The views expressed in this report are those of the Strategic Adviser for Quantitative Methods and do not necessarily reflect those of the Economic and Social Research Council.

Proposals to support and improve the teaching of quantitative research methods at undergraduate level in the UK.

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29 December 2009

> *The [substantive course] lecturers never mention anything about stats in our lectures at all. They don't relate any of it, that's not their job to relate stats.*
>
> Student comment, Southampton Pilot Project focus group

> *I've got a bit of a block against it. But it's not hostility, it's just I don't feel all that wonderfully competent in that area myself.*
>
> Staff comment, Southampton Pilot Project focus group

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ACKNOWLEDGEMENTS

I would like to thank the many quantitative methods university teachers who took the time and effort to respond to the survey used in this report; to the many colleagues who gave their time to answer my many questions in visits to departments with patience and insight; to all those from research support and other organisations I consulted with in compiling this report and to the authors of the several earlier excellent reports and studies which this report draws upon so extensively, and to the hard work of the staff I reported to at the ESRC.

Executive Summary

Current situation

Beyond economics and psychology, social science undergraduate quantitative methods teaching ranges from the absence of any provision at all through to specialist options, mostly taught in Year 2. The latter teaching does not give students enough contact time to develop confidence in their skills, often has an outdated focus on primary data collection, and does not pay enough attention to secondary data analysis. Cost pressures and lack of skilled staff are the main reasons for inadequate teaching. Teaching also faces hostility to numbers from students who have sometimes experienced poor school mathematics teaching, have done no maths for three years (since GCSE), and have never before encountered maths in an applied setting. Quantitative methods skills are not reinforced elsewhere in the curriculum, giving students a clear message that social science is about essay writing and evaluating arguments. Methodology and evaluating empirical evidence appears as an 'optional extra' that can be safely ignored. Therefore, few who progress to postgraduate research consider using quantitative methods, so that as few as one in six university social science teachers, and possibly a much smaller proportion, has any skills in them. This fragile teaching base reproduces the weakness of training for future cohorts, pushing quantitative methods to the margins of UK social science. This marginalisation has become institutionalised. It has been reinforced by the division of methodology into quantitative and qualitative approaches, by the tendency to define the use of any quantitative methods as inaccessible or irrelevant 'positivism', and by the use of such arguments to legitimise ignorance of their most basic features. Many students are unaware of the career advantage of good quantitative methods skills, and badly equipped to critically assess relevant quantitative evidence in any sphere of their lives after graduation.

Strategic levers for change

Because it needs higher staff-student ratios and more bespoke teaching material than other courses, good methods teaching is expensive for HEIs and vulnerable to pressures to reduce costs. QAA benchmarking has failed to ensure adequate minimum coverage and standards of quantitative methods teaching. Web-based technological innovation in the dissemination and analysis of data, and in the development and dissemination of e-learning materials (both for students and staff) can be used more effectively to improve the nature and coverage of teaching. However extra support for those currently teaching quantitative methods, while welcome, cannot address the problems of curriculum space, the allocation of resources within HEIs, the fragility of the teaching base, or the marginalisation of quantitative methods. This is why the impact of previous reports has been limited. Something is required to persuade HEIs and departments to invest more in methods training and give quantitative methods a much higher priority.

First, certification, via the creation of a new post-school qualification, the modification of an existing one or recognition of degree courses that teach methods

well, should be the first priority. This could be used to 'kite mark' degree pathways with sufficient and appropriate attention to quantitative methods.

Second, a better case could be made for the contribution better social science quantitative methods teaching could make to graduate numerical literacy. A lobbying effort, modelled on the STEM initiative, should be developed, to bring together the ESRC, the Royal Statistical Society, charitable foundations and others.

Third, although the ESRC's policy is to have a coherent approach to quantitative methods across the educational life course, responsibility for implementing this policy is spread across a wide range of panels, committees, boards and executive officers. This can make coherence difficult to achieve. A person, or board, should be given the remit to achieve and oversee progress in QM and report regularly on it.

Immediate measures

In addition to these strategic measures the following measures should be taken:

Successors to the ESRC's pilot projects should be rolled out in up to ten HEIs, able to give commitments to both curriculum change and substantially increased curriculum space for quantitative methods.

A national training and placement scheme in secondary data analysis should be organised with additional funding from the Nuffield Foundation.

The existing community of methods teachers should be supported through a network and annual workshop. This effort can be coordinated with the HEA, C-SAP and MSOR.

More training in quantitative methods should be aimed at teachers and researchers with few or no skills.

A web portal should be developed and supported that catalogues and quality assures existing web-based teaching material, including that produced by the pilot studies and publicises it to methods teachers.

New web-based material should be commissioned where there is a clear demand for it, and it can be produced in a format flexible enough for use in diverse teaching contexts.

Links with schools should be improved, so that school students are more aware of the role of quantitative evidence in society and the nature of social science research. The ESRC should participate in the debate over maths in schools supporting those changes that it believes might lead to better undergraduate numerical literacy.

1 Introduction

1.1 The remit of the strategic advisor

In 2008 ESRC announced its intention to develop, along with the HE Funding Councils a £2m initiative to enhance undergraduate teaching in quantitative methods across the UK social science community addressing the limited appetite for both the teaching and learning of quantitative methods (QM) in many disciplines. The initiative would address a skills shortfall in quantitative literacy across the UK social science sector. Its aim would be to develop imaginative and innovative ways to deliver quantitative methods training which would engage the interests of undergraduate students and those teaching them.

This initiative followed a number of reports over many years that have highlighted weaknesses in QM provision for undergraduates. Their results can be summarized as follows:

> Most social science students graduate with only a narrow range of QM skills, little confidence in using them and little practice in applying them. Few students use any QM in their project or dissertation work, and even fewer undertake secondary analysis of existing data.
>
> QM teaching is rarely integrated across the undergraduate curriculum with progression across each year of the degree, but almost entirely confined to specialist courses in QM, or components of methods courses covering both quantitative and other approaches.
>
> While most QM teaching is done within departments, and thus takes place within a specific disciplinary environment, it is not 'embedded' elsewhere in the curriculum. The lack of reinforcement of QM by the use of appropriate quantitative evidence in substantive courses, together with the limited curriculum time for methods courses gives students a strong message that QM is not of great relevance to the subjects they study.
>
> In some departments the low priority given to QM is reflected in the low status associated with teaching it, so that some teaching may be unimaginative. Teaching may follow a routinised programme covering some basic elements of questionnaire design, the use of SPSS to enter data, simple descriptive statistical analysis of it and graphical presentation of the results. Limited curriculum space often encourages this kind of approach.

The ESRC's current strategy has three key aims:

1. create a comprehensive and coordinated training framework in quantitative methods *at each* level of the educational life course;
2. integrate training *across each level* to create a coherent multi layered national training infrastructure which builds quantitative skills development at each subsequent stage of the educational life course; and
3. create a framework which is flexible enough to meet the particular skill

requirements of individual researchers.

The ESRC and Funding Councils held a consultative workshop in November 2007 to explore how best to strengthen the social science training infrastructure in quantitative methods at the undergraduate level. Following the workshop the ESRC decide to appoint a 'strategic advisor' for undergraduate quantitative methods whose remit was to:

1. *Identify and assess the impact of existing initiatives aimed at enhancing the undergraduate teaching of quantitative methods in the social sciences*
2. *Consider how existing initiatives might be extended or added to by further investment*
3. *Determine how the introduction and positive uptake of a new programme could be incentivised to ensure maximum impact*
4. *Recommend the best models that might be developed to roll out the programme looking at options for regional and national organisation and delivery*
5. *Identify opportunities for working in collaboration with others to provide an integrated strategy for improving quantitative methods training at the undergraduate level*

I started work in January 2009. Following discussion with colleagues it was decided to omit Psychology and Economics from the current phase of work. While these disciplines may have particular concerns about methods teaching, it is clear that almost all undergraduate students in these two disciplines are exposed to a greater amount and range of quantitative material than is the case for students in such disciplines as criminology, education, human geography, politics and international relations, social policy, social anthropology and sociology. This report draws upon a review of relevant studies of undergraduate QM teaching, a small online survey of undergraduate methods teachers, a series of visits to departments to talk to methods teachers, a review of four pilot projects commissioned by the ESRC to explore innovative ways of teaching QM and consultations with stakeholders such as the Funding Councils, the Royal Statistical Society, Nuffield Foundation, JISC, HEA, ONS, NUS and centres which provide material for QM teaching or train QM teachers (NCRM, ESDS, RSS CSE, Census Services and UK Data Archive at Essex).

1.2 The role of QM in university social science

Methods teaching, broadly conceived, lies at the very heart of the social sciences, since it is only by virtue of the methodologies they employ that they can lay claim to a specifically scientific status. There is a vigorous debate about just what 'scientific' methods comprise, and a welcome pluralism of approach within and between disciplines, however, any professional social scientist needs sufficient basic competence in all methodologies to be able to keep abreast of and evaluate the relevant substantive literature that comes from beyond whatever their own methodological specialism (if any) or substantive area of research or teaching might be. There are thus a range of core methodological skills in research methods which all university social science graduates and those who teach them ought to possess.

