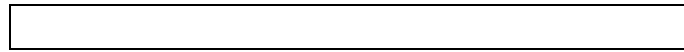


**INTERACTIONS BETWEEN
RESEARCH, TEACHING, AND
OTHER ACADEMIC ACTIVITIES**



Final Report to the
Higher Education Funding Council for England
as part of the Fundamental Review
of Research Policy and Funding

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Report contents

The report is in nine parts as follows:

Each main part of the report has a lead author from within our study consortium, but the whole body of our evidence and findings represents the work of the whole consortium.

Summary

The interactions between research, teaching, and other activities of higher education institutions.

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Annexes

A: Institutional policy and practice on the interactions between research, teaching, and other academic activities

Lead author: Allan Schofield

B: Interactions between research and teaching: academic activity

Lead authors: Professor Ronald Barnett, Dr Kelly Coate, Professor Gareth Williams

C: Indirect relationships: shared facilities and cross-subsidy

Lead authors: Melanie Burdett, John Fielden

D: Three international perspectives

Lead author: Svava Bjarnason

E: Views of young researchers

Lead author: Svava Bjarnason

F: Survey of institutions

Lead author: Jacqueline Burke

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INTERACTIONS BETWEEN RESEARCH AND TEACHING

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SUMMARY

1. This report is an analysis of evidence about the interactions between research, teaching and other activities in universities and colleges of higher education.

Context

2. Staff and institutions are almost invariably keen to engage in research – because it provides strong esteem drivers and is perceived to bring broadly based institutional and individual benefits – and this desire is reinforced by external assessment and public funding approaches.
3. Research in many peoples' minds equates to the paradigm of the science or laboratory-based model with (often) a pre-occupation with empirical data, research teams, high technology, and a consequent requirement for external funding. It is important to remember that the research model in some disciplines is different from this, but is not then less relevant to this national policy study.
4. Teaching is also a strongly valued activity for academic staff, but it is less overtly driven by public policy. The role of teaching is changing, however, under the influence of the diversification of the student population, pressure on the unit of resource, and new technology.

Key findings

Linkage of research to teaching

5. There is a strong presumption throughout much of higher education that '(good) research is necessary for (good) teaching'. This is true in many circumstances, but no one form of synergistic relationship is present across all institutions, disciplines and levels of study.
6. There is evidence of a number of areas in which research can benefit student learning. We identify four particular outcomes of this positive synergy:
 - direct benefits to some levels and types of study which come from exposure to the cutting edge of development of the knowledge base of the subject
 - direct benefits to potentially every higher education student, which come from developing the attitude of enquiry, the use of data to test theories and ideas, and the transferable skills of critical analysis and presentation of findings based on evidence
 - indirect benefits which come from the role of research in helping institutions to attract, reward and retain high calibre staff, who might otherwise not be available for undergraduate teaching
 - indirect benefits to student learning from the use of shared facilities, and the enhancement of resources and environment that research can bring to institutions.

7. The first type of outcome is largely driven by high quality in the 'classical' research model. This is the form that many institutions have in mind when they claim a necessary relationship. By contrast, the second type is much more generic across higher education, and could come equally from a range of other types of 'knowledge' activity, including research done for users, consultancy, and professional practice.
8. This analysis bears on the issue of whether excellent teaching can take place in departments or institutions with no research profile. The evidence is that it may do so, where it is underpinned by scholarship.

Scholarship

9. Scholarship is recognised as an important underpinning for both teaching and research, but scholarship is often not clearly defined or managed and has no specific funding. Research-intensive institutions often assume that research provides this underpinning; while less research-intensive institutions pay more specific attention to scholarship as an activity.

Institutional policies

10. Formal institutional policies to manage a direct academic relationship between research and teaching are sometimes weak. This reflects a general need for higher quality strategic human resource management in the sector.

Other relationships

11. Teaching benefits research. The main mechanisms for this are again direct and indirect. Directly, teaching provides a stimulus to individual academics, and some student projects may produce data which could feed into published research or grant applications, particularly in the sciences. Indirectly, teaching creates the research leaders of the future, and it also supports a base of shared facilities and resources with research.
12. Other entrepreneurial and commercial activities are not currently a source of significant synergy or conflict with teaching and research activities. However, this may emerge as the volume grows.

Research training and early career development

13. The pattern of research training is complex, but the traditional 'apprenticeship' model is being supplemented by more specific research training initiatives. Early career development and training can sometimes be haphazard, however, and new researchers can experience difficulty in obtaining appropriate preparation for the dual roles of research and teaching.

Shared facilities and subsidy

14. Teaching and research both benefit from the large element of common facilities (or joint production) which is one of the characteristics of UK higher education. We estimate that approximately one-third of the resources of research-active institutions may be conjoint in the sense that they contribute to both activities and cannot sensibly be separated.
15. There is increasing evidence that research projects are being subsidised by institutions. There are a number of sources of this subsidy. They include some running-down of physical infrastructure and income from commercial activities (consultancy etc). It is also clear that many staff work long hours. The impact on teaching is not simple to disentangle, but there is no evidence that direct teaching effort is being eroded. There is some evidence that innovation and development in teaching has suffered but there is no evidence that the UK is less innovative than other countries.

Staff

16. Pressures on academic staff may 'compartmentalise' activity but, depending on how this is managed, it may increase or reduce the efficiency and effectiveness of research, teaching, and other activities.

1 INTRODUCTION

- 1.1 Teaching and research are the core academic activities. Most academic staff do both. It is generally considered that research is a valuable, or necessary, part of the environment for good teaching, and it is assumed by many that all higher education institutions should therefore do research. Some also assert that the pressures to improve research outputs and quality have had an adverse impact on teaching. There is surprisingly little evidence around these issues, or on the conditions necessary to maximise any beneficial impact of research on teaching.
- 1.2 This report has been prepared to provide such evidence in support of the HEFCE Fundamental Review of Research. We review the relationships between research, teaching, and other academic activities and their effects across a range of disciplines and different types of institutions. The report draws on research and analysis carried out by a consortium of consultants and academics during the period November 1999 to March 2000. The study aims and method are in the Appendix.
- 1.3 This report provides an evidence base, from three main perspectives:
- a. the institutional perspective – the policies and strategies that universities and colleges have to influence these relationships (Chapter 3 and Annex A)
 - b. the academic activity in departments and academic units – what staff and students experience of these relationships (Chapter 4 and Annex B)
 - c. the resources that support these activities and the way they interact – issues of cross-subsidy and shared resources (Chapter 6 and Annex C).
- 1.4 We also examine research training in Chapter 5 and we draw upon: international comparisons; the views and experience of ‘new researchers’, and on a questionnaire survey of institutions. The core of the evidence base from our work is in the Annexes of the report and needs to be viewed as a whole. However, to help those who may not have time to study all the Annexes, this report provides a brief, and necessarily incomplete, summary of the evidence.

Acknowledgments

- 1.5 During the course of the study, our team have had contact with many individuals in more than 40 universities and colleges in England, Scotland, Wales and Northern Ireland. We wish to thank them all for their contribution to our work, and in particular, those institutions (listed in the Appendix) which provided information or hosted a visit by our team. They all contributed to our work, but the conclusions and views expressed in this report remain entirely our own responsibility.

2 CONTEXT AND DEFINITIONS

- 2.1 This study focuses on three aspects of academic activity: research (R), teaching (T), and other knowledge-based activities (O) of institutions, and the relationships between them. To do this, we pay attention to scholarship (S) which is closely related to, and can be important in, supporting research, teaching and external activities. We see these four activities as part of a spectrum of academic or scholarly activity and linked by a common aim of learning.
- 2.2 This report is primarily about the impact of research on teaching, but we do also look at the other relationships.
- 2.3 While there is some literature on the relationship of research and teaching, it is clear from our work that different institutions, disciplines and academics interpret and use these key words in different ways. We need to define a common language for the purpose of this study, and set the relationships between these activities within the current context of higher education (HE).

