sample, on both research indexes. Figure 4, derived from separate regression estimates for the CAEs and the pre-1987 universities, illustrates an aspect of this disordinal interaction.

Since the CAE sub-sample represents such a small number of departments, it is impossible to draw any firm conclusions from this aspect of the results. It may be that at very low rates of aggregate research productivity there is a positive association between departmental research output and individual commitment to teaching. Since the CAE departments and low aggregate productivity are inextricably linked, it is not meaningful to try to determine which effect is the more salient.

Different academic quality groups

It is sometimes true that analyses of entire samples conceal relationships within subgroups. For example, it could be argued that one group of academic staff might prove to be both effective researchers *and* effective teachers, despite the generally negative relationship that exists for the whole sample. We have already shown that this may be the case within the CAE sub-sample, although the effect is very small and might have occurred simply by chance at individual level. In order to examine this hypothesis from another perspective, the whole sample was split into four groups on the basis of scores on the self-rating of research and teaching questions

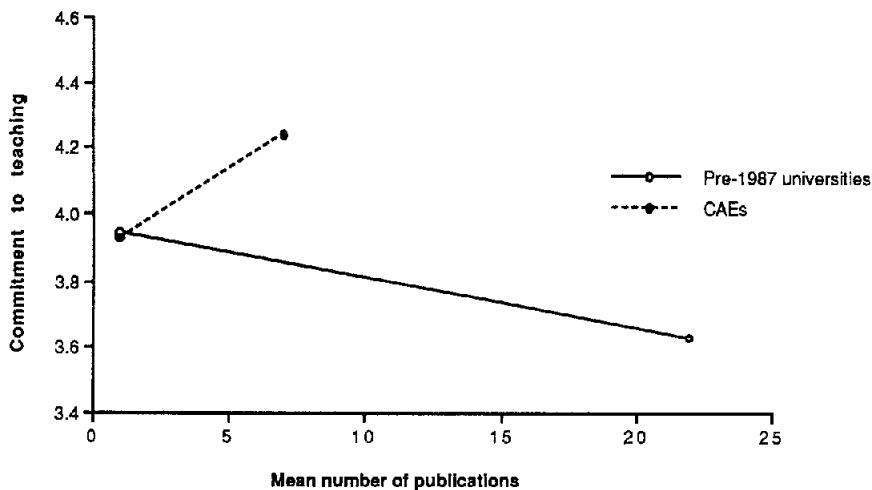


Fig. 4. Commitment to teaching (individual level) by aggregate research productivity, for the CAE and pre-1987 university subsamples.

previously described. The groups were defined by dividing the original values of the self-rating variables at the median. A score on the median or higher defined membership of the high group; a score below the median defined membership of the low group. This procedure allocated each member of academic staff into one of the four cells of the typology of research and teaching quality illustrated in Figure 5.

It was necessary to examine the comparative research output and commitment to teaching of the four groups. Table 10 shows that the teacher-researchers are almost as active and productive in research as the researchers, with the other two groups being far behind. If we add this finding to the fact that the teacher-researchers also reported a high commitment to teaching – almost as high as the teachers – it becomes evident that there is one quite large group of staff who appear to be effective at both teaching and research. As might be predicted from this conclusion, we found that the teacher-researchers scored significantly higher on the teaching-research nexus attitude scale ($P < 0.0001$). In fact, twice as many of this group (16.4 percent compared with about 8 percent each of the other quality groups) strongly agreed with the defining item of this scale ('Students' questions can help me elucidate issues in my research'). These academics not only believe in the interdependence of the two activities, but appear to practise their belief in their work. In terms of the indexes used here, they are good at research and they are, on average, among the more effective teachers.

What then are the characteristics of this group of academics, and what might those characteristics tell us about how to enhance the apparent relationship between research and teaching among other staff? The teacher-researchers formed a distinct group in our sample. It was dominated by staff from the pre-1987 universities. Social scientists and arts specialists were overrepresented. These staff were older than those in the other groups (44 per cent of them were 51 or older), had more years teaching experience, and were likely to be men who were readers or professors and who held a PhD or higher qualification.