These core skills have come to be labelled 'quantitative' and 'qualitative', although both the underlying logic and practical value of drawing such a distinction has been questioned. This distinction may be rooted in the institutional division that has developed between those using QM and others, which is described later in this report. While it is possible to make some distinction between the explanation of quantitatively measured recurring social events on the one hand and the interpretation and understanding of meaning on the other, the two always go together. Data about events can only ever be socially constructed, understood and interpreted with reference to its meaning. Meaning, to be relevant, has to be applicable to a wider range of social phenomena than those originally studied to uncover it. For the purposes of this report, quantitative methods or QM are taken to mean methods that make substantial use of evidence that is numerical in form, and in which the manipulation and analysis of such numbers is used to describe aspects of social processes, relations or structures, or to evaluate theories made about them.

For example, a table that showed how men and women in the UK were distributed across different social classes, using the Register General's social classification of occupations, would count as 'quantitative'. This would be the case even though much of the methodology behind it would be 'qualitative', such as the relevance of taking biological sex categories as an indicator of gendered social processes; the development of the meaning of the concept of social class, and within that the origin and institutional development of this specific operationalisation of it; the concept of an occupation and its relationship to the operation of contemporary labour markets, the evolution and relevance of 'UK' as a territorially bounded state, and so on.

The evidence considered in both this and previous reports suggests strongly that British university social science, has become critically weak in methodology in the disciplines considered here. This weakness has been caused by the neglect of quantitative methods. The vast majority of university teachers do not have the core skills in basic quantitative methods that would allow them either to teach these methods to undergraduates, were they called upon to do so, or to understand and evaluate research in their specialist area using anything but the simplest quantitative evidence. One indicator of this is that as few as one in ten university teachers in the disciplines reviewed here have the skills necessary to teach a basic QM course. Another, related, indicator is that the time devoted to

undergraduate QM teaching is not enough to give students any sound grasp of these core skills. The result is a vicious circle of decline.

Because quantitative methods do not receive adequate attention at undergraduate level, few students develop enough interest or competence in them to consider using them at postgraduate level. They are therefore less likely to develop their skills there beyond the basic competence delivered in courses designed to deliver the ESRC's generic quantitative skill requirements. The danger is that such courses replicate, albeit at a higher level of skill competence, the undergraduate learning experience.

The mission of the ESRC is 'to promote and support world class research and related postgraduate training in the social sciences'. Its initiative on undergraduate quantitative methods comes from the need to secure a better supply of students progressing to postgraduate study who wish to train in quantitative methods, or have the basic skills needed to make best use of the generic training in this area. This raises the issue of whether to secure such a supply by ensuring that an adequate number of those talented students most likely to progress to postgraduate study get good QM provision, or to do this by improving provision for all students. In turn, while the first objective is clearly within the remit of the ESRC, the general standard of undergraduate teaching falls more properly to the funding councils and QAA.

It will become clear in this report that while I favour the second approach, the first also has merits. Given the limited resources available for any initiative, it may be best to focus them on a core of students who offer the best prospect of becoming the quantitatively skilled researchers and teachers that disciplines badly need over the coming years. Resources delivered centrally (for example through the placement programme on secondary analysis suggested below) are easier to control, may be targeted more efficiently and monitored more effectively. Methods teaching is resource intensive, since to be done well it needs a substantial amount of small group work. At the level of individual universities, therefore, it may be easier, especially in the short term, to focus extra resources on small groups of students, rather than attempt to raise the level for all.

However, focusing only on students who offer the best prospect of progression to quantitative work at postgraduate level risks failing to address a more general methodological malaise in the social science subjects considered here, which might best be described as a systematic failure to give appropriate attention to methodology in general and the treatment of quantitative evidence in particular. This malaise could be made worse were it to be accepted that only students wishing to 'specialise' in QM need a good grounding in these skills, since this would reinforce the message that such skills, rather than being a prerequisite for *any* good social scientist, are some kind of optional extra.

In the course of my discussion with teachers in departments, I heard a range of experiences that in different ways described what I refer to hereafter as the *marginalisation* of QM. By this I mean the way in which academic staff in the social sciences beyond economics and psychology tend to draw a clear distinction between quantitative and qualitative approaches, associate this split with the epistemological division between explanation and understanding, or between the analysis of statistical

regularities and the interpretation of meaning, view the essence of the distinctive approach of the social sciences as concerning the latter and either dismiss any quantitative approach as 'positivist' or consider it as a specialist concern of interest and relevance only to the small minority of staff who regularly use such methods in their work.

This intellectual vision is reinforced institutionally and normatively. Staff tend to be seen as a 'quants' person or not. 'Quants' people are defined by their methodology, while others are more likely to be known for their substantive area of interest. In turn, a 'quants' approach is routinely seen as empiricist or positivist, in the particular sense of paying insufficient attention to the nature of the social construction of knowledge (especially the kind of data collected in census and surveys) or the interpretation of meaning. Allocation of teaching, supervision or assessment duties routinely assigns anything with more than a very simple level of QM content to 'quants' people, since others do not have the relevant skills. Finally 'quants' is seen as *inaccessible*: a form of knowledge available only to those initiated into its mysteries and capable of communication in the obscure language of coefficients, tests, formulae and algebra.

This division is not just a matter of perception. Its root lies in the lack of basic QM skills on the part of the great majority of staff; many of them skills which the best departments teach their students and expect them to have in order to qualify for a degree. This is not because these skills are complex, technical or difficult to learn. Least of all is it to do with the calculation of numbers, which is nowadays safely left to computers. Unlike other research and analysis skills which all staff are assumed to possess by virtue of being competent members of their profession, quantitative skills, no matter how basic, have come to be seen as the exclusive responsibility of 'quants' specialists: as if reading a simple contingency table had more in common with the skills needed to undertake advanced multivariate analysis, than, say, the skills needed to evaluate arguments and the evidence for them that students develop in writing essays.

This division appears to have become entrenched, despite the fact that quantitative data and evidence is now easier to access and process than ever before. Software is now much easier to use than before. The skills needed to produce simple descriptive statistics or tables using SPSS, Excel or other analysis packages are hardly more complicated than those needed to use many of the features of a word processing package. There is a greater range of high quality data available on a wider range of subjects than ever before, while the web has revolutionised data access. Good, relevant, data on almost any topic is widely available on the web. Microdata can be downloaded for analysis in a couple of minutes, while NESSTAR makes it possible for those without any knowledge of SPSS or other packages to carry out simple analysis on-line. The web has also made it possible to access an enormous range of teaching material, although there are important issues to consider about its quality and the facility with which it can be tailored to the skill level and interest of different groups of students.

The marginalisation of QM is not a sustainable situation for a healthy discipline. It means that the QM teaching students receive on methods courses is not only insufficient itself to give students a good grounding in relevant skills. Such teaching is only very rarely reinforced in any coherent fashion elsewhere in the curriculum. The end result is that

students come to see QM as marginal or irrelevant to the social science they study, come to see social science as about the interpretation of meaning, and about writing essays focused on this rather than on 'analysing data'. While they become adept at evaluating competing arguments and interpretations, they may gain little experience of assessing the use of empirical evidence in the arguments they consider. It is hardly surprising therefore that they prefer doing something they receive constant practice and coaching in - writing essays - feel unconfident about numbers and come to share the apparent attitude of many of their teachers to them: that they are not very relevant to their degree. It is little wonder that students progressing to postgraduate study, and who may later go on to a career in university social science, take these attitudes with them. The end result is the reproduction of the marginalisation of QM.

This is not a question of arguing for any superiority of quantitative over qualitative methods, or arguing that QM needs to be developed at the expense of other methodologies. Rather it is a question of restoring methodology to the centre of university social science and returning to a more productive relationship between explanation and understanding in the teaching of methodology to students. No explanation is possible without attention to the interpretation of meaning. The latter is fundamental to the social construction of data and the analysis of it. Conversely almost all understanding involves processes of comparison or observation that involve categorisation and measurement. Both sides of the epistemological divide are impoverished if either is allowed to wither, yet this is what appears to have happened to quantitative approaches. This situation now appears to have become so entrenched that it has proved resistant to change: the weakness of undergraduate QM provision is one of the results of a system within which QM itself has become marginalised. Insofar as QM is seen as a specialist activity it no longer forms part of the core of a discipline, so that staff recruitment decisions, for example, may pay little attention to whether or not a candidate has any skills in this area. Thus the extremely weak teaching base for QM is reproduced, and its continued marginalisation ensured.

Any lasting improvement in QM provision therefore depends upon creating a climate in which research methodology returns to the heart of UK university social science and to the core of the undergraduate curriculum for all students. Without such a change, provision focused only on the strongest students will risk being undermined by the general marginalization of methodology. The scale of the effort required to do this may mean that, in the short term, concentrating resources on students likely to become postgraduates is the best that can be achieved. However identifying such students may not be straightforward. An alternative may be to focus on selected departments, or particular subject areas, in order to start the process of change.

Since 'numerical literacy' skills are also highly marketable and attractive to employers, students without them are at a disadvantage in the labour market. It was beyond the scope of the present study to collect systematic evidence on this, but it forms the background to the STEM initiative, the Smith Inquiry and the Roberts report. However, one example may illustrate the scale of the problem. The Scottish Government undertook a major recruitment exercise for social science graduates last year. Monitoring showed that most applicants were familiar with and relatively knowledgeable about qualitative methods,

but that virtually none (except those with an economics background) had even a basic knowledge of quantitative methods. The fact that this recruitment exercise included applicants with Masters qualifications as well as first degrees is even greater cause for concern.

Perhaps most important of all, an inability to handle quantitative information critically weakens graduates' capacity to be active, aware, informed citizens. No public debate of any importance takes place without a mass of accompanying statistics. Few of these may stand up to rigorous scrutiny. The kinds of skills good QM course can impart are fundamental to citizens' ability to distinguish strong from weak evidence in virtually any sphere of life.