The higher education context

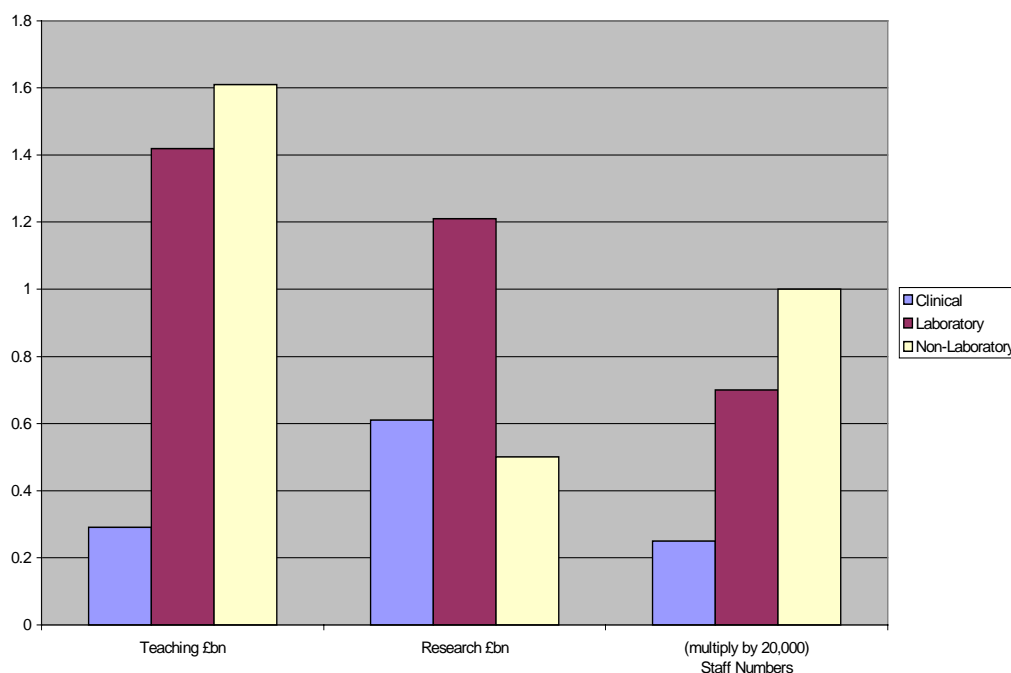
- 2.4 The Fundamental Review is set against the context of increasing selectivity in the public funding of research; the importance of retaining a UK research base which is of world class; and the increasing priority attached to applied and industry-relevant research.
- 2.5 The background for teaching includes the very significant expansion in student numbers in recent years; the creation of the new (post-1992) universities; the increase in vocational and professional subjects in higher education; and the current development of new quality assurance arrangements for teaching.
- 2.6 The expansion of higher education has been accompanied by a lowering of the unit of funding per student, and most universities and colleges have developed strategies to diversify their sources of funding to the point where the main block grant public funding for teaching and research is less than 40% of institutional funds (HESA Resources 1997-98). One of these strategies, now also a government policy, is the development of a third stream of academic activity relating to knowledge transfer activities such as consultancy, services to business, and exploitation of intellectual property rights.

Research activity

- 2.7 The pattern of research funding by broad discipline grouping is illustrated in Figure 1, which also shows the funding for teaching, and numbers of staff engaged in research.
- 2.8 By cost, the majority of research is concentrated in a few disciplines where there is usually a requirement for high-technology infrastructure and often for research assistants and technicians, and hence for significant external funding. Figure 1 shows that science, technology, and medicine account for approximately 80% of research income to universities and colleges¹.

¹ HESA Resources 1998-99 income (all sources) by department/Unit of assessment, grouped as appropriate.

Figure 1. Funds for research and teaching and staff engaged in research by broad subject groups 1998-99



- 2.9 Similarly, expenditure on research is concentrated in a few institutions (the 30 most research-intensive UK institutions account for about 75% of the publicly funded research).
- 2.10 However, these statistics alone, which suggest significant concentration of research activity, can give a misleading picture. Research activity is in fact very widespread. Virtually every UK institution submitted in the last Research Assessment Exercise (RAE), and there are 5 or 5* rated departments in 86 institutions (1996 RAE). Research in the arts, humanities and social sciences is generally less expensive than the sciences and is undertaken by a large number of staff. Over 20k staff in classroom subjects were returned in 1996 RAE, compared with under 14k in laboratory subjects and 5k in clinical (source: HEFCE).
- 2.11 It is inherent in the definitions given below that research has a public output which is open to scrutiny by the academic community, and research is normally seen as the highest form of scholarship. All the funding and reward mechanisms reinforce this value system and the definition of a university effectively requires a significant research portfolio to underwrite the use of research degree-awarding powers. Research is also perceived to be good for staff development, institutional image and reputation, student recruitment, and teaching quality. At a more pragmatic level, institutions have experienced long-term decline in the unit of funding for teaching, and many with little tradition of research perceive that developing a research portfolio is a way to diversify and protect their funding.

Teaching activity

- 2.12 Teaching is the other great academic activity and also holds a powerful position in the value system of many academics. However, its nature as a service activity contrasts with the more overtly ‘expert’ nature of research, and statements like ‘academics are paid to teach, but research because they want to do it’ illustrate this (while being an over-simplification).
- 2.13 Student numbers in higher education in England have risen significantly in recent years, and in 1996-97 the total number was over 920k full-time and over 520k part-time. The nature of the student population has also changed, with a significant increase in ‘non-traditional’ students. These include mature and part-time students, and also large numbers on vocational and professional programmes – sometimes in subject areas where there is not an established tradition of research – and the relationships with teaching will inevitably differ from the more traditional science or humanities disciplines.
- 2.14 The widening diversity of the student population; the switch in emphasis from teaching to learning; and new forms of teaching and learning pose significant challenges to the traditional concept of teaching in higher education. It is not yet clear how far new technology will replace traditional methods, but most commentators agree that whatever technology is used to deliver teaching, the need for tutorial support in some form will remain.
- 2.15 Funding for teaching by broad subject groups is shown in Figure 1, and there is an obvious difference in the relativities with research funding between subject groups.
- 2.16 Compared with research where the RAE provides an acknowledged ‘gold standard’, there is less agreement about what constitutes ‘world-class’ in teaching, and different stakeholders would emphasise different aspects (students, employers, professional bodies, academics, government). Teaching Quality Assessment (TQA) has a broader purpose than just quality (public accountability etc) and is about fitness for purpose, so is not strictly comparable between institutions (or departments).
- 2.17 There is much anecdotal dissatisfaction with TQA and some cynicism about whether the scores achieved really measure the quality and relevance of the student learning experience. The new QAA procedures for benchmarking will help significantly here by providing a threshold in terms of teaching standards, and QAA may also identify exemplary practice which could include examples of institutions ensuring the beneficial impact of research on teaching.

Staff

- 2.18 Academic staff are the common link between all these activities. Much of this report is about the evidence on how staff spend their time, and the factors which influence the interactions between their main activities.
- 2.19 It is commonly accepted that there are now significantly increased pressures on staff time and that for some staff, probably particularly during academic terms, these may become acute enough to influence the way different activities are carried out. The Transparency Review is likely to provide evidence on long hours worked by some

academic staff. While not unique to higher education, these factors influence our evidence, both on the interactions between activities, and on the issues of costs and subsidies.

Definitions

Research

- 2.20 A commonly accepted interpretation of research is to mean the discovery of new knowledge e.g. ‘creative work undertaken on a systematic basis in order to increase the stock of knowledge of man, culture and society’ (the OECD/Frascati definition).
- 2.21 Some would feel that this is too restrictive, and in this report we use the broader RAE interpretation: ‘original investigation undertaken in order to gain knowledge and understanding. It includes work relevant to the needs of industry and the public and private sectors; the invention and generation of ideas, images, performances and artifacts; and the use of existing knowledge in experimental development to produce new materials, devices, products and processes’.
- 2.22 While the ‘scientific’ or laboratory-based model of research dominates much policy discussion, it is important to remember that research in the arts and humanities follows a different model. It is more commonly individual (rather than a team activity) and library or desk-based, and it often involves relatively more engagement with the ideas and work of others, and relatively less with using technology to seek empirical data. These differences are relevant to the remit of this study, and they also mean that cutting-edge research in these disciplines can often be done without significant external funding. This partly explains the differences in relativities shown in Figure 1.
- 2.23 There may also be other models of research which are so far less well-characterised, e.g. in the creative and practice-based disciplines.
- 2.24 As well as this distinction between laboratory, and desk, library, or performance-based research, we can look at the objectives of the research. Generally, that sponsored by the Research Councils, medical charities and ‘own-funded’ by institutions (i.e. using the funding council’s block grant for research) would be regarded as more speculative and strategic, i.e. about new knowledge with no immediate requirement for application. Research for industry is often much more tactical or applied. At this end of the research spectrum, research shades into a number of other activities – such as development, testing, consultancy, clinical trials, artistic production – most of which would be ineligible for submission to the RAE, but the boundaries are not always clear.

Teaching

- 2.25 Teaching may be interpreted in a variety of ways from the relatively restricted (transmitting knowledge) to the more inclusive (e.g. designing and facilitating a range of student experiences and monitoring and evaluating). With the development of resource-based learning, some aspects of teaching in the broader definitions are under institutional control, rather than that of individual academics.
- 2.26 In terms of the existing categories of QAA subject review, this definition would include:

- curriculum design, content and organisation
- teaching, learning and assessment
- (part of) student progression and achievement
- (part of) student support and guidance
- (part of) quality management and enhancement
- (but exclude altogether) learning resources.

2.27 We note that only the first two of these appear to have the potential to directly benefit from subject-based research.

Other activities

2.28 Other activities includes a range of academic activity directed at producing outputs which are specifically not teaching or research. These can range widely, but for this report, we include all the **knowledge transfer activity** which is of growing importance in most institutions and is commonly seen as comprising the ‘third leg’ of an academic career. We would include:

- consultancy and services to industry
- development and exploitation of IPR
- outreach and work with the community.

2.29 While they generally do not lead to published outputs these activities do produce intellectual outputs for clients (including non-publishable research). This is an important feature of O which, at least at advanced levels, should be seen as a rigorous academic activity with measurable outputs. For this review we would exclude from O support activities like administration and other business activities with no advanced knowledge-base (residences, catering, conferences etc). However, we note that many staff interpreted O more widely (to include administration and other support activities) and we do discuss the importance of these in the report.

Scholarship

2.30 Scholarship is widely used as a term in some institutions, but is less well-defined than Teaching or Research. We define scholarship to imply an interest in already existing texts (or authoritative sources of knowledge) and to have a notion of breadth and of altruism – i.e. of seeking improved understanding as a goal in its own right. There must also be a social dimension to scholarship, which implies an active engagement with academic peers (not just private study). It also means accepting academic norms on plagiarism and referencing.