These characteristics suggest a traditional academic stereotype: the middle-aged,

		Self-rating of teaching quality	
		Low	High
Self-rating of research quality	Low	Group 1 <i>Low</i> (N=135)	Group 3 <i>Teachers</i> (N=159)
	High	Group 2 <i>Researchers</i> (N=211)	Group 4 <i>Teacher-researchers</i> (N=361)

Fig. 5. A typology of academic quality groups.

Table 10. Research activity and productivity by academic quality group

	IA score	IP score
Group 1: Low	4	3
Group 2: Researchers	7	13
Group 3: Teachers	4	3
Group 4: Teacher-researchers	7	12
P<	0.0000	0.0000

Note: IA and IP scores have been rounded to the nearest whole number.

senior male, almost certainly with tenure. Such university teachers might be regarded as being among the more influential in forming, preserving and projecting the ideologies of the academic world.

Unfortunately, as far as proponents of the teaching-research hypothesis are concerned, little evidence that would endorse a functional interpretation of the linkage between research and teaching can be found in this aspect of the results. One might expect a stronger relationship between the two variables among the teacher-researcher group if the connection operates among these academics but not among the others. Table 11 shows correlations between commitment to teaching and IP and IA separately by the four quality groups. The differences between the groups are small and not in the predicted direction. The teacher-researchers who are very active researchers report themselves to be slightly less good at teaching than those who are moderately active. Similar results were obtained when aggregate-level analysis was carried out. Academics defined as teacher-researchers were no more likely than academics in other three groups to show a strong commitment to undergraduate teaching if they were members of highly active research departments.

Discussion

These results offer little or no foundation for a belief in the existence of a positive causal relationship between effective undergraduate teaching and high levels of

Table 11. Correlations between teaching and research by quality group

	Quality group			
	Low	Researchers	Teachers	Teacher-researchers
Commitment to teaching \times IA	-05	-06	-06	-07
Commitment to teaching \times IP	-07	-00	-16	-17

Note: Coefficients have been multiplied by 100.

research activity in Australian higher education. Our findings were generally consistent. Using both student ratings of instruction and staff self-reports of commitment to undergraduate teaching as criteria of effective teaching, negative or near-zero correlations were typically obtained at departmental level. At individual and multiple levels, the same pattern occurred, using in this case only the staff reports of their commitment to teaching as the criterion.

The validity of the research indicators was supported by the connections made by the respondents themselves between self-ratings of research quality, research activity and publications. The validity of the commitment to teaching scale, which is a self-report attitude and behaviour scale presumably even more susceptible to manipulation than the research indicators, was endorsed by the results of earlier studies that linked staff and student ratings, and by the similarity of the between-subject area results to those obtained in the parallel study of students' perceptions of the effectiveness of their courses (Ramsden 1991a). As we have already argued, the ratings of teaching used in the accountancy study (which were also based on those reported in Ramsden 1991a) seem to be entirely defensible. Comparable results were obtained when graduates and current students were surveyed, and there was evidence that the scores correlated with other measures such as student satisfaction, observers' reports, and student interviews (see Matthews *et al.* 1990). The inescapable conclusion is that the student rating scale is a sound indicator of teaching effectiveness at aggregate level.

Although all these research and teaching measures are certainly imperfect, it is not easy to explain the uniformity of the results obtained unless their accuracy, at least as crude indicators of teaching and research performance, is accepted. Our results might however have been different if our academic respondents had had incentives artificially to manipulate their reported publications and commitment to teaching – if, for example, the data had been collected in the context of performance measurement. Future studies which tested the replicability of these findings would be improved by using in addition student ratings at individual level, peer ratings of research, a valid measure of consultancy activity, and bibliometric indicators (citation analysis and impact analysis).

Neither the stronger nor the weaker versions of the teaching-research hypothesis receive support from these findings. The Accounting Review results demonstrated that academic departments which have a relatively high average research output per member of staff may be the least effective, in their students' eyes, at teaching. If there is no association, or a negative one, between research and teaching, then the existence of a positive functional relation is evidently ruled out. Is then the relation a negative functional one? Does doing research cause poor teaching? Does being a good teacher cause low research output? These are much harder questions to answer, and we cannot establish any causal links of this kind using the present results. The findings are based on studies of association, rather than of functional mechanisms, and therefore cannot reveal the existence of a sequence of cause and effect. The reliability of the inverse relationships at different levels of analysis and across different subject areas is nevertheless suggestive, and it provides a warrant for more intensive investigations of functional agency. It seems entirely plausible that

heavy involvement in research and publication, at least for some academic staff and some departments, takes time and effort away from teaching undergraduates. However, it is crucial to understand that the present evidence in no way refutes the proposition that the continuing study of and intellectual curiosity about a subject is necessary for effective teaching. Our results indicate rather that the simple model of more research, therefore better teaching, is suspect.