It can be readily seen that the concern about the weakness of QM provision at undergraduate level in the social sciences is a long standing one, and a succession of enquiries, research projects and reports have discovered, or rather re-discovered much the same set of problems and suggested fairly similar remedies. However this fact itself suggests either that the remedies suggested have not been taken up for some reason, or have proved ineffectual when applied. It would be unfortunate, to say the least, were the findings of this report to fall into the same unproductive cycle. Thus this report addresses not only some of the immediate measures that might be taken to improve the situation, but also says something about the larger underlying problem which I believe should be addressed if any real or lasting progress is to be made. If this is not done, the resources devoted to the proposed programme risk not producing any lasting change for the better.

2 Background

ESRC's undergraduate quantitative methods (QM) initiative follows several recent reports or reviews suggesting that undergraduate quantitative methods training provision in the social sciences is, at best, uneven. Such reviews extend at least as far back as 1987 (ESRC 1987) but have become more common over the last ten years, and in particular since Gordon Marshall, then Chief Executive of the ESRC, concluded in 2001 that:

> *British universities and colleges are not producing quantitatively competent social scientists in sufficient numbers*

There appears to be a decline in undergraduate courses with a strong focus on quantitative methods across the social sciences and the proportion of social science students choosing to deploy quantitative tools and techniques in their doctoral work is small. The Commission on the Social Sciences (2003) concluded that, whilst there were real pockets of expertise in quantitative analysis, there was an overall 'critical deficit in quantitative skills within the UK'. The Higher Education Funding Council for England (HEFCE) *Review of Strategically Important and Vulnerable Subjects* (2005) identified shortfalls in the UK quantitative skills base and further studies co-funded by the ESRC, Higher Education Funding Council for Wales (HEFCW) and Scottish Funding Council (SFC) exposed similar concerns about the strength of the social science research base in Wales and Scotland (Lynch *et al*, 2007, McVie *et al*, 2008).

The JISC funded study by Rice et al (2001) of the use of numeric data in teaching and learning in the social sciences found that the latter was 'rare', and mostly confined to specialist methods courses. They found that there was little institutional support or recognition for the significant extra effort in terms of course preparation and maintenance that such work involved. They concluded that

> *A broad initiative is recommended to promote subject-based statistical literacy for students, coupled with tangible support for academic teaching staff who wish to incorporate empirical data into substantive courses.*

Among their principal recommendations were:

1. More rewards for innovative teaching are needed, combined with adequate facilities, preparation time, and personal support for teachers who wish to integrate hands-on use of data by students into coursework. This is true for both methods teachers and subject teachers, but the latter may need extra help in making a start.

2. Many teachers need to build or rebuild confidence in their own quantitative skills for incorporating students use of data into coursework. 'Refresher' courses should be made available locally, which are convenient for staff with busy teaching schedules.

3. Bursaries are needed for teachers to attend specialized short courses and summer courses.

4. Universities should develop IT strategies that include data services and support for staff and students, and integration of empirical datasets into learning technologies.

Almost ten years on, insufficient progress has been made in these areas. The establishment of the Researcher Development Initiative (RDI) and the National Centre for Research Methods (NCRM) have addressed point 3, albeit indirectly, through providing training and bursaries for researchers. Some progress may have been made on point 4, but I saw little evidence of it in my visits to departments. However, greater progress has been made in the ease with which empirical data suitable for teaching has become available, due to the efforts of the UK Data Archive, ESDS, ESS, MIMAS and other organizations, together with the way in which the web has revolutionized the user-friendliness of data access, dissemination and analysis.

Williams, Collett and Rice (2004) conducted a 'baseline study' of QM teaching in Sociology in 2002, sponsored by the British Sociological Association (BSA), for the Higher Education Academy (HEA) subject centre for Sociology Anthropology and Politics (C-SAP). It found that while the teaching of QM was widespread in Sociology degrees, there was little evidence of integration of a quantitative approach into substantive course teaching, there was pessimism about students' ability to develop QM skills, a widespread belief that an important motivation for students' choice of sociology was their desire to 'avoid numbers' and evidence that at least some QM teaching, and perhaps much of it, was unimaginative and failed to engage students.

The ESRC funded a project by Williams et al in 2006 to examine sociology students' attitudes to QM and the familiarity with QM skills of sociology students in years 2 and 3 in 34 English and Welsh Universities. Almost all (94%) had studied QM in their degrees and only a minority (around one in five) said that avoiding numbers had been a motivation for choosing the subject or that sociology students should not study statistics. However *two out of three* said that they would rather write an essay than analyse data, and there was other evidence of student anxiety and lack of confidence about QM. Using both their survey results and a follow up focus group study, Williams et al (2008:997) concluded that

> for most, getting through statistics and quantitative methods was a necessary but unappealing process made more difficult by a perceived lack of enthusiasm by those teaching quantitative methods.

The range of subjects that students reported studying suggested strongly that QM teaching was focused more on *knowledge* of it than ability to *use* it. Examining the final column of data in Table 2 (reproduced below) reveals that while most students had studied frequency tables, correlation or hypothesis testing, much smaller numbers recalled studying any of the statistical tools (such as Chi Sq, *r* or Cramer's V) they would need to *apply* their knowledge, or critically evaluate its use in scholarly articles and books. As they commented:

> The systematic exploration of cross-tabulations with two or more variables, and the standardized techniques for investigating how variables interact do not appear to form part of [undergraduate] quantitative training. It is little wonder, then, if students going on to study for PhDs are predisposed to opt for topics lending themselves to non-quantitative methods, and later become professional sociologists whose orientation is to the qualitative end of the spectrum. (2008: 1000)

Table 2 Difficulty of statistical technique

		Easy	*Hard*	*N*[1]
GroupA	Bar charts, pie charts	94.6	5.4	626
	Mean, median, mode	92.0	8.0	636
	Sampling	84.0	16.0	583
	Frequencies	79.9	20.1	556
	Histograms, scattergrams	79.8	20.2	526
Group B	Correlation	73.2	26.8	570
	Hypothesis testing	63.8	36.2	486
	Standard deviation	59.3	40.7	543
Group C	Chi Square	46.6	53.4	335
	Pearson's r	45.5	54.5	231
	Cramer's V	45.3	54.7	139
	Z tests	44.7	55.3	150
	Spearman's rho	42.5	57.5	200
	Regression	40.1	59.9	227

Notes: [1]Total number who said they had studied the topic.

Source: Williams et al (2008: 999)

In 2008, along with the Teaching and Learning Committee of the Political Studies Association (PSA) Carey and Adeney carried out a survey of research methods teaching (whether including QM or not) in university politics departments. 53 departments responded (out of 70 contacted). Eleven (one in five of those responding to the survey) did not teach research methods at undergraduate level. The composition of this group was in some way surprising. Only 1 was a post-92 University, while some prestigious universities such as Cambridge, Manchester, Edinburgh, Cardiff and Birkbeck appeared in this group. A further eight universities taught *optional* methods courses only, again including some surprises: LSE (where the optional course was only taught in the 3rd year), Lancaster, York and Strathclyde. Moreover, of the 42 departments teaching methods to undergraduates, seven taught no *quantitative* methods. Thus only in two thirds of departments responding to the survey did undergraduate students have the *opportunity* to study QM, and in one quarter of these, such an opportunity was optional. The range of topics taught was similar to that found by Williams et al. Only one half of

departments teaching QM went as far as contingency tables or statistical significance. Of universities not teaching research methods, most said it was '*not a departmental priority*'.

The findings and conclusion of Williams *et al* and Carey and Adeney apply to other disciplines. Fewer than one in ten of the methods teachers I surveyed thought that the students they taught would graduate with confidence in their ability to use QM. They also reported very low levels of student project or dissertation work using QM. Employers also revealed a fairly universally negative perception of social science graduates' QM skills.

3 The study of social science university QM teachers

Given the existence of the JISC survey, the two surveys by Williams et al, Carey and Adeney's study and the scoping studies in Scotland and Wales, further survey work was not a priority for my remit. Moreover, given the complexity of the relationship between academic departments, course units and degree pathways at undergraduate level it would be a major task to produce an accurate sampling frame for social science undergraduate methods courses. However, since there were some important gaps in the information available about QM provision, a small survey of social science QM university teachers (excluding psychology and economics) was undertaken.

A short description of the survey and summary of the key findings is given in Appendix C. It should be noted that the way the survey was organised was via QM teachers. This means that departments which do *not* teach QM at all, or where those charged with teaching QM might not see it as a core responsibility or have little interest in responding to a survey about it, are under-represented. Thus the survey should be taken as describing what happens in departments with a commitment to QM that is *better* than the general level. The survey confirmed the situation described in previous studies and also highlighted the following:

> QM teaching takes place entirely within methods courses, with little curriculum space: a median of 14 hours of lectures, mostly in year two with about ten hours each of computer labs and tutorials, over the entire three year degree. Less than one in three QM teachers report that other courses in the department normally make use of quantitative evidence. This amount of curriculum space is not sufficient to give students a secure grasp of even the most basic of quantitative methods. Students spend many hours honing their essay writing skills and getting extensive feedback on them. Nothing like this is done, even in the best universities, to give students practice in critically interpreting quantitative evidence of any kind. Regardless of what students learn in their methods options, neglect of QM *elsewhere* in the curriculum gives them a strong message that 'quants' are not a core part of their subject.
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> The content of QM methods courses follows a fairly standard pattern covering survey methods, questionnaire design and simple descriptive statistics. Only a half of the courses taught correlation, and one quarter looked at controlling for a third variable. Both of the latter are key skills for using QM knowledge in evaluating empirical evidence in monographs and journal articles. The emphasis appears to still be on preparing students to do their own primary data collection and analysis. The educational value of this is doubtful. Conversely, the revolution in the accessibility of secondary data over the last fifteen years has not been matched by a corresponding shift of attention to secondary data analysis.
>
> There is little evidence of progression. Many teachers argued that year 1 teaching in methods could be problematic, either because of high class sizes or assessment limitations. Curriculum content could be divided between cross-subject and subject-specific courses. The former require agreement across a range of disciplines to include QM, while putting too much QM in the latter risked alienating students

who might opt to switch to another subject at the end of the year. In some universities a ‘race to the bottom’ has occurred in which a decision by one department to make a methods course unpopular with students optional encouraged other departments to follow suit.