2.31 Scholarship has been described by Boyer (see Annex G) as having four elements: the scholarship of discovery, the scholarship of integration, the scholarship of application, and the scholarship of teaching. The first two elements might broadly be viewed as being about the advancement and rigour of knowledge, and the second two as about its useful application to serve society.

- 2.32 Scholarship in this sense is not the same as research (although it is closely related to research in the arts and humanities). As Boyer notes, it may have a range of different manifestations, but as defined above it is always a rigorous activity which leads to outputs that can be recognised by institutions, students and academic peers
- 2.33 Reflecting the lack of a common interpretation in the sector, we have considered two definitions of scholarship which differ in whether they regard scholarship as an aspect of the other three academic activities – which is often the case – or whether scholarship can, in certain circumstances be a fourth distinct activity in its own right. We expect that views in the sector will differ on this, and for purposes of this report, we adopt the second broader interpretation.
- 2.34 We would argue that scholarship is a necessary underpinning to both good teaching and research, but both are sometimes done without it. We discuss the requirements for ‘being a scholar’ in chapter 4.

Summary of definitions

- 2.35 There are risks in attempting to shorten or simplify the above definitions, but we offer the table below as an illustration of the way we define R, T, O, and S and the outputs they produce. There are significant overlaps between them, and the relative extent of these will vary with discipline and level of study. For example:
- In the arts and humanities there may be considerable overlap of R and S
 - at postgraduate level, R and T will overlap much more than they do at undergraduate level
- 2.36 We discuss these relationships, which are the main focus of our study, in more detail in the following chapters.

Figure 2. Definitions and outputs of Research, Teaching, Scholarship, and Other activities

Teaching (T)	delivery of knowledge and facilitation of learning	student learning
Research (R)	development of new knowledge	publishable results
Other activities (O)	knowledge transfer with business and the community	income and outputs to clients
Scholarship (S)	intellectual engagement with the discipline (may include parts of T, R, O)	outputs to T, R, O

3 INSTITUTIONAL CONTEXT

3.1 In Annex A, we consider the way that universities and colleges view the interactions between research and teaching, the objectives they have in this area, and how their intentions are set down in institutional policy and subsequently implemented. The key questions we address are:

- What do institutions believe about these relationships?
- What policies and plans do they have to influence them?
- What are they doing in practice?

3.2 For the purpose of selecting case studies for our research, we grouped institutions into six broad categories as shown in the table below, which also shows the numbers of institutions in each category contributing to our research. These categories reflect the relative proportions of research (by income) and of postgraduate students, and they can be helpful when considering the relative place of research and teaching in the institution, and the relationships between them.

3.3 In this and subsequent chapters we sometimes refer to institutions as being (for example) ‘a Group A institution’ as a convenient shorthand which gives an indication of the type of institution without having to name individual universities or colleges.

Group A	The research-led institutions (>50% R)	4
Group B	Research-intensive (R income 30-50%)	14
Group C	Pre-1992, selective R (R income >20%)	10
Group D	Post-1992, research-active (R income >10%)	6
Group E	Teaching-intensive (limited R income)	3
Group F	Specialist institution	4

Institutional assumptions about the interaction of research and teaching

3.4 Almost all research active universities and colleges in our survey identified research as being essential in supporting and enriching teaching, and indeed in many such a link is almost an article of faith. The response of one Group B university is typical:

‘teaching and research are intimately linked and enrich each other in broadly equal measure’

3.5 Such views are often supported anecdotally by statements such as ‘our best researchers are often our best teachers’ although evidence to support such contentions is rare.

3.6 Many less research active institutions identified a similar interaction between research and teaching. One Group D institution reported:

‘The idea that any university can sustain its teaching and other activities without a substantial and dynamic research base is untenable’

- 3.7 However, many institutions in this group also report that high quality teaching does not necessarily depend on staff being research active.
- 3.8 The closeness of the perceived link between research and teaching is not difficult to understand: both processes are at the heart of UK higher education, and for many senior staff and heads of departments, their own experience is likely to have been that their own research has enriched their teaching. The research literature shows that this view is not unique to the UK.
- 3.8 However, the evidence for any necessary relationship between research and teaching is poor. In particular:
- considerable research in different countries has failed to identify any strong link in practice between research and undergraduate teaching. (The published evidence has been reviewed in more detail in a paper by Professors Barnett and Williams which was a precursor to this study)
 - although studies of student satisfaction have identified that students perceive benefits from the ways that research can inform teaching, they also perceive significant drawbacks
 - if the RAE and TQA outcomes are to be accepted as measures of quality, the existence of academic departments with 'excellent' TQA scores but with weak or no research must question the assumption that high quality teaching needs to be associated with research.
- 3.9 This issue has important implications for policy. A significant proportion of students are educated in institutions which are not funded for research, and they might be considered to be disadvantaged by current funding policy if research were shown to be essential for good teaching.

Institutional policy on the interaction of research and teaching

- 3.10 If the beneficial interaction between research and teaching which institutions value cannot be assumed, we might ask what policies they have in place to ensure it is achieved. We can find evidence in two main areas: research strategies, and teaching and learning strategies.

Research strategies

- 3.11 As already noted, there are strong drivers to develop and increase research activity in virtually every institution. Many, but not all, of those we visited had a formal research strategy. We are interested in the impact of these on teaching. We observed three different types of strategy which are interesting in this respect. These are of course illustrative rather than a definitive summary of research strategies.

a. Devolved approach – maintaining a leading research profile

- 3.12 A small number of the most research-intensive institutions (Group A and a few in Group B) had a ‘light touch’ strategy in which they effectively considered that research policy should be led by the academic departments, and that the role of the centre was ‘to attract world-class research staff and to give them their heads’.
- 3.13 In general, these institutions were less concerned about which areas of research were pursued than that all staff were research-active and that every department’s research performance was good. One noted that departments that performed well would retain substantial autonomy, but those which failed to do so would find themselves effectively required to restructure or merge.
- 3.14 We are of course interested in the implications of this strategy for teaching. These institutions were typically among those that saw the closest relationships between research and teaching, and they usually had in mind the scientific model and upper levels of undergraduate and postgraduate work when they illustrated this. For example (speaking of their final year undergraduates):

‘all students with experience of project work and some awareness of the current leading edge(s) of their subject’

- 3.15 The evidence for a close synergy of research and teaching here is difficult to interpret because of the difficulty of unambiguous measurement of teaching quality and its links to student outcomes. Certainly most of these world-class research institutions score highly on TQA. However, we might question whether this is a specific result of their strategy, rather than a by-product of attracting the most excellent staff and the most highly motivated students (and operating with a relatively high resource base).

b. Centralised approach – selective improvement

- 3.16 A larger group of institutions in Groups B and C had a more directive approach to research strategy. In these cases, typically there was a proportion of staff who were not (or no longer) research-active, and the institution wished to improve its research profile in some specific areas.
- 3.17 These institutions took a much more ‘hands-on’ approach with their departments, to the point of selecting specific areas for improvement and backing this up with institutional resources. Typically, these institutions were also much more likely to have considered the impact of these policies on teaching, and some had developed a number of human resources policies to deal with this.

c. University developing a research profile

- 3.18 A further group with clear and distinctive policies in this area was represented by a number of institutions (typically in Group D) where the main focus of their strategy was to develop and extend their research usually from a relatively small (and largely unfunded) base. A typical statement on the reasons for this:

‘all faculties cite the enhancement of teaching as a primary rationale for research, and are able to give illustrative examples’

- 3.19 In most cases, these institutions did not have large reserves or uncommitted funds and so had to adopt a targeted approach to investment into selected areas where there was perceived to be the best prospect of achievement. This might include decisions to cross-subsidise research in order to pump-prime new developments.
- 3.20 In these institutions, where there was often not a history of a general research culture, quite specific policies were also needed to support and develop staff for a research role. By contrast with the other groups, these institutions mainly had a culture which was led by teaching and so they were often found to have devoted much more management time and attention to the conditions required for good teaching, including encouraging pedagogic research, special policies on scholarship etc.

Teaching and learning strategies

- 3.21 At the time we visited, all institutions were in the process of preparing teaching and learning strategies under an HEFCE initiative. A number discussed their policies with us, and we also reviewed the written strategies of 78 English universities including the London University Colleges.
- 3.22 We found that only about 50% of institutions had any statement resembling a commitment or objective in their strategies that research should have an impact on teaching, and a much smaller proportion (approximately 10%) identified in any detail the mechanisms by which this impact might be achieved.
- 3.23 The small group of institutions which had identified such specific mechanisms broadly equated to either the most research-intensive institutions (it included all four in Group A), or those in the forefront of educational development in teaching.

Policy linkages

- 3.24 Several institutions appear to plan for specific activities drawn from research to have a direct impact on teaching, for example through specifying particular teaching activities or assessment methods. Thus one university requires all third year undergraduates to undertake a research project based wherever possible on current research activities within departments. In other cases institutions may not plan such activities centrally but provide the opportunity for staff to change the curriculum, for example by introducing new modules to correspond with particular research interests.
- 3.25 In other cases the institution may plan for a particular interaction of research on teaching without specifying outcomes, for example by specifying that all research staff have to undertake some teaching. In many institutions there may be no planned or direct impact of research on teaching, rather the assumption that a research oriented culture will inevitably have a positive impact on teaching.
- 3.26 In Figure 3, we illustrate the two dimensions that are crucial to understanding institutional interpretations of the link between research and teaching: the extent to which any link is planned or not; and the extent to which the link is direct or indirect.