We have seen that two exceptions to the generally negative pattern of association between research and teaching occurred. The first was in the multi-level and aggregate level analyses of the CAE sub-sample (the association at individual level was positive in sign but not significantly different from zero). It is conceivable that there is a genuine effect here, given that many of these departments concentrate (or used to concentrate) on teacher education; perhaps this subject is unique in being best taught by staff who work in departments where articles about it are written and research grants to study it are obtained. There is a logical sense in which research about teaching, and teaching about teaching, are more closely linked than teaching and research in other subject areas (see Stenhouse 1985). Further investigations of the association between teaching and research at low levels of aggregate research productivity are required to establish whether marginal increases in research activity might benefit teaching in these departments.

The other apparent exception concerned the group of staff – the largest of the four groups into which the sample was divided – who rated themselves as high quality teachers and high quality researchers. The positive connection did not operate, however, when the associations within the group were examined. The staff in this category are apparently good, on average, at research and at teaching; it is true that there is a sense in which teaching and research go hand-in-hand for them; among these staff there no doubt exist outstanding researchers who are also excellent teachers. But the inverse within-group correlations offer no suggestion that the two areas of competence are functionally related. It is possible that an unidentified common cause of high ability in each area exists among these academics, although Feldman's review (Feldman 1987) explored this possibility and found no evidence to support such an explanation. It is nevertheless important to understand that the analysis of the characteristics of this group suggests that it contains a high proportion of staff who by virtue of their seniority are able to exert a dominant influence over the ideology of teaching and research in higher education. The strength of the continuing belief in a necessary complementarity between the functions may be related to their authority.

Since these results undermine the established view that teaching and research are mutually beneficial activities, their implications seem clear. First, the practice of allowing research performance to act as surrogate for teaching performance, as often happens when lecturers are appointed, is insupportable; teaching and research need to be separately assessed. The results endorse movements towards greater recognition of teaching in promotion decisions. Similarly, the assumption at aggregate level that the highest quality undergraduate teaching will inevitably be found in the best research departments cannot be sustained. At system level, any attempt to use performance indicators in higher education institutions in the search

for a more efficient allocation of resources must involve collecting data on both teaching and research activities.

The second implication might appear to be that separation of teaching and research would increase quality – especially teaching quality. The weak researchers would be freed from the distractions of attempting to do something they were inexpert at doing, could get on with doing what they are good at, and be rewarded for doing it. The objection to this argument is that it assumes that mediocre university researchers must be good university teachers. While our results do not support a causal interpretation of the effect of teaching on research, or the effect of research on teaching, neither do they provide any evidence that doing little or no research necessarily implies excellence in teaching. In fact, just as some staff rate themselves as good at both activities, some admit to being good at neither. Since our sample is almost certainly biased towards academics who see themselves as effective in at least one of the two areas, a far greater proportion of the total population than of the sample is probably underproductive in both. Neither separation nor integration of research and teaching provides a solution to enhancing these academics' effectiveness. A similar argument might be applied to the system-level policy option, on the face of it supported by our aggregate-level findings, of allocating research and undergraduate teaching activities separately between different institutions. It is not obvious from these results how this would enhance output in either area. On the other hand, it does seem clear that any general increase in research funding to institutions which have hitherto pursued little research cannot be expected automatically to enhance their teaching effectiveness.

A final implication relates to student choice of high quality courses. Our findings suggest that undergraduate students who select their programmes of study in the belief that high status, highly selective, highly productive research departments will provide the best teaching may be making a mistake. The most committed teachers are sometimes to be found teaching in the less distinguished departments – which, paradoxically, often have lower entry requirements. Although we have seen that good teaching and good research sometimes coexist, it is equally clear that scholarly prestige and extremely competitive entry requirements do not necessarily indicate excellence in teaching. More accurate public information about teaching quality in Australian higher education institutions might help prospective students to make more rational decisions about their programmes of study.

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