In most departments fewer than one in ten students use QM in their dissertation work and secondary analysis is rare.

The teaching base is fragile, typically one, two or three people in a department. The respondents to the survey were usually also busy with externally funded research and publications, and regularly used advanced QM techniques. The survey almost certainly understates the fragility of the teaching base as it was typically more established QM teaching staff in departments running courses who responded to the survey.

Only around *one quarter* of respondents feel that QM is a departmental priority, that QM is in the mainstream of the discipline, or that they have the time and resources to teach QM well. Only one in ten think that QM teaching is recognised for promotion and none reported that the extra preparation time necessary for teaching QM was recognised in the allocation of teaching loads. One third agree that their interest in QM marginalized them in their departments.

Almost all QM teachers feel that most students ‘do not like numbers’ and strongly support the idea that better student ‘numerical literacy’ would improve things. They want to see a larger QM teaching base, more curriculum time to deliver QM teaching to students and more accessible and better teaching resources available on the web. There was surprisingly high support for a web based ‘off the shelf’ course, given that this was a survey of staff who already teach QM and who also reported substantial investment not only in preparing teaching materials, but in maintaining them from year to year.

Most QM teachers said the *enjoyed* teaching QM. This is perhaps the most valuable resource that this initiative can base itself upon: the high motivation of many, but not all, QM teachers.

4 The pilot projects

In 2006, the ESRC commissioned five pilot projects on undergraduate QM teaching. A review of four of the reports submitted by September 2009 follows, together with a summary analysis.

4.1 *Brown et al (Manchester RES-043-25-0002)*

Students were offered five additional, *non-credit bearing* workshops taken by 11 students after their normal year 2 research methods modules. All of the students had at least GCSE Maths (although this was not a requirement). Students received £100 for attending all five workshops and a further £100 if they submitted a dissertation using QM, with a £500 prize for the best dissertation. 5 students went on to use secondary data analysis in their dissertations, although often only as a small component in their final research. Drop-in clinics were also provided. Students rated the workshops highly and reported significant improvements in confidence in using QM, including sourcing analyzing and interpreting secondary data. Three workbooks were developed and an extra module based on the workshops has now become part of the normal year 2 curriculum. 18 students were registered for the course in 2009.

4.2 *Carey & Adeney (Sheffield RES-043-25-0004)*

The methods course they devised lasted for two full semesters, allowing a gradual build up of knowledge and confidence and time to examine the use of quantitative evidence in everyday life, explore the relevance of QM and increase students' awareness of the career benefits of QM skills. Lectures from those using QM in different careers were very successful.

Their work shows that it is quite possible to teach a large cohort (c180) of students secondary data analysis with 'teaching' datasets. However this required a heavy investment in staff preparation and teaching time, so that secondary analysis work was flexible enough to allow students to pursue issues defined by them rather than driven by the availability of data.

Despite being a highly successful, imaginative, student centred and well resourced course, student evaluations were still less positive than for other substantive courses, suggesting that even with the best teaching there will be a significant proportion of undergraduate social science students who fail to be excited by QM.

4.3 *Falkingham et al (Southampton RES-043-25-0008)*

This pilot focused on the link between QM teaching and the substantive (i.e. non methods teaching) curriculum. It provided a 'consultancy' type service offering advice on relevant quantitative material to incorporate in lectures as well as bespoke preparation of teaching and learning and assessment resources. On-line self-assessment 'quizzes' using substantively relevant examples for students doing the compulsory year 1 and 2 methods courses were also produced. Finally student and staff attitudes were investigated via focus groups.

Despite the team's efforts, only 9 out of 80 staff came forward to participate in the focus groups, self-selected towards those with a greater interest in QM. Staff apathy also undermined the attempt to run QM skills workshops for staff. The focus groups revealed that students saw QM as a 'side' activity not integrated into the rest of their curriculum. They also wanted more substantively relevant examples in their QM teaching, and smaller teaching groups.

A little over a half of students used the discipline specific self-assessment quiz material, mostly during revision rather than during the courses themselves, those that did found it useful, and, paradoxically, often also did the quizzes for 'other' disciplines. The material required substantial staff time to prepare, using resources from a university teaching and learning fund as well as those from the ESRC.

The activity in the two pilots at Southampton increased the profile of QM and led to an increase in general staff interest in QM activities.

4.4 *Falkingham et al (Southampton RES-043-25-0009)*

This project supported students (who had already taken two compulsory courses in QM, in years 1 & 2) to use QM in their year 3 dissertation by providing a series of workshops in semester 2 of year 2, a five day summer school (9-5 in the computer lab), a three day winter school, 'drop-in' clinics and support to staff supervising QM dissertations, in the form of advice and offers to co-supervise. £150 was offered to those attending the summer school if they submitted a dissertation using QM, with a £250 prize for the best dissertation. Students were not penalized for 'missing' days on the schools (as they were in Manchester: see below) but all 22 students attended all 5 days of the summer school.

12 students undertook their own survey, while six carried out secondary analysis of the BCS, HSE and GHS. Six students enrolled in a 3rd year option on Multivariate Data analysis (no students from such degree programmes had enrolled before). Five students applied for postgraduate study and 3 obtained ESRC 1+3 awards. Students requested that the summer school be repeated the year following the pilot and 17 students attended, with 4 dropping out.

Staff supervising dissertations involving QM were often unconfident about their own QM competence. Contact with such staff had various spin-offs including an increase in such staff's own use of QM, and a better 'image' for QM.

The activity in the two pilots at Southampton increased the profile of QM and led to an increase in general staff interest in QM activities.

4.5 *Summary analysis*

The pilot projects produced a remarkable amount of useful information and material for discussion. Seven conclusions can be drawn from the evidence provided by the experience of the four pilots projects:

1. All the projects used amounts of staff time and other resources that would normally be hard to secure within typical curricula. While some of these extra

resources represented a heavy initial investment in preparing teaching materials etc., others were recurring. Computer workshops need high staff-student ratios. One-to-one support is often a critical input and vital for building student self-confidence, especially in the early stages. Such resource commitments can be sustained only if departments choose to devote more curriculum space to quantitative and qualitative methods. It is notable that the positive experience of the pilots probably helped to shift departmental views of what such priorities should be, but it is also the case that three of the pilots were located in departments with a strong record in quantitative research and where there was already a solid core of staff with relevant expertise.

2. The Sheffield Pilot shows that it is possible to teach QM in a stimulating way to large classes, in the first year of study and within a discipline specific context. However, this is best done if such teaching moves away from a focus on basic statistical techniques towards the analysis of the social construction and use of data in society. The key challenge is to get students who we know can become interested in theoretical debates or the contrast between different schools of thought in a substantive area when they are writing essays to become equally interested in the use and abuse of data, arguments about makes different kinds of evidence strong or weak and what kind of analysis of is possible with different kinds of evidence. Such an approach helps students understand what the statistical techniques they learn are there to do.

3. Even the best existing QM courses are not sufficient to give students confidence in using QM in their work. They cannot overcome the lack of attention given to QM and to methodology generally, across the rest of the curriculum. QM tends to be seen as a set of techniques learned in order to pass an assessment, and not as something integral to social science as science. In the pilot projects, a significant effort was devoted to consolidating skills students had already been taught in preceding methods courses, since the opportunity for such consolidation was absent elsewhere in the curriculum. To apply their knowledge they needed further training, which was intensive in terms of staff time. This training was effective in generating students' interest in and enthusiasm for QM, and turning students towards PG study using QM, but was costly in terms of staff input.

4. All the projects had spin-off impact on staff without QM skills and improved the image of 'quants' in the departments concerned. Indeed this may have been one of the most valuable results, given what has been argued above about the unhealthily low level of QM skills amongst non 'quants' staff. However, challenging the lack of attention to QM across the rest of the curriculum, in order to 'embed' QM in a substantive context within disciplines met not only inertia but sometimes active resistance. This is unsurprising given what we know of the level of QM skills held by many staff. However, until this challenge can be met, QM will continue to be marginalised.

5. Despite substantial levels of support, most students still preferred to create their own data rather than carry out secondary analysis of existing data. This is worrying because as Carey & Adeney argue, secondary analysis teaches students

to develop much more robust QM skills than primary research, in part because much less time is invested in collecting the data. Opinions may differ on the educational value of having students design their own questionnaire and undertake their own survey. My own view is that it can be very limited. It may reflect the content of existing introductory QM courses which tend to cover issues such as questionnaire design or constructing a small 'practice' data set in SPSS but rarely give pay much attention to how to access and analyse secondary data. It may be due to students' interest in discovering more about their peers (many survey are of other students) or to some sense that showing competence in the whole process of research from start to finish is necessary to get a good mark. I would argue that it may be evidence of two things. First it reflects the lack of the explicit use of such secondary analysis elsewhere in their degree programme. Students may frequently encounter the *results* of such analysis as deployed in different debates, but will rarely be faced with considering how these results were produced. Second, this may lead to students failing to appreciate the crucial role of *comparison* in social science. Faced with an issue students often assume that best way to research it is to study the experience of a particular social group, process, institution or situation, rather than start out from a comparison between it and others. They tend to assume that a case study is the best approach (including a survey of the object in question) rather than thinking in terms of how existing survey data may reveal how a group or institution differs from others.