Figure 3. Interactions of Research on Teaching

	<i>Direct impact of Research on Teaching</i>	<i>Indirect impact of Research on Teaching</i>
<i>Planned impact of Research on Teaching</i>	Through specific teaching methods e.g. third year undergraduate research projects for all students	Through institutional guidelines that state processes but without specifying outcomes e.g. all research active staff should teach, but without any expected direct impact
<i>Unplanned impact of Research on Teaching</i>	Through individual activity by academic staff in relation to specific parts of their own teaching e.g. curriculum changes	Through the assumption that a research culture has an impact on teaching

- 3.27 The mechanisms and manifestations of these and other interactions are discussed in Annex B and chapters 4 and 5. Not surprisingly, the matrix above needs to be significantly disaggregated to cover all the relationships that we observe in a selection of academic departments in different disciplines and institutions.
- 3.28 Even within those institutions noting the importance of research for teaching, only a very small number identified the deeper issue of the interactions between research and student learning. This suggests that the emphasis that HEFCE has begun to place on learning has yet to be fully reflected in the strategic thinking of many institutions.

The impact of research and the RAE on teaching

- 3.29 The task of identifying the way that institutions influence the link between research and teaching is complicated by the existence of numerous factors, which makes any simple statement of cause and effect difficult. These factors include:
- the mission and culture of the institution
 - disciplinary and subject differences which influence curriculum design
 - the influence of professional bodies on the curriculum
 - the rewards and incentives available to staff
 - differing conceptions of teaching
 - the intellectual ability of students
 - the effectiveness of institutional management in creating the circumstances for research to inform teaching.

3.30 In practice it is complex to deduce any simple relationships between institutional actions and beneficial (or other) impacts of research on teaching. However, it is clear that research has the potential to inform teaching in a positive manner and that institutional actions can facilitate or hinder this beneficial impact. In Annex A, we consider a number of conditions that need to be met to help to ensure a positive relationship.

The Impact of the RAE

3.31 There is general agreement that academic staff have to cope with greater, and more conflicting, pressures on their time than in the past. The RAE is only one of these influences, but one of the most powerful. A critical issue is whether the pressures of the RAE have directly damaged the quality of teaching. We found a widespread view that this is not the case, and there is no evidence of institutions or departments with high RAE scores doing poorly on TQA – in fact the reverse is the case.

3.32 We conclude that the RAE has not directly damaged the quality of teaching. There is a view among some interviewees that innovation in teaching has suffered as more emphasis is placed on the RAE and workloads are strained; however, there is no evidence that the UK is less innovative than other countries. Activities quoted as coming under pressure include, for example, producing new teaching materials, experimenting with initiatives, and the attention paid to student support, tutorials, and so on. However, there is a wide variety of views about whether such consequences are inevitable – or primarily due to the RAE.

3.33 Overwhelmingly, the view of approximately 30 senior staff, including vice-chancellors and deputy vice-chancellors, deans, heads of educational development units, heads of personnel, and so on was that there was a negative effect of research on teaching, weak management within most universities was the most frequent cause, and all too often heads of departments were left to manage competing workload demands without guidance or support from senior managers.

3.34 However, an alternative argument was identified in some post-1992 universities, where a more managed approach prevails and teaching loads are very high. Some considered that the point may well have been reached where widespread staff commitment to research within a department is very difficult because of the high workloads involved.

Resource allocation

3.35 The way institutions allocate resources is one of the most powerful ways they influence academic activity. In England, the block grant principle enables institutions to use their funding council grant for teaching and research as a single sum which they can allocate internally according to institutional strategies and priorities.

3.36 Our survey of institutions (Annex F) shows that most in fact choose broadly to reflect the way the funding council calculates the grant – i.e. based on research volumes and quality, and student numbers and price bands. Many have internal resource allocation models which reflect these factors, although some also build in incentives or weightings to reflect institutional priorities. This reflects a prevailing culture in many institutions that it is academic departments which know best how to use the HEFCE

- resources they have earned. An exception to this is that some post-1992 universities are much more likely to make strategic allocations in order to facilitate new research developments, not based on the existing pattern of activity.
- 3.37 This pattern of resource allocation within institutions transmits the research driving incentives to departments. At departmental level, resource allocation is primarily about staff time and the management of staff workloads for teaching, administration etc. Again, there is a common culture in a number of the established research universities of a rather collegial approach to this where the main objectives may be some kind of broad perceived ‘fairness’, and where the head of department (who may be elected or rotating) is seen as simply a *primus inter pares*. In some of the newer institutions, by contrast, there is a more managerial ethos which may have a more directive approach with the specific aim of maximising outputs and income.
- 3.38 As regards Other activities, the main issues are related to the way that ‘private consultancy’ is interpreted and managed (if at all) by the institution, and the policies on sharing of income from these activities. The evidence shows that this area is still relatively small at sector level (although important for certain disciplines and institutions, and now being encouraged by government). In general, institutions do not yet have well-defined policies in this area.
- 3.39 We discuss resources used for teaching, research, and other activities in Chapter 6.

Human resource management and staffing issues

- 3.40 The interactions between research and teaching raise significant strategic issues for human resource management (HRM). We have examined the extent to which institutions have introduced specific HRM policies to encourage a creative interaction between the two. We noted above a widespread view that better management of time and workloads is a key factor in mitigating any adverse impacts of the RAE. However, our observations support the view that the majority of institutions we encountered were still struggling with the problems of the past decade (such as contracts and ensuring that staff appraisal schemes worked), rather than future-looking policies to achieve added value in institutional outcomes.
- 3.41 We note in this connection evidence that the culture in some institutions is suspicious of ‘management thinking’ and that some even do not accept that recognised good practice in HRM is appropriate to an academic culture.
- 3.42 Despite this background, progress is being made in some areas. A particular cause of concern has been the domination of research in promotion and staff selection decisions. It now appears that many research-intensive institutions have amended their procedures explicitly to take account of teaching in both initial academic staff selection decisions and for promotion to senior lecturer. However, the research culture remains strong in relation to HRM, and few of those institutions which have opened up ‘teaching-friendly’ routes to promotion have yet had significant numbers of successful candidates through this route.
- 3.43 The impact of the Institute for Learning and Teaching (ILT) as a way of encouraging teaching remains unclear, and a number of senior staff in research universities visited could not see much incentive for their staff to join. In general, the view in less

research-intensive institutions was much more positive, and it was common for these institutions to offer incentives to staff to do so, or even to make it effectively a condition of employment.

- 3.44 Among new researchers there is concern that the demands of participating in ILT (although widely accepted) come at exactly the most difficult time when they are struggling to establish their research credentials. A related strong message from the work with new researchers was that institutional practice in terms of induction of new staff, and their preparation for both teaching and research, is variable, with many staff considering that they have been relatively poorly equipped for these roles.
- 3.45 The term scholarship was not much used in our conversations with research universities; many would consider that a research ethos provides a base of scholarship. In contrast, we found that institutions or departments without much research activity commonly have specific policies to promote scholarship as a matter of staff development and to underpin good teaching.

Conclusions on institutional strategies

- 3.46 With the growth in student numbers, and the growth of new subjects, many students are taught by staff who are not themselves research-active or in institutions which are not research-led
- 3.47 However, all students need transferable skills and can potentially benefit from exposure to the methods and attitudes associated with advanced forms of scholarly activity that require the assessment of evidence, critical analysis of ideas and theories, and the skills to interpret data and communicate conclusions.
- 3.48 Expressed in this way, it is clear that these beneficial impacts are not uniquely derived from research measured by publications in refereed journals. There are numerous ways that academic staff can stimulate subject interest, for example through consultancy, technology transfer, and membership of professional bodies. While it is rightly assumed that high quality research has the potential to enhance teaching under certain conditions, all indications show that other appropriate forms of advanced scholarship – usually externally derived – can have a similar effect, again under appropriate conditions.
- 3.49 In view of the central nature of research and teaching in HE, the almost universal assumption that R benefits T, and the importance of scholarship, it is perhaps surprising how relatively few institutions have specific policies in place either to monitor or to develop and maximise these beneficial synergies.
- 3.50 The attitude of ‘minimal management intervention’ adopted by some institutions recognises that linkages between the four academic activities are subtle and not necessarily amenable to simple management action. However, it may be good practice for all institutions to examine whether there would be benefits in spreading best practice.

4 OBSERVED RELATIONSHIPS BETWEEN T, R, AND O

4.1 In Annex B, we review the evidence ‘from the chalkface’. We present there a range of evidence about the relationships between research, teaching and other academic activities as these are experienced by staff and students in four discipline areas in a range of types of institution. The discipline areas chosen were:

- chemistry
- engineering
- history
- business studies.

4.2 These were selected to represent the broad groupings of types of discipline (science, technology, arts, professional) and also because the data we obtained could build upon previous work, thereby adding additional value in the necessarily tight timescale for this project. However, we recognise that other disciplines might show different characteristics, and in particular it would be interesting to compare our results with the clinical disciplines and also with examples of the professional, vocational and performance disciplines.

4.3 In this chapter, we provide a necessarily partial summary of some key elements of the evidence from Annex B. In particular, we address the following questions:

- Does world-class research lead to excellent teaching?
- How does research inform student learning?
- Is research necessary for good teaching?
- What minimum level of scholarship might be expected of all staff?

Analysis framework: volumes, values and possible relationships

4.4 The framework we have used for analysis distinguishes between the *volumes* of teaching and research, indicated by the staff time and workloads associated with each activity, and the *values* which academics, students and institutional managers accord to each activity. Sometimes these two dimensions are in balance; sometimes they are in opposition.

4.5 Within this framework for analysis, there are six relationships between research and teaching which are illustrated in Figure 4. These relationships can be:

- integrated (R and T are the same or there is significant overlap)
- positive (R benefits T or vice versa)
- independent (no interaction)
- negative (R damages T or vice versa).

Figure 4. Relationships between research and teaching in academic departments

Research and Teaching – no distinction considerable overlap if not identical	
R: positive influence on T	T: positive influence on R
Research and teaching independent of each other (neutral relationships)	
R: negative impact on T	T: negative impact on R

4.6 All these relationships might be found within any one department in an institution. This in itself is an important finding which challenges some of the easy assumptions that it is always the case that ‘research is good for, or is necessary for teaching’.

Findings on volumes

4.7 Within the context of volumes, we find that:

- staff time is the main resource (we consider non-staff resources in chapter 6)
- the distribution of effort varies widely across the year as well as between staff, departments, disciplines and institutions
- many institutions have a collegial rather than a managed style in academic departments
- most staff claim to work more than 40 hours and many do work outside normal hours that may not be known to their department
- teaching workloads and time are easier to measure and manage than research
- it is difficult to measure the effort on research because of the ‘indivisibility’ of T and R and the difficulty of separating ‘work’ and ‘pleasure’.

4.8 Work done for the Dearing Inquiry (a telephone survey of 800 academic staff in 1996-97) provides one of the most comprehensive sources of information currently available on how staff spend their time, and their attitudes to their various activities. The Transparency Review will, over the next few years, provide for the first time a comprehensive and robust source of data on the time devoted to the various academic

- activities (but not in time for this review). We also obtained some useful data from the 350 new researchers who attended workshops during the review (see Annex E).
- 4.9 The Dearing survey found that more than 80% of staff did some research and that, on average, they spent 20% of their time on research, but wished to spend more. A large proportion of staff (nearly a half) claimed to do most of their research in their own time.
- 4.10 There is some evidence that the RAE has shifted the balance of the volumes of T and R in favour of research. There is also a view that the RAE encourages research that: places a premium on short timescales; generates quantitative rather than discursive findings; and generates publications in prestige refereed journals. It is also felt by some that these may not be as beneficial to the curriculum as some less publishable research and consultancy.
- 4.11 Teaching is a substantial consumer of time for many staff, including – of particular interest for this review – new ‘research staff’. While the pattern varied significantly, it was clear that many of the new researchers attending workshops had significant teaching loads to the extent that often considerably less than 50% of their time was available for research. In some cases, their research time was as little as one day per week, and even this was sometimes ‘requisitioned’ by their departments (e.g. to cover for staff absences).
- 4.12 Relatively little staff time across the sector is devoted to O activities as defined in chapter 2 – although this can be very significant for individual staff and within particular departments. A survey reported in the Times Higher Education Supplement (10 March 2000) shows that approximately 50% of staff spent no time on entrepreneurial or commercial activities, and approximately 20% spent less than one hour a week on them. These percentages were similar for both old and new universities.
- 4.13 There is a widespread view that ‘administration and management’ has grown significantly and is now, for many staff, a major pressure on their time. A significant part of this growth is due to external pressures for accountability (e.g. TQA, which is acknowledged to have some beneficial effects on teaching). Other work is associated with the growth in student numbers and diversity, and the complexities of running institutions in a more competitive and accountable environment.

Findings on values: shifting priorities and the impact of RAE and TQA

- 4.14 We have already noted the strong external research driver. In research-intensive institutions, this usually aligns with the values of staff, and the result is a strong orientation to value and reward research effort, and to manage workloads and processes in order to facilitate staff time on research. An example of this is research-active staff being able to ‘buy themselves out of teaching’. [Other manifestations of movement of research-active staff which it is claimed often works to the disadvantage of institutions with a lower research profile who see promising young staff moving to more established research institutions THIS SENTENCE DOESN’T MAKE SENSE]. However, we note that the study from PREST of staff movement found no evidence that the RAE was significantly promoting staff movement; rather, it showed that it was

having some small effect on the timing of movement, and that in fact the level of movement might not be large enough to support continued dynamism in the sector.

4.15 These factors have the potential to be negative for teaching. However, there is also a strong value attached to teaching, and there is some evidence that this has been strengthened in recent years, partly as a result of external quality assessment. There are examples where institutions have recognised the need to express this value through a number of initiatives, including:

- expecting all professors to teach
- introducing teaching routes to promotion
- promotion of scholarship and pedagogical research.

Does world-class research lead to excellent teaching?

4.16 The evidence shows that there is no automatic relationship which implies that staff, departments, or institutions that are conducting excellent research will necessarily be excellent at teaching.

4.17 There is a correlation between the two because the attitudes, values and competencies that lead to excellence in research are also likely to lead to excellence in other spheres of academic activity. Moreover, the strong presumption many staff hold that research and teaching are mutually beneficial, implies that they are likely to behave in ways which will realise these relationships. Further, the strong element of joint production and use of shared facilities (which we discuss in chapter 6) will tend to create a positive relationship.

4.18 However, there are examples of excellent research which has no direct connection with student learning, and there are examples of good researchers who are poor teachers, or who do not teach. There are also examples of research competing with resources for, or distorting, teaching activity.

4.19 [We conclude that while excellent research can create a stimulating environment for student learning, a number of other factors must also be in place and it is not a sufficient condition and teaching, research and other activities must be integrated at the level of the individual, department or institution. THIS SENTENCE DOESN'T MAKE SENSE]

How does research inform student learning?

4.20 Despite the above qualifications, research can in many circumstances act to benefit teaching. The range of these positive interactions is illustrated in the following figure.

Figure 5. Positive interactions of research on teaching

Examples of types of relationships	Indicators/impact or comment
Research as means to extend the boundaries of subjects	Students experience cutting-edge of subject and stimulation this brings
Research as a process of critical enquiry	Students develop critical analytical abilities

	– how to find, evaluate and use information
Pedagogy research	Teaching and learning process is optimised
Research as reward for academic staff	Retention of higher calibre of staff
Research as provider of resources	Teaching enriched through shared use of resources

4.21 The first and second of these are of most interest in this chapter as the two principal direct (or academic) mechanisms by which research informs student learning.

Direct benefits at the cutting edge of disciplines

4.22 Firstly, in certain institutions and disciplines, and at certain levels within HE, it is important for students to experience being ‘at the cutting edge’ of their subject. This is a relationship where the excitement of engaging with the development of the knowledge base of the discipline itself contributes to student learning. (It is true of course that research underpins all human knowledge, and therefore in one sense – but not a very helpful one for this review – all teaching draws upon the results of research.)

4.23 Both staff and students regularly commented on the value of this aspect of the relationship between research and teaching. It normally presupposes the existence of some cutting-edge research in the institution, and so is not relevant to every type of institution. The importance of this type of relationship will be a function of the mission and value system of the institution concerned.

4.24 We find that this relationship is generally much closer, in the science-based subjects, at upper levels of undergraduate work (years 2 and 3 and in Honours years) and in postgraduate work. It is probably necessary for this relationship to work in order for students to have a sufficiently developed interest and ability to be able to benefit.

4.25 The following figure summarises the observed closeness of links between research and teaching. In the figure the pluses show the strength and directness of the relationship which many consider necessary or desirable to achieve the outcomes of good teaching.

Figure 6. Observed direct relationships between research and teaching

Observed relationships between teaching and research

	Chemistry	Engineering	History	Business Studies
P Grad R	++++/+++	++++/+++	+++	++
P Grad T	+++	+++	++++/+++	++
U Grad Y3	++++	+++	++++/+++	++
U Grad Y2	+	+	+	+
U Grad Y1	+	+	+	+

Key:

- ++++ Teachers/supervisors 'teaching their own research'
- +++ Teachers/supervisors research active in relevant field
- ++ Base of relevant research in the department
- + General culture of research and enquiry informs teaching

4.26 This figure is only indicative. Not all academics or institutions would agree about it, and anyway it is a summary of a complex situation. In reality, the closeness of these links will vary with discipline, institutional circumstances, student ability and other factors. However, the general pattern of relationships is supported by our evidence, and could be illustrated by a number of particular instances such as:

- The most direct relationships in chemistry and engineering are at the level of postgraduate research, and the final year of undergraduate programmes. Typically, final year undergraduate students and research students work on the same research projects as the academic staff. These projects often lead to joint publications between staff and students.
- The picture is quite different in history at postgraduate research level. We were given examples of cases where students and supervisors were even located in different departments from each other. However, the research interests of history staff quite often form the basis of the curriculum of final year undergraduate courses and of MA programmes.
- In business studies, the research students may be working on projects which are closely related to their supervisor's research, but this is not automatic and necessary in the same way as in the sciences. The research students we spoke with indicated that it was important for the general area of their research to be represented among the staff, but their supervisors were not necessarily research-active in the same field (indeed, they might not even be considered to be research-active in the strictest, RAE sense).
- At the levels of the first years of the undergraduate degree in all four subjects, the relationship between teaching and research is not very direct, and may almost be non-existent. Although many respondents claimed to use examples from their research to illustrate concepts to undergraduate students, this does not constitute a close integration of teaching with research. However, a general culture of research and enquiry existed in all the departments we visited, and most respondents perceived the research culture to enhance their teaching even in first year introductory courses (by enthusing the staff, giving them more authority, and so on).