6. Although small numbers of students progressed to using QM in their research projects, especially in comparison to the resources committed to the pilots, substantial proportions of these students went on to postgraduate study. This is an important achievement in increasing the supply of graduates capable of taking full advantage of improved QM training at postgraduate level.

7. Whatever the impact of the financial incentives in encouraging student participation (it does seemed to have played at least some role) it seems to have become less important, *once students became engaged with QM*. In turn, this engagement was often very powerful, as reflected in the rates of progression to postgraduate study.

5 Mechanisms for change

The Higher Education Funding Councils do not see it as their remit to issue 'directions' to HEIs about curriculum content, as opposed to, non-compliance with subject benchmark standards. Unfortunately, but not without reason, the latter are vague about quantitative methods (see Appendix A). Many make no specific mention of quantitative methods, or of ability to interpret numerical data or evidence, as opposed to simply citing 'knowledge of' research methods, or interpreting evidence etc. More worryingly, unpublished research by Jary on students' perception of achieving benchmark standards apparently found that quantitative methods was an exception to the generally good level of confidence graduates had that they had achieved benchmarks. This finding is consistent with the results of all the relevant surveys cited above, with the experience of the pilot projects (in that substantial extra teaching was necessary before students had the confidence to use QM in their project or dissertation work) and with the survey, in which only a minority of teachers expected their students to graduate with good methods skills.

However, the problems with undergraduate methods teaching and learning are fundamental. First, a minority of students can graduate without doing any QM training at all, and indeed some may not even have the opportunity to study it as an optional course. Second, experience of the pilots shows that students can successfully complete even good quality compulsory courses and still lack confidence in their QM skills and ability to use them independently, *because QM training is not regularly underpinned by the appropriate use of quantitative material elsewhere in their curriculum and because there is not enough time devoted to QM in the curriculum*. Third, the vast majority of teaching staff in social science departments considered here do not have the basic QM skills that many departments (including their own) expect their *students* to have. Moreover, if the experience of the Southampton pilot is representative, it appears that most staff without such skills do not see gaining them as a priority within the many competing demands upon their time. Fourth, this situation marginalizes QM and reproduces a situation in which UK university social science becomes weaker.

This position is all the more problematic as there is a strong case for seeking to give all those finishing their secondary schooling some command of basic 'numerical literacy' skills, since they can be seen as a basic to full participation in the benefits of citizenship in a democratic society, given that so much civic and political discourse turns on the interpretation of quantitative evidence.

HEI undergraduate curriculum content and teaching standards are not the responsibility of the ESRC. However, the QM skill profile of HEI social science departments, the way in which they approach QM teaching, and the marginalization of QM is a matter of wider concern. In the short term it undermines the UK's social science research capacity, and in the longer term, as Williams et al (2008) make clear it threatens the health of the disciplines concerned.

Turning this situation round will not be easy for three interrelated reasons. First, any lasting change is unlikely to be imposed successfully 'from above'. Unlike postgraduate training where recognition for courses can be approved or withheld, university teaching staff will quite properly continue to have substantial autonomy in deciding what

constitutes the core of the undergraduate curriculum, as well as how they define what skills are central to their discipline. Second, better QM teaching, especially its fuller integration across the curriculum, will require the reallocation of resources, since it will inevitably require greater curriculum space, greater time in the preparation of teaching materials, higher staff-student ratios and most important of all, a substantial investment in training non 'quants' staff in basic QM skills. Without the latter there will be neither sufficient staff to deliver QM courses, nor sufficient integration of relevant QM material across the rest of the curriculum. Third, this implies raising the priority accorded to QM, when, as we have seen, those responsible for deciding such priorities (i.e. the majority of staff) often see it either as marginal, or something in which they themselves are not competent.

Given this context, even the substantial sums the ERSC is prepared to invest, no matter how well they are targeted, are unlikely to lead by themselves to the kind of substantial changes needed to produce a lasting improvement not only in QM provision and a more balanced curriculum, but in a healthier integration of QM within social science disciplines. Moreover, in the longer term, the resources for QM provision must come from the same source as other teaching. What is required is a change in priorities within HEI social science departments. Thus alongside the resources which ESRC could devote to supporting QM provision in the ways outlined below, attention must focus on drivers for change within HEIs.

University management, from vice chancellors to departmental heads, have an important role to play in revising priorities and stimulating curriculum change. They have a responsibility to ensure the future health of UK university social science.

Perhaps the most important challenge is how to deliver a much greater volume of more effective and engaging QM teaching when it is clear that such an effort would depend, at least initially on an already fragile teaching base. The majority of university QM teachers are highly motivated, enjoy teaching methods and determined to improve the position of 'quants', even if they sometimes feel isolated within their departments. On the other hand it is clear that such staff often have many other commitments (in terms of publication and funded research projects) precisely because of their QM skill level, and there is also evidence from the Williams study that some students experience QM teaching that appeared to them as a chore to be endured. In such a situation simply requiring HEI departments to undertake a greater amount and higher standard of QM teaching (even if the mechanism to make such a demand existed) would risk worsening the quality of QM provision by foisting it on under prepared under resourced or unenthusiastic staff. Since the QM teaching community is the key resource base for securing change, it is important to support it and foster collaboration across departments and institutions to this end.

6 Recommendations for action: strategic measures

In order to bring about lasting change, and avoid the limited impact of previous initiatives, recommendations for action are divided into two parts: strategic measures that while they can be started now, will need to be developed over the medium to long term, and those measures that can be taken immediately.

6.1 A post-school qualification in use of quantitative evidence

In consultation with relevant stakeholders, principally the Royal Statistical Society, its Social Statistics section and Centre for Statistical Education, **the ESRC should take the lead in establishing a post-school level credit bearing qualification in the use of quantitative evidence based on social research methods** and following on from the 'Use of Maths' qualifications currently being piloted in schools. The syllabus for this qualification would enable the ESRC to prioritise the undergraduate QM skills that are most relevant, fostering change in the undergraduate curriculum and the content of university QM courses.

Such a qualification should carry considerable weight in the labour market, as it would act as a 'kite mark' certifying the holder's level of QM competence. It could also become a prerequisite for progression to postgraduate study. Certification appears to have worked in other disciplines, such as Psychology. It could thus be an effective driver for substantial change. The qualification would raise the profile of QM, and the potential contribution of the social sciences to supplying a sufficient number of graduates with a good level of numerical and statistical literacy. It would underpin the longer term efforts of the proposed lobbying body in making the case for support for university social science as a provider of such graduates. Once soundly established, the qualification would be a reliable measure of students' capacity for postgraduate study, and eligibility for studentships.

The success of the qualification would depend on three criteria:

1. It must become popular and attractive to employers, *and seen as such by students*. We have ample evidence of employers interest in QM skills, although proposal 6.2 below suggests that this could be more systematically collected and disseminated. Students' awareness of this interest will be a crucial driver in sustaining long-term change in the standard of QM provision. It is the most powerful possible counterbalance to students' reluctance to engage with numbers, any negative experiences with maths in schools, or their attraction to arguments that legitimate such reluctance by dismissing quantitative evidence on epistemological grounds. Students would hesitate to enrol in a psychology degree course without BPS recognition because they see that the latter is central to their future career prospects. Universities would hesitate to mount such a course as it would be difficult to recruit students. This is not to subordinate scholarship to entrepreneurship; rather it is to create a useful and relevant lever to drive change which is highly desirable for the many reasons presented in this report. QM skills are in some ways unique in that they not only lie at the heart of an academic discipline (since they focus on such issues as research design, the analysis of

evidence and elaboration of theory) but are also highly transferrable and marketable. This provides an important opportunity.

2. It must set an exacting but achievable standard. The syllabus must be both comprehensive but also critical. The qualification would *not* be about statistical competence as such. Rather it would focus on the appropriate *use of* statistical and other quantitative ideas. This means, above all, sufficient understanding of QM to critically assess *others'* use of it. If it simply encouraged students to master QM techniques at the expense of the critical understanding of the potential and limits of quantitative evidence it would achieve little.

3. It must be seen as prestigious. The close involvement of the RSS should help ensure that all three objectives are achieved.

Such a qualification could be achievable in two ways.

Students could sit an **examination**, set nationally, which assessed their abilities on a key range of QM skills. Such an arrangement has two advantages. It need not be expensive to establish and part of the cost could be recouped in examination fees. It could be introduced relatively quickly. It also has three disadvantages. Universities might see this as an unacceptable invasion of their autonomy to decide upon curriculum content or the precursor of some kind 'national curriculum' for universities. If HEIs decided that preparing students for such an exam was not a priority it would stimulate little curriculum change. Without such change students would be unlikely to take on the burden of preparing for the exam themselves. Finally some of the QM skills that it is vital to foster (such as secondary analysis of datasets) do not lend themselves to assessment by examination. However the AP Statistics College Board exam in the United States, introduced in 1997 and taken by 120 thousand students last year, is an example of a successful initiative of this kind.

Alternatively, existing university social science degrees whose curriculum included sufficient attention to QM at an appropriate level, could be **recognized as fulfilling the requirements for this qualification**. Candidates could follow an approved degree pathway (with relevant coursework and examination). It would be possible for degree courses at both undergraduate and postgraduate level to be recognised, so that completing a first degree which did not fulfil the requirements would not be a barrier to later progress (but only if the qualification was not a prerequisite for going on to postgraduate study). Such an arrangement would maintain university autonomy over curriculum content (subject to benchmarking), but give universities that sought recognition for their degrees a more substantial and tangible interest in devoting adequate resources and curriculum space to QM. The recognition process could ensure that HEIs were aware of, and kept up with, developments not only in QM knowledge itself, but in the most effective ways of teaching QM. This could be achieved, for example, by requiring methods courses to be reinforced by adequate use of quantitative evidence elsewhere in the syllabus, by ensuring that the volume and content of QM teaching and the standard of assessment used was sufficient to ensure that graduates were competent in the critical use of quantitative evidence and made appropriate use of it in projects or dissertations. This would offer a more powerful and precise lever than the current benchmarking

arrangements and external examiner system. It would bring together three crucial elements of any substantial change in the quality of undergraduate QM provision: curriculum, pedagogy and assessment. In the longer term it would help break down the division between quantitative and qualitative methods in social science by securing the greater integration of QM into the mainstream of social science disciplines. Universities are already used to similar processes at postgraduate level, and in some existing undergraduate disciplines, such as psychology or various branches of business studies and economics.

The major disadvantage of a recognition procedure is that it would be more expensive to establish, and crucially, no matter how well designed, would create an extra administrative burden for QM teachers, since not only university submissions for recognition but also the assessments of such submission would draw upon their expertise. A 'light touch' recognition procedure might achieve little, while one thorough enough to ensure that genuine curriculum reform had taken place could well divert an undue amount of QM staff time into administrative duties. However, the simple requirement to double student contact time from current median levels across a degree programme could perhaps achieve a lot.

The alternatives of a national exam and recognition of university courses are not mutually exclusive. The exam could be rolled out first, and then recognition built up as universities start to respond to the challenge.

6.2 A lobbying body for social science QM

The ESRC should form a high-level strategy group to make the case to government and employers for the capacity of the social sciences to deliver better graduate numerical and statistical literacy. Its objective should be, to ensure that they are aware of the economic and social advantages of such a development, and to make the case for the necessary resources to overcome blockages to its achievement, including the barriers to better QM provision identified in this report. The government sees the supply of numerically literate graduates as an urgent policy priority, and following such investigations as the Smith Inquiry and Roberts Report has allocated substantial funds to attract more students towards STEM subjects (HM Treasury 2002; DfES 2004, 2005). My consultations with stakeholders such as the RSS, Nuffield Foundation and BA suggest that there would be solid support for the creation of such a lobbying body.

Either through such a body if it is established, or directly, if it is not, **the ESRC should make clear to university Vice Chancellors' that the weak position of methodology in general and QM in particular in university social science departments threatens the future health of UK social science and its international standing**. The ERSC should raise with Vice Chancellors the need to reform the undergraduate curriculum in social science subjects to (a) give greater emphasis to research methods (quantitative and qualitative) (b) secure their greater integration across the curriculum and (c) address the unacceptably low level of use of quantitative evidence and lack of attention to quantitative analysis in the curriculum. Lasting and substantial improvement in

undergraduate QM teaching will only come if sufficient space for it is created in the curriculum and there is proper recognition of the time effort and coordination needed to do it well within a degree programme.

6.3 A successor to the 'strategic advisor' role

ESRC should ensure that its policy of a coherent approach to QM training across the educational life course is consistently applied across its diverse domains of activity. It should consider either appointing someone to take overall responsibility for QM training, establishing a new working group or giving one of its existing boards responsibility for this, together with an obligation to report regularly on progress. This would be consistent with its own recognition that integration across all levels is important, and that useful links can be made between schools and universities, including those proposed below. Such a person, group or board would oversee the implementation of whichever recommendations from this report are accepted by the ESRC to form the undergraduate teaching initiative. They could also take the lead in establishing the lobbying forum suggested below, and take responsibility for establishing the proposed post-school level qualification in using quantitative evidence.

The ESRC should consider reporting mechanisms and their relationship to the ESRC's governance structure carefully. The person, group or board concerned would need to have sufficient status to enjoy the confidence of staff in HEI departments, regardless of whether they have QM skills or not, and the experience to deal with a range of stakeholders at the highest level. They would also need to be able to devote a significant amount of their time regularly to the leadership of the initiative.

In particular this should not become confused with championing the development of advanced QM, although there may be some overlap. The remit should focus on the broadening of the QM skill base and the deeper integration of QM into university social science.

7 Immediate measures to support QM provision in universities

These measures are presented in order of priority, along with some indication of the level of funding necessary and possible timescale. Each of the measures aims to improve undergraduate QM teaching by pursuing the following objectives:

To ensure that all social science students are taught QM

To start QM teaching in year 1 and ensure progression through the degree

To increase curriculum space and student contact time devoted to QM

To shift the emphasis in teaching towards secondary data analysis

To 'embed' QM more effectively in substantive courses

To increase the number of staff able to teach QM

To ensure that such staff are supported by good quality web resources

7.1 Supporting curriculum innovation in QM teaching

The pilot projects had some impact on the curriculum in the universities concerned, so that future cohorts of students will benefits from the innovations made. Such curriculum innovation required the significant investment in resources in the short tem that made such changes possible. **The ESRC should commission a further series of similar projects, building upon the lessons learned from the pilots**. Their aim should be fourfold:

1. to secure increased curriculum space for QM, including teaching in year 1 and more contact time for students
2. to innovate in QM course content, with more emphasis on understanding and analysing data and proper treatment of secondary data analysis
3. to promote embedding of elements of QM in substantive course options
4. to increase the proportion of dissertation and project work using secondary data

Their award should be made conditional upon commitments from the HEIs in which the projects are located to make appropriate curriculum change and substantially increase teaching hours. The commissioning timetable should take into account the time necessary for applicants to secure such commitments, and the level of funding offered sufficient to make the possibility of securing such commitments realistic. The success of this programme should be judged on its ability to drive successful curriculum change that brings together pedagogy and assessment in a coherent way. The projects should be required to deposit teaching materials produced for access via the web portal described below.

Up to £1m should be allocated for this purpose, which should allow 8 to 10 such projects to be commissioned. Projects might start in 2011, with new teaching arrangements rolling out from the academic year 2011/12.

7.2 Training and incentives for students conducting secondary data analysis

The Nuffield Foundation has indicated its willingness to fund placements in research projects and training in secondary data analysis for undergraduate social science students, parallel to the bursary scheme that it currently offers science undergraduates. At least to start with, such placements would be located in research centres large enough to be able to provide adequate mentoring and training for such students. Funding would be available both for the costs of such training, and a stipend for the students involved. ESRC should match this funding. While mentoring would occur in the research centre, initial training could be provided for all students going on these placements by a 'summer school' that would probably best be timed between April and June each year. Its content could be based on the workshops piloted in Manchester and Southampton, with some greater attention to secondary analysis techniques.

The Thrift review of UK research careers made the following recommendation:

> Research councils should work with universities, research institutes, charities and industry to develop a national Research Experiences Programme for undergraduate students.

The arrangements proposed here could form a major part of such a programme. The level of funding provided from the ESRC should complement that coming from Nuffield. This would mean a budget of at least 250k over a four to five year period.

Support resources for students

A priority should be given to encouraging more students to use quantitative material in the projects or dissertations that are a virtually universal feature of degree programmes. In particular **students should be encouraged to undertake secondary data analysis in these projects**. ESRC should commission a project to create a web portal to support students to undertake secondary data analysis. This should include an accessible guide, illustrated with discipline specific material, to the key procedures of secondary analysis, and a guide to suitable datasets, such as the range of teaching datasets now available, and data sources that permit online analysis via NESSTAR, for example the European Social Survey. This need not be a large project, since some of it would consists of drawing together resources already available on the web. However attention should be given to the organisation and presentation of these resources. A budget of £80k should be sufficient. The creation of such support resources should be commissioned as soon a possible.

A Student Competition for dissertations with secondary data analysis

The ESRC should consider holding an annual competition with cash prizes for the best undergraduate dissertation using QM. It might be possible to link the award of some of the prizes to an offer of an award for postgraduate study. Cash incentives did seem to be relevant in attracting students towards QM in both the Manchester and Southampton pilots, although once so attracted, its relevance declined. The publicity surrounding such a competition would raise the profile of secondary analysis. It would also reward departments with good QM provision, insofar as they could cite the success of their students in departmental handbooks, recruitment literature and so on. A sponsor

could be sought for the competition, to cover at least some of the costs of its administration. The budget for this would be small: no more that £2-3k per year.

7.3 Changing student perceptions of QM

Long term change in student perceptions of QM will depend upon its better integration across the curriculum, better supported and resourced QM teaching, and, in some cases, the introduction of a more imaginative and engaging approach in teaching. However much could be achieved in the short term by better student awareness of the later career advantage of transferable QM skills. The ESRC should commission a project to produce brief videos, podcasts or other material from employers and alumni about their experiences with quants and their relevance to a range of career possibilities for use by QM teachers (analogous to Carey and Adeney's invited lectures). £50k should be sufficient to produce a range of good quality resources. These would need maintenance to keep them relevant, but the annual cost of this should not be too great.