Direct benefits at cultural or methodological level

4.27 Secondly, higher education is about developing the capacity for critical thinking, and gathering and evaluation of information (i.e. self-directed learning) which we believe is the distinguishing factor in 'graduateness'. There is a considerable body of evidence from institutional policies and strategies which supports the view that this requires students to:

- engage fully with their subject matter
- be exposed to the research method

- be aware of the latest thinking in their disciplines
 - understand how data can be evaluated and analysed
 - be aware of the limits of their knowledge – and how to extend them
 - have some experience of project work
 - have experience of marshalling and presenting evidence and defending and explaining theories against critical scrutiny.
- 4.28 In principle this type of relationship applies equally to all students and all disciplines in higher education. For those not involved in research projects and work drawing on cutting-edge research discussed above, this second relationship will be their main opportunity to develop these values and competencies. The benefits to student learning come from a process whereby the students are themselves engaged in discussion, self-directed learning, project work, and other forms of relevant learning experiences.
- 4.29 A critical difference is that these forms of learning do not require staff to be recognised in terms of high RAE ratings. They can be informed by staff who have personal experience of, and the credibility and authority that comes from, a variety of types of (usually externally derived) scholarly activities. These would certainly include research, but could also include other appropriate forms of scholarly activity including:
- advanced (evidence-based) consultancy
 - professional practice at advanced levels
 - engagement of a senior and strategic nature with relevant external activities.
- 4.30 This second beneficial synergy between ‘research’ and teaching is therefore more generic than the first and is about the beneficial synergy of a number of forms of advanced scholarly activity. This helps to address the third question of whether research (as defined in chapter 2) is required for good teaching (see below).

Indirect relationships

- 4.31 As Figure 5 shows, there are other less direct relationships by which research can impact on teaching. These include:
- the impact of pedagogical research on teaching and learning methods
 - the beneficial impact on recruitment and retention of staff
 - the potentially beneficial impact on resources in institutions with significant research income (which we discuss in detail in chapter 6).

Is research necessary for good teaching?

- 4.32 The assumptions made in the sector about the closeness of the links between research and teaching lead to a number of key questions to be addressed:
- Does every teacher have to be engaged in research?
 - Are institutions with no research less able to do good teaching?

- Does the fact that a significant proportion of the sector is not funded to do research (as part of the policy of selectivity) therefore threaten the quality of teaching for many students in HE?

4.33 The evidence which we have discussed just above leads to the following conclusions:

- a. Not every teacher needs to be engaged in research, in the narrow sense of the sort of work that will win recognition under the RAE, but they probably do need to be engaged in some advanced scholarly activity (see below). For students in some disciplines and years of study, some of the staff at least do need to be involved with research as discussed above.
- b. Few institutions have 'no research', but a significant number probably have such a low research profile (in the RAE sense) that many students would not be significantly exposed to cutting-edge research. It follows from the evidence and analysis presented above that such institutions are not prevented from doing excellent teaching. There is evidence that many do so, underpinning the student learning experience by various forms of scholarly activity other than research and including 'non-RAE' research.

It might however be difficult for such institutions to teach very research-dependent subjects. There is also a question about how satisfactorily institutions with little or no high quality research activity are able to supervise postgraduate research degrees.

- c. As the sector has expanded, many students are now studying subjects which do not have an established research base, or a tradition of strong research activity. For students who choose to study these subjects, there is no detriment to their education if they study in departments or institutions without a strong research base, provided that the conditions are in place for the student learning to benefit from research and other forms of advanced scholarly activity as appropriate to the circumstances.

What minimum level of scholarship might be expected of all staff?

4.34 There is an underlying assumption in all the conclusions above that staff, departments and institutions are engaged in advanced scholarly activity which can benefit student learning, even if in particular cases there is no relevant research activity. A critical issue therefore is to define the minimum level of such activity which is required for effective undergraduate teaching. The evidence suggests that:

- a. All teaching staff should have a minimum amount of funded and recognised space and time in their schedule to allow them to develop the attributes of scholarship discussed below.
- b. All teaching staff should be strongly encouraged or expected to do something outside their teaching and the direct preparation for it. This is analogous to CPD required in many professions, and we might call it 'engagement with the discipline in the real world'. Examples include:

- research
 - university consultancy at an appropriate level
 - professional activity (e.g. professional practice with clients, or playing a role in the running and business of a professional body).
- 4.35 To amplify this, we make some additional comments about what is required to be a scholar.
- 4.36 It is possible to be considered a scholar either because of an outstanding 5* contribution in a rather narrow field of study (imagine a leading researcher in astronomy, or nuclear physics) or because of a much broader-based contribution (the archetypal polymath in the humanities – who may be widely recognised as an authoritative commentator).
- 4.37 It is not helpful to be too prescriptive about how institutions or individuals are to achieve the necessary level of scholarship. Some in research-intensive universities claim that to be a scholar it is necessary to be engaged in research. However, it cannot be assumed that research of itself makes for a well-rounded academic, department or institution (or necessarily for good teaching). As an extreme illustration of this we were interested to hear from one institution of a ‘brilliant researcher’ who was not considered ‘a scholar’ because of the narrowness of his interests, and we have quoted examples where students in a research-active environment found that their curriculum was too dictated by the research interests of their teachers, and lacked overall breadth and relevance as a result.
- 4.38 Many institutions in Groups D and E encourage pedagogic research and have policies which require staff to engage in scholarship as a part of their professional development. These sometimes include the development of centres or units within the institutions with a focus on research and outreach activity relevant to the needs of local or regional industry and the professions. The critical point seems to be that, whether or not research is done within the institution, there will be a culture of enquiry and integration and that if the institution is not itself research-active it will have external links and appropriate policies to enable academics to keep up to date with research and by other relevant sources.

5 RESEARCH TRAINING

Introduction

- 5.1 In this chapter we discuss the issues related to the training of research staff. This is an area where the differences, between subjects and between institutions, in research-teaching interactions are particularly apparent.
- 5.2 Our findings and evidence in this area are included in Annex B.

Findings on the pattern of activity

- 5.3 In science subjects, research students usually work on topics linked to departmental projects as part of a research team and publish jointly with their colleagues and supervisors. In the social sciences and humanities they are much more likely to be working on individual topics of their own choice.
- 5.4 Many of the claims we heard about the close relationships between research and teaching in departments appear on closer examination to be mainly concerned with postgraduate programmes and to a lesser extent with students in the final year of undergraduate courses (see Figure 6 in chapter 4).
- 5.5 Of the subjects we examined in depth, research training is a long-standing integral part of departmental activity in chemistry and electronic engineering, whereas in history research students in any significant numbers are a much more recent phenomenon and the links between them and the work of their department in both research and undergraduate teaching is much looser. In business studies, where many of the research students are part-timers, the links are, for the most part, even more tenuous: we were often told that work outside the university was more attractive for able graduates, especially in business studies and engineering.
- 5.6 Some research training occurs at undergraduate level. This is a complicated issue. One old criticism of some first degree courses was that they were more concerned to prepare students for research than for life outside the university. This is no longer true of the great majority of courses. However, as evidence of interactions between research and teaching we were frequently told of cases where third and fourth year student projects made a significant contribution to departmental research, both as publishable articles in themselves, and in providing material for academic staff to develop further. This was less common in history.

Types of research training

- 5.7 Most research training is for students registered for research degrees. The distinction between taught courses and research degree programmes is not absolutely clear-cut. Many taught postgraduate courses include a substantial research based component, and most research degrees now include a significant taught research training component. Another recent development is the rapid growth of professional doctorates that span both professional development needs and research training.

- 5.8 Most, though not all, universities now supplement the apprenticeship model of research preparation with more formal research training. Training programmes include specialist departmental courses, faculty or institution-wide courses which all research students are required to attend, and research students auditing of Masters and third year undergraduate courses. Specialist programmes were more frequent in large high??MISSING WORD?? research departments. Threshold numbers are needed to make them cost-effective.
- 5.9 All departments are making strenuous efforts to encourage their full-time research students to complete within four years. Research training programmes were believed to make a contribution to achieving this. Most respondents cited pressure from Research Councils as a motivating factor.
- 5.10 There are substantial differences between subjects in the extent of contact between research students and their supervisors. In laboratory subjects it is common for full-time students to have some contact with their supervisor every day, whereas in non-laboratory subjects contact is normally much less frequent. In general research degree supervision is a staff-intensive activity. Supervision of research students is relatively high on the value scale of many academic staff.

Funding

- 5.11 Nearly all the research students we met were full-timers. However, almost exactly one-half of research students are part-time and there are differences between subjects. Two-thirds of research students in Physical Sciences are full-time compared with less than a quarter in Education and a little over one-third in Business Studies.
- 5.12 We came across examples of the use of research students to teach, work in laboratories, assist with IT courses for staff and undergraduates, and conduct tutorials. Most of this work seems to be done on an ad hoc basis and may be more or less voluntary. Students and young researchers often mentioned the need for more systematic management of such contributions.
- 5.13 There are two dominant sources of funding for full-time UK students in the minds of heads of departments. One is Research Council studentships; the other is studentships funded by the university. These are more widespread in the post-1992 universities and are one of the strategies to build up research capacity. RAE related funds were sometimes used for this purpose.
- 5.14 Although we obtained little information about part-time students it is apparent that their funding sources are much more varied and at the level of departments much less is known. Most part-time students finance their own study.
- 5.15 Postdoctoral is a term that belongs entirely to science and engineering departments. People doing similar jobs in social sciences or humanities are likely to be called research officers or research assistants. Postdoctorals are thus part of the population of young researchers more generally. It is the stage where training for research explicitly becomes research apprenticeship.