7.4 Support, training, resources and incentives for QM teachers

Developing the university QM teaching community

The enthusiasm, motivation and commitment of the university QM teaching community is the most valuable resource available both to improve QM provision and to bring methodology back to its proper place in university social science. This community will be responsible for undertaking most of the changes proposed in this report. **Increased contact and collaboration between members of this community spread across different university departments should be fostered**. The person appointed or group established under proposal 6.3, or other appropriate person, should manage the mailing list established for methods teachers, organise regular meetings or workshops to exchange ideas and expertise on QM teaching, and ensure that innovations in teaching and examples of best practice are properly publicised and disseminated, for example via the web portal suggested below. Consultations with the HEA, QAA or other appropriate bodies about how best to resource such a meeting on a continuing basis should be held. A 'pump-priming' budget of £25k should be sufficient to get this programme started.

A web portal for support resources

Knowledge of existing support resources for teaching can be improved by **creating a web portal for QM teaching resources**, such as the material produced by the pilot projects, teaching data sets, T&L resources produced by ESDS, MIMAS and other bodies and the ever growing amount of online QM training and learning resources produced by university social science and service departments both in the UK and abroad. At present it is difficult for QM teachers to access and use such material because they do not know what is available or where to look for it, and their needs are often highly specific to the disciplinary and curriculum context in which they work. **The ESRC should commission a project to catalogue and publicise the best of this material for use by QM teachers**. This project should liaise with the ReStore project to decide how best to service and maintain the web resources selected.

In the course of my visits to departments some methods teachers suggested that they would be willing to share the resources they had developed for teaching with others. The portal suggested here would be an appropriate site. As the survey of methods teachers revealed, most teachers prepare some kind of material for the classes they teach: from Powerpoint slides to workbooks and teaching datasets. A concern some expressed was that such material be treated with appropriate respect, and in particular that posting such material might draw criticism, especially from colleagues with a higher level of QM or statistics knowledge. This is a legitimate concern. Constructive criticism would be positive, giving such a repository of teaching materials a staff development function, sharing knowledge of best practice and giving newer QM teaching staff access to the material of more experienced colleagues.

Such a site would also be useful for sharing information on assessment techniques. For example, staff at one university I visited, working with colleagues from the natural sciences, had developed an Excel-based system for distributing individualised random selections of cases within a dataset to students for assessment tasks, so that while students could collaborate on how to tackle a task, they would still have to apply that knowledge individually to their own set of data to obtain the correct answer (which the software could mark automatically if required).

Such a site could support innovation in the content and delivery of QM courses at undergraduate and postgraduate level, helping to shift the focus towards the understanding, exploration and analysis of data.

A modest budget should be sufficient to establish such a portal provided that the QM teaching community become fully involved in developing and suggesting content. I am confident that such collaboration would be forthcoming. Up to £100k should be allocated to this project.

A web based 'off the shelf' blended learning course in QM

There was support in the survey for this idea, but any decision to commission such a course should be made with caution and with further consultation. A good quality course that fully exploited the interactive nature of the web would be expensive. Attention would have to be paid to its structure, so that its use would be flexible enough to fit into different disciplinary and curriculum demands in different institutions. An inflexible structure, the wrong kind of content or negative student reaction would severely limit the use of the material. The course should be innovative in the way it approaches QM, drawing on the Sheffield pilot and other examples of innovative QM teaching. Research for C-SAP has shown that students can be highly critical of 'e-learning', especially when it appears to them as a way of limiting their face-to-face contact with lecturers. Against this, online course delivery can be more effective than lectures in encouraging students to *practice* using QM which is an essential element of good learning. If further consultation demonstrated that there was a real demand for a course of this type, it could prove a useful way of enabling departments, unable to pursue other ways of improving QM provision to do so. It could also support the introduction of the post school qualification suggested in 6.1.

This would not be expensive option. A good quality comprehensive set of online course materials would cost perhaps £250,000 to develop. However economies of scale could come from, for example, two or more institutions submitting bids for the projects described in 7.1 collaborating to produce such a course as part of their project to reform and improve QM teaching.

Teaching support materials

The C-SAP and MSOR HEA subject centres should be encouraged to fund the development of innovative teaching support materials in QM. In particular attention should be given to the technical and pedagogical issues involved in making web based teaching material that is more readily adaptable to different disciplinary focuses and data sources. JISC may be prepared to share in the funding of such innovation, and the RSS CSE could also be involved.

7.5 Broadening the teaching base

Workshops should be organised that focus on basic QM skills for 'non-quants' staff. Any lasting improvement in undergraduate QM teaching will depend on drawing more university staff into such teaching. Either the RDI should be adapted or a new vehicle created, to provide staff with sufficient skills to be both confident and competent in supervising quantitative work by undergraduates and sharing the task of teaching basic QM skills. Regional workshops or courses would enable staff to participate who would not normally consider participating in the Essex summer school, for example. Such workshops should ideally be timed in such a way that they can respond to any increased interest in QM stimulated by the rolling out of the successors to the pilot projects described in 7.1.

The various centres funded to support quantitative data resources for research should be given, as part of their remit, **the task of producing and supporting relevant teaching materials for use not only in QM training but across the social science curriculum**. Many centres already do this, and I was strongly encouraged by their enthusiasm to do more such work in the future. Such work should be recognised in decisions about future funding levels for these centres. Given the success of the recent ESDS event on using data in teaching and learning, a series of regional workshops of this character should be rolled out over the next two to three years.

The costs of running workshops should be modest. A budget of £100k should be sufficient to provide around 20 to 25 events.

7.6 ESRC support and incentives for QM curriculum change

The ESRC should consider how it can also help to drive curriculum change in undergraduate QM through its existing procedures. There are at least two mechanisms that should be considered.

1 **The recognition process for the proposed Doctoral Training Centres should include review of what procedures are in place at undergraduate level for QM training**. The rationale for this is twofold. Good doctoral training depends

upon a supply of undergraduates with core QM skills: this is not something that can be left to postgraduate study only. Good doctoral training depends upon an environment in which QM is properly integrated within disciplines rather than marginalised. A good yardstick of the existence of such an environment is the undergraduate curriculum, which is in turn dependent on there being an adequate skill base for QM in the institution(s) comprising the DTC or DTU.

2 **Applicants for research funding should be asked to briefly report their contribution to methods teaching and this contribution should form part a modest part of the assessment of proposals**. The long term health of social science research requires an adequate commitment of those conducting it not only to passing on their skills to subsequent generations of researchers but to championing the cause of research by enthusing students at all levels about its possibilities.

3 **ESRC should consider how relevant findings from research it has funded could be adapted and provided use in undergraduate teaching**. A section in end of award reports could ask for relevant material, which could be made available such as powerpoint slides or information sheets for teachers. Ideally such a service would be resourced in such a way that advice and assistance could be given to lecturers seeking to incorporate such material in their courses. This could be done alongside the maintenance of the web portal suggested below.

4 **The ESRC should monitor the proportion of end of project reports making appropriate use of quantitative data**. Research by Sturgis has shown that this proportion is surprisingly low. Monitoring would not be about favouring quantitative over qualitative methodology. It should be about ensuring that grantholders, whatever methodology they adopt are capable of the using of relevant quantitative evidence appropriately.

7.7 Links with schools

ESRC should seek to develop links with schools so that pupils become aware of the relevance of QM and the wide range of their application. The RSS CSE already works with schools and links should be developed here, perhaps under the RSS's proposed initiative on statistical literacy.

Funding has been made available by SAS for up to twenty bursaries for undergraduate social science students with a Maths qualification, or postgraduates with a social science degree to spend two weeks in schools Maths departments. This gives them the opportunity to give pupils an insight into the place of QM within social science. This small initiative is a start. It should be built upon, drawing from the experience of the Nuffield foundation in the natural sciences, working with the relevant professional associations (such as BSA, PSA, SPA, ASA) identifying a future source of recurrent funding. This is consistent with the recommendation of the Thrift Report (Thrift 2009) on Research Careers in the UK that

Subject associations should work in partnership to promote careers in research at an early stage by working more intensively with school teachers to inform them of the possibilities for their pupils.

'Use of Maths' A-level qualifications are currently being piloted in schools. The proposed curriculum is highly relevant to QM skills, including such topics as sampling and descriptive statistics. **The ESRC should give appropriate support to this initiative**.

Only a minority of social science students currently come to university with a Maths qualification at A-level (e.g. 12% of respondents in the study of sociology undergraduates reported by Williams et al 2008). It is rare for A-level Maths to be an entrance requirement to study social science subjects at university. It would neither be desirable nor possible to shift university entrance policies towards a blanket requirement of a maths qualification for social science students. However in the longer term it is worth considering whether the lack of attention to maths sends the right signal to pupils making subject choices at earlier years.

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Appendix A QAA Subject Benchmark Statements: extracts

Criminology

Research design and data collection skills in relation to crime, victimisation, and responses to crime and deviance, including knowledge of survey, experimental, and case study design; the identification of an appropriate sampling method; structured, semi-structured and in depth interviews; ethnography; evaluation methods; and the critical use of published data sources.

The ability to analyse data including indexing and retrieval of qualitative data, and an understanding of basic statistics (sampling, measures of significance and knowledge of the relevant software).

Able to draw on materials from a range of sources and demonstrate an ability to synthesise them. Able to design and use appropriate research strategies for data collection using quantitative and qualitative methods.
Able to apply basic statistical techniques where appropriate.

Communication, media, film and cultural studies

Draw on the strengths and understand the limits of the major quantitative and/or qualitative research methods, and be able to apply this knowledge critically in their own work.