Career issues

- 5.16 For many young researchers there is an uneasy limbo between their time as subsidised research students and their careers as academic researchers. They are dependent on short term contracts and often haphazard employment conditions.
- 5.17 The absence of career development strategies for young researchers was often commented on. Many of them believe that current demands to undertake heavy teaching loads means little time to develop research at the stage in their careers when they are likely to be most productive.
- 5.18 There were several suggestions about how this gap between PhD and established post might be bridged more effectively. Research Fellowships, such as those offered by the Wellcome Trust, were seen as positive initiatives enabling young researchers to establish a research portfolio early in their careers. It was suggested that some HEFCE money might be earmarked for young researchers to give them the opportunity of proving themselves. It was claimed that this might counteract the effects of the RAE which was widely believed to discourage universities from employing first time researchers. However, we note that the study by PREST found no evidence for the assertion that institutions are reluctant to employ those recently embarked on a research career, either in terms of numbers or age of recruitment. Another suggestion with a similar aim was that RAE submissions should include an account of career development policies and practices for younger staff, and that these should be taken seriously by the panels. Training needs that go beyond learning to be an individual researcher were also referred to. Few young researchers had had any formal research training in bidding for funds or managing externally funded research.
- 5.19 It is widely believed that there is a general problem of recruiting and developing the next generation of research-active academic staff, though the picture varies between subjects and disciplines.

Conclusions

- 5.20 The following main points emerge from this review of research training in the context of research-teaching interactions at departmental level.
- a. The basic structure of a research degree is similar across all institutions and departments.
 - b. There are wide differences between subjects and institutions in students' experiences in achieving a research degree.
 - c. Research students in the sciences are likely to be closely integrated into the research and teaching of their departments.
 - d. In many of these departments students make a significant contribution to the departmental research output.
 - e. In the humanities and social sciences research students are less likely to be closely integrated.
 - f. Most research training is apprenticeship in nature.
 - g. There are wide differences in frequency of contact between students and their supervisors.
 - h. The amount and type of formal research training depends on the size and research profile of the department.
 - i. The main driver of formal specialist and generic research training is the Research Councils.
 - j. Some institutions use HEFCE funds to offer research studentships.
 - k. In some subjects training for a career in research is no longer attractive to the most able graduates.
 - l. The early period of postdoctoral research experience is very haphazard for most young researchers.

6 INDIRECT RELATIONSHIPS – CROSS-SUBSIDY AND SHARED FACILITIES

6.1 Annex C reviews the evidence with regard to the indirect (resource-related) relationships between teaching, research and other activities. The main issues of interest are:

- the use of shared facilities and the way this may benefit both T and R
- the extent of any cross-subsidy between T and R.

6.2 Like other parts of our work, this is an area where there is little reliable evidence at present. Currently, few institutions are able to split the use or cost of shared facilities (like libraries, IT, or space) between the main activities they support, and none have full and robust costs for Teaching and Research that could be compared with the funding to reveal any subsidy.

6.3 The Transparency Review will help to resolve these difficulties when institutions begin to calculate and report their costs for T, R, and O firstly in the summer of 2001, and in a fully robust way by 2003-04. A good deal of work is under way in preparation for this, and the evidence in this area, which is described in Annex C, draws upon this early implementation work for Transparency.

Issues

6.4 The issue of cross-subsidy is complex, and it is important to understand the nature of the evidence in this area. Two particular factors need to be borne in mind:

- a. Research and teaching are joint production activities, by which we mean that the same facilities and effort may contribute to the outputs of both. Given the complexity of the activities discussed in chapter 2, it is inevitable that methods used to attribute costs between Teaching and Research will involve a certain element of judgement or arbitrariness. At the extreme, a part of the activities are genuinely ‘indivisible’ – for example, supervision of student research projects – and there is simply no objective way to split these. Fortunately, this element is probably relatively small in terms of academic staff time, although it may be relatively larger for other costs.
- b. Costing is not an exact science. Transparency has advanced thinking considerably in these areas, and institutions now have standard definitions and detailed guidance on methods. However, it will only be possible to draw robust conclusions where there are differences which are significant and material, and it would be inappropriate and misleading to attempt to use these data to investigate fine differences. In particular, institutions are not monolithic, and any conclusions on cross-subsidy which are drawn at institution level will include a range of different positions in different departments.

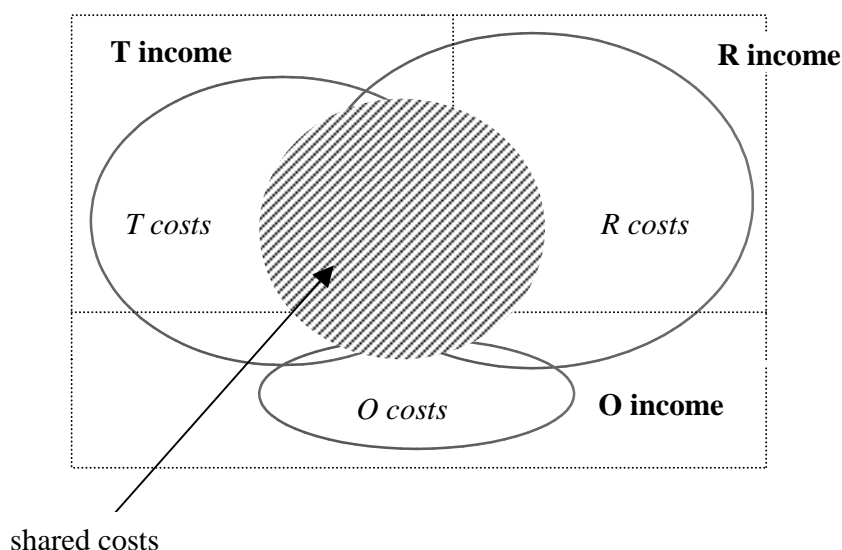
- 6.5 Despite these cautions, there is no difficulty in principle about separating the costs of the main shared resources. Almost all the resources of institutions can contribute to teaching and research, but in practice the most significant ones, which we have reviewed in Annex C, are:
- academic staff effort
 - libraries and learning resources
 - IT
 - buildings and equipment
 - general institutional infrastructure.
- 6.6 The most significant of these is academic staff time. It is difficult to attribute robustly for two main reasons: the ‘indivisibility’ of elements of T and R and their overlaps with other activities such as S; and the fact that many academics work non-standard hours and may do research outside the normal working day.

Shared and specific costs

- 6.7 It is helpful to distinguish between specific costs (which can readily be attributed to teaching or research) and shared costs which support both activities (and so cannot).
- 6.8 Examples of specific costs:
- academic time on undergraduate student contact, preparation and assessment
 - library textbooks
 - lecture theatres and rooms used only by undergraduates
 - student services – e.g. counselling, welfare
 - laboratories and equipment provided for research and not used by students.
- 6.9 Examples of shared costs:
- the ‘indivisible’ elements of academic time
 - library infrastructure and some books and journals
 - IT networks and staff computing facilities
 - much laboratory and equipment provision
 - general infrastructure and administration of the institution.
- 6.10 The proportion of the total of each type of cost that is shared will vary with the type of cost – and possibly also with the type of institution or discipline. In general however, we find that:
- a major part of library costs are shared (possibly as high as 80%)
 - a very significant part of IT costs are shared (perhaps 50%)
 - for space and equipment, this will vary
 - much of the general infrastructure is shared (90%).

- 6.11 Overall, we deduce that the proportion of sector resources which are shared in this way is of the order of one-third. This reflects the very significant overlap between the activities of teaching and research across the sector as a whole.
- 6.12 We can illustrate this beneficial overlap by noting the value to teaching of shared resources which were originally provided primarily for Research or by funding for Research, e.g.:
- equipment provided for research, used by teaching
 - research staff working with students on projects
 - additional Research staff providing flexibility to departments
 - research acting as scholarship to underpin teaching.
- 6.13 It is sometimes claimed that the main benefit of research for teaching in the research institutions is that it enables them to have much more favourable student:staff ratios (SSRs). However, this can be a misleading inference. While the SSRs may appear favourable on paper, many of the additional staff are actually engaged in research, and the availability of staff to support undergraduate learning is not necessarily as much more generous than in less research-intensive institutions as the latter may believe. There are, however, benefits in terms of flexibility of staffing.
- 6.14 The relationships between shared and specific costs and income are illustrated in Figure 7 (for a typical research-intensive university).

Figure 7. Costs and income in a typical research-intensive university.



Subsidy

- 6.15 Subsidy occurs when an activity or service is not required to cover its full costs, for example because the institution accepts a lower income or price than the full cost of the activity or service.
- 6.16 Cross-subsidy occurs when funds provided for one activity are used to cover part of the cost of another. Both subsidy and cross-subsidy are normal in the management of an

institution. They permit innovation and development which are important in higher education. As long as the institution balances its overall income and costs (or better), and funds from public sources are not being used to subsidise private sector activities, then internal subsidies are an important management tool.