Education Studies

Application of numbers
7.9 On graduating with an honours degree in education studies, students should be able to:
collect and apply numerical data, as appropriate
present data in a variety of formats including graphical and tabular
analyse and interpret both qualitative and quantitative data.

Geography

Skills should normally include:

employing a variety of social survey and interpretative methods for the collection, analysis and understanding of information from the human world

employing a variety of technical and laboratory-based methods for the collection and analysis of spatial and environmental information (eg GIS, remote sensing, statistical and mathematical modelling)

Effectively and appropriately interpret and use numerical statistical information.

History

No specific reference

Housing Studies

No specific reference

Health Studies

No specific reference

Social Anthropology

No specific reference

Law
Numeracy, information technology and teamwork
8.2 A student should demonstrate a basic ability:
where relevant and as the basis for an argument, to use, present and evaluate information provided in numerical or statistical form
Numeracy
4.18 Typically, law students demonstrate their ability to make use of numerical and statistical information in a variety of ways. Many legal subjects presuppose an ability to understand and make use of numerical and statistical information in sophisticated ways. In company law, succession or trusts, the student needs to be able to understand proportions in order to comment on the allocation of shares in companies, estates or trust arrangements, issues on the measure of damages also require understanding of numerical information. In subjects such as English legal system or criminology, statistics might be used to demonstrate the effectiveness of civil justice or forms of crime prevention. The concern here is not the ability to undertake complex calculations, but to be able to use and evaluate the information provided as the basis of an argument.

Politics

4.11 Research methods and methodologies in politics and international relations include the use of information retrieval techniques; quantitative and qualitative methods, research design and the use of information technology. Their weight and character cannot be prescribed except to say that these should be determined in the light of the requirements of the particular curriculum being taught.
4.16 Graduates in politics and international relations should be able to:
gather, organise and deploy evidence, data and information from a variety of secondary and some primary sources

Social Policy

3.2 Graduates of single honours social policy programmes in the UK should be able to demonstrate knowledge of:

some of the more significant sources of data about social welfare and the main research methods used to collect and analyse data.

3.4 Graduates in social policy will be able to demonstrate that they can:
undertake either on their own, or in collaboration with others, investigations of social questions, issues and problems. This will involve skills in problem identification; the collection, storage management and manipulation of data, including secondary data, and other information; the use of archival sources; the construction of coherent and reasoned arguments; and the presentation of clear conclusions and recommendations

Sociology

Students should develop competence in the ability to identify a range of qualitative and quantitative research strategies and methods and to comment on their relative advantages and disadvantages
Sociology students should have access to the opportunity to develop further transferable skills in statistical and other quantitative techniques

Appendix B

Post-school level qualification in the Use of Quantitative Evidence: draft curriculum

The theoretical context
The epistemological status of empirical evidence and measurement
Relevant philosophy of social science
Levels of measurement
The nature of causality

Data collection
Ethical issues
Sources of secondary data
Register data
The Census
Social survey design
Questionnaire design
CAPI
Measurement error
Sampling frames
Non-response bias

Descriptive statistics
Measures of level and spread
Percentages, proportions, odds, probabilities
The Gaussian distribution and its properties
The graphical representation of statistics
The popular abuse of statistics; critical interpretation of published statistics
Exploring data (Tukey etc.)
Simple statistical notation and algebra

Inferential statistics
The theory of random sampling
Testing null hypotheses
Hypothesis elaboration
Tests of significance
Type I and II errors

Associations between variables
Contingency tables
Correlation
OLS linear and binary logistic regression

Dealing with a third variable
The logic of statistical control
Partial correlation
Causal pathways
The development of statistical models
Explanation and prediction

Reporting evidence
The distinction between significance and substance
The distinction between correlation and causation
'Good table manners'

Appendix C Key findings from the survey of university methods teachers

The following strategy was adopted. A list of UK university departments offering social science degrees was complied and an email sent asking for contact details of members of staff teaching research methods courses with a quantitative element. At the same time a mailing list for QM teachers was established, hosted by NCRM, and based initially on these contact details. The list was used to distribute some basic information about web based QM teaching resources, which increased the list membership, and the list was then used to distribute and online questionnaire. The characteristics of the departments making returns were analysed and on this basis a further list of departments was drawn up for subject areas poorly represented in the first wave of returns. Finally a telephone follow up was made to try to elicit basic information from non-responding departments in the second group. This last stage proved to be a more difficult and slower process than originally envisaged, and is still being completed. The results reported here are based on 116 returns, four of which were excluded as falling out of scope.

The respondents to the study were located in the departments shown in table 2.1. Also shown is the percentage of those departments providing compulsory QM courses for undergraduates.

Table 2.1 Respondents to the survey

Department		% with UGQM course
Sociology; Soc. Policy; General Social Science	51	90
Service (Statistics; Research; Psychology; Economics)*	13	NA
Criminology	12	100
Social Anthropology	8	0
Politics / IR	7	71
Geography	6	100
Other (Education; Linguistics; Health; Nursing)	11	46
Total	108	78.0

** Respondents in departments providing 'service' QM teaching to other departments*

Although these figures might at first sight seem encouraging, it must be remembered that the principal aim of the survey was to gain information about courses currently taught from QM teachers, so that departments without QM provision will be under-represented. However it can be seen that QM provision is absent in social anthropology, and less common in

politics departments than in sociology and social policy: these findings are congruent with those of Williams et al and Carey and Adeney.

Respondents were asked about the timing, format and volume of teaching. Of the 66 respondents returning data on contact hours on the courses they taught, results were as follows:

Table 2.2 Teaching hours

	Median Total Contact Hours across all years			
	Computer lab	**Lectures**	**Tutorials / Practicals**	**All**
Geography	10	17	0	31
Politics / IR	2	12	14	28
Sociology / General	10	19.5	11	44.5
Criminology	12	10	3	40
Other	10	12	0	12
Service	10	22	0	30
All	10 **Q_1** 2 **Q_3** 20	14 **Q_1** 10 **Q_3** 30	10 **Q_1** 0 **Q_3** 20	36

Median class sizes were 120 in year 1, 80 in year two and 50 in year 3. This implies that social science students in departments that teach QM receive about twelve hours of instruction each year across a three year degree, and that between one third and on half of this takes the form of lectures in fairly large classes. It is difficult to imagine that such curriculum time is sufficient to give students a firm grounding in QM, especially considering that most will have no experience of maths beyond GCSE level. As we shall see below the experience of the pilot projects commissioned by the ESRC suggested that the current level of provision is not sufficient to give students the confidence to *apply* QM, even in departments with comparatively good methods courses.

All such teaching took place in specialist courses or modules on research methods. While these courses are usually taught within a disciplinary context, this is sometimes fairly broad (economies of scale in lecturing are possible when students from different disciplines within a school or faculty are brought together). Some teaching is still delivered as service teaching from statistics or maths departments, but the experience of such courses was uneven: while some rose well to the challenge of making QM relevant to their audience, some staff I spoke too felt that such courses sometimes struggled to meet the limited knowledge and absence of any maths background of some of their students. I found no example, apart from the Southampton pilot and its later impact, of any systematic attempt to 'embed' QM teaching across the curriculum linking substantive teaching to the development of QM or other research skills. Some of the comments received in the survey reinforced this

finding: QM teachers expressing frustration at the lack of quantitative evidence used in substantive courses, which could have reinforced the knowledge students gained in QM courses.

72 respondents returned the information shown in Table 2.3 on the content of courses. There is little evidence of any common arrangement for 'progression' in the sense of some subjects occurring more frequently in year 1 or subsequent years. It is worrying that only half of the respondents reported 'correlation' as a topic, and just over one quarter controlling for a 'third variable'. This strongly suggests that in some courses the aim is to teach students *knowledge of* QM rather than how to use QM to assess material in substantive courses or carry out their own research. The progression issue is not a simple one. In visits to departments many teachers argued that year one teaching in methods was problematic for a number of reasons. Curriculum content could be divided between cross-subject and subject-specific courses. The former require agreement across a range of disciplines to include QM. Putting too much QM in the latter risked alienating students who might still opt to switch to another subject at the end of year 1. In some universities something of a 'race to the bottom' has arisen in which a decision by one department to make a methods course unpopular with students optional has encouraged others to follow suit. Finally the pass/fail nature of assessment in terms of final degree classifications meant there might be less incentive for students to do more than the minimum required to pass. Most QM teaching took place in year 2, where performance would relate to degree classification, but be early enough to give students skills for project and dissertation work.

Table 2.3 Content of QM courses

(col. %)	Taught in any year	Taught in first year
Descriptive statistics	69	19
Survey Methods	69	24
Contingency Tables	69	16
Sampling	68	19
Graphic Display	66	19
Questionnaire design	65	18
Levels of measurement	64	14
SPSS	58	15
Anova	54	11
Correlation	49	10
Controlling for 3rd variable	27	3
OLS regression	18	3
Logistic regression	5	3

N = 72

In visits to departments, an issue frequently raised was the difficulty in assessing QM coursework and examinations in such a way as to produce a distribution of marks consistent with other courses. Since, unlike most other courses, there are explicitly correct and incorrect ways of addressing many technical issues, results tend to have a bimodal distribution, with students who have mastered the material scoring very highly, and students who have not

scoring lower marks than they might do in an essay based topic. It may be that alongside limited teaching time and perceived student resistance (see below) this acts as a further incentive to concentrate more on 'teaching about' QM as opposed to 'teaching how to do 'QM.

Respondents in departments where students had to complete a project or dissertation