- 6.17 The normal way to identify subsidy would be to compare the cost of an activity with the income attributable to it. This is not generally possible across the sector at present, but it will become possible for institutions to do this for themselves as they produce their first results under the Transparency Review.
- 6.18 In the meanwhile, we can investigate subsidy by three approaches:
- a. Modelling of sector-wide financial data.
 - b. Deduction from early Transparency results for a small sample of institutions.
 - c. Discussion with institutions.

a. Modelling of sector-wide financial data

- 6.19 A number of studies (quoted in Annex C) have shown a research ‘funding gap’ on Research Council and other externally funded work. The inability to substantiate the magnitude of this gap was one of the factors precipitating the Transparency Review. Unpublished survey work which we have done supports these general conclusions because it shows that nearly all ‘publicly funded’ research grants and contracts (whether funded by Research Councils or UK government bodies) are priced at well below the full economic costs, although they should normally cover the direct costs of the work. Although our survey did not cover these, we are aware that a not dissimilar picture applies with many contracts with UK industry, with grants from charities, and with EU-sponsored work.
- 6.20 This leads to a conclusion that publicly funded research is being subsidised.

b. Deduction from early Transparency results

- 6.21 At the time of writing this report, the first unvalidated results were available from the eight pilot universities which have to implement the Transparency Review and to report on their results during the summer of 2000. While further work will be needed to refine these data, it is already clear that a number of robust conclusions can be drawn about the relative costs and funding of research, teaching and other activities in this small sample of predominantly research universities (those with preliminary data in March 2000 were mostly in Group B).
- 6.22 The conclusions that appear to be supported by these early data, (subject to confirmation) are as follows:
- research in these institutions is significantly in deficit (i.e. costing more than the funding). This conclusion is true of all research, but within this total it appears that the position is significantly more in deficit for publicly funded research (that supported by the Research Councils and funding council block grant). Non-publicly funded research (supported by other grants and contracts with charities, UK industry etc) is also in deficit, but less so than publicly funded

- the costs and funding for publicly funded teaching are broadly in balance
- other activities (as they should) are making a small positive contribution (surplus).

6.23 These are important conclusions for the sector, but they are provisional, and further work is being done to verify them.

c. Discussions with institutions

6.24 Our discussions with institutions have identified a number of factors which confirm this picture and support the evidence that research is being subsidised:

- in institutions with little research which are carrying out research in areas where they have no funding for research, this must be so
- it is equally true in research-intensive institutions where grants with low or no indirect costs are accepted for ‘collaborative’ research beyond the level where this is supported by the QR element of the funding council block grant (i.e. beyond the limit where the dual-support system can fully cover the costs); or where staff are not submitting under the RAE or not receiving funding
- the value attached to research leads many academic staff to be willing to work outside normal working hours on research so that it is effectively conducted at a marginal cost to their employer.

6.25 This raises the question of where the subsidy is coming from. We suggest that the main sources of this will be a combination of:

- a. Run-down reserves and/or physical infrastructure.
- b. Use of joint production (shared facilities not funded pro-rata from R income).
- c. Cross-subsidy from O.
- d. Cross-subsidy from fee paying students.
- e. Under-pricing of academic staff time.

6.26 The extent of each of these will vary, but no doubt they are all factors in different circumstances. They would all be legitimate strategies, but not necessarily desirable, in a commercial business.

6.27 Items (a) and (e) are not really satisfactory in anything beyond the short term as they will create other problems for the institution (and this is being formally recognised under Transparency). Item (b) is a strength of the UK system where teaching and research are conducted side-by-side in the same institutions. Item (c) would be an example of successful commercial activity being used to add value to the core public-service business. However, as already noted, the level of O is low, and it is unlikely that (c) makes a major contribution in many institutions. Item (d) is legitimate and mirrors to a certain extent what happens in the US.

6.28 These issues will all be studied further over the coming months as part of the early benchmarking of results from the Transparency Review.

- 6.29 The evidence of whether there has been a significant disbenefit to teaching from diversion of effort to research is unclear. The indications from available information suggest that:
- there is much anecdotal evidence of this diversion from some staff
 - it is difficult for institutions to divert significant funds from T because of the constraints of a defined curriculum structure, pressures of competition for students and TQA, and because the commitment of academic staff to students would not allow it
 - there is evidence of some deterioration in performance statistics (e.g. progression, drop-out rates) but these may be partly due to changes in the student population
 - although there has been pressure on SSRs this is seen to be as much due to efficiency gains and other pressures on staff as to the effect of any cross-subsidy
 - the elements of subsidy in the other direction (i.e. from R to T) are probably at least as significant (and probably much larger in R-intensive institutions) and would off-set any detriment to T
 - in particular, scholarship (a necessary cost of T) is often funded as Research in R-intensive institutions.
- 6.30 This area clearly needs further study. However, it is obviously true that, locally and for short periods, teaching and other resources are used by institutions to ‘kick-start’ research and other activity which is expected to bring additional funds into the institution in due course. It is also true that over longer periods they may sustain speculative or other types of research for which funds are not specifically available. We suspect that most of this subsidy will consist of additional marginal academic staff time and some use of shared facilities, neither of which will necessarily have the effect of denying core resources to T.

Conclusions

- 6.31 Research is being subsidised by institutions. This is a general conclusion, supported by several different types of evidence, including early data from the Transparency Review. There are indications that within the totality of research it is the publicly funded element (Research Council and ‘own-funded’ from the HEFCE block grant) which is the most heavily subsidised. However, it is clear that non-publicly funded research is also subsidised.
- 6.32 There is no evidence of any direct damaging impact on teaching as a result of funding provided for teaching being significantly less than the costs. Of course, institutions have been seeking efficiency gains in this area for many years, and there may be some areas where the resources available for teaching are inadequate (even though broadly covered by the funding), but this is not reflected as a material deficit or cross-subsidy at the expense of teaching.

- 6.33 Notwithstanding this broadly comforting conclusion about cross-subsidy, externally funded research should in general be priced by institutions to cover its full costs, and government and other public sponsors should recognise that it is not a viable strategy in the long term to fund a core higher education activity as if it were a marginal cost to institutions. It is to be hoped that improvements in costing and pricing will enable institutions to negotiate more realistic fees for research grants and contracts, and to be much more careful about tolerating 'loss leaders' in their core business.
- 6.34 It is likely (but we have to wait for Transparency) that non-publicly funded T, R, and O are subsidising publicly funded T and R. This would be a reassuring finding in terms of value for money from public funds.

APPENDIX STUDY AIMS AND METHOD

Purpose of the study

The aim of this study was to investigate the relationships between teaching, research and other activities of universities and colleges of higher education. It was one of a series of research and consultancy projects intended to underpin and provide the evidence base for the work of the HEFCE Fundamental Review of Research.

The remit for this study was to look in particular at six aspects of these relationships:

- the extent of any cross-subsidy between T, R and O
- the benefits of shared facilities etc
- interactions at the level of institutional policy and practice
- interactions in the classroom and the workshop or laboratory
- links to research training and the impact of policies in this area
- international comparisons and evidence.

Method

We used a mixture of research and consultancy techniques including: literature review; academic peer discussions and review; financial and resource analysis; policy review and evaluation; brainstorming and focus groups; surveys and comparative analysis; informal benchmarking; and international comparisons.

The main elements in our work consisted of:

- a. A review of the published literature (see Annex G).
- b. A questionnaire survey of institutions. We circulated a request for written information to about 40 institutions and received information from 38. The results of this survey are summarised in Annex F.
- c. Case study visits. Two types of visit were undertaken:
 - at institutional level, we reviewed strategies and policies in a number of institutions selected to represent the range of types of institution in the sector. This enabled us build up a holistic picture of the different elements in the relationships within a single set of institutional policies, practices, and culture (although these are not all uniform even within a single institution)
 - at departmental level, we studied relationships in four subject areas (history, business, chemistry, engineering) in a range of different institutions so that we can build up a picture of variations both within and between subjects.
- d. Other research: we worked with other institutions and with national networks and other sources of data and advice. For example, in the area of libraries and learning resources we liaised with the main professional bodies UCISA and SCONUL. In the area of cross-subsidy, we drew on the work under way as part of the early piloting of the Transparency Review. We used our associate consultants overseas and other contacts to assist with the international comparisons work. As

researchers and consultants active in higher education, we also drew on a wide range of our other contacts and knowledge of both the UK and other countries.

- e. We participated in a seminar in January 2000 on 'The Relationship between Research and Teaching in Higher Education: Present Realities, Future Possibilities.'
- f. We helped to facilitate a series of workshops for young researchers arranged by HEFCE during February and March 2000. Over 350 individuals who are near the beginning of their research career attended these meetings, and some outcomes are summarised in Annex E.

LIST OF CASE STUDY INSTITUTIONS

In the course of the work, we visited a large number of institutions. We are particularly grateful to the following who all submitted questionnaires to us, and in many cases, for also arranging programmes for us to meet staff and discuss issues relevant to the review.

University of Bath
University of Birmingham
University of Bradford
University of Bristol
Brunel University
University of Cambridge
University of Central Lancashire
Cheltenham & Gloucester College of Higher Education
Cranfield University
De Montfort University
University of Exeter
University of Glasgow
University of Greenwich
Harper Adams University College
University of Hertfordshire
University of Hull
Imperial College of Science, Technology and Medicine
Institute of Education
University of Kent at Canterbury
University of Leeds
University of Leicester
Loughborough University
University of Manchester
University of Newcastle upon Tyne
University of Nottingham
University of Oxford
University of Portsmouth
The Queens University of Belfast
University of Reading

Roehampton Institute
Royal College of Art
Sheffield Hallam University
University of Southampton
Southampton Institute
University of Strathclyde
University of Surrey
University of Sussex
UCL
University College, Northampton
University of Warwick
Wimbledon School of Art
University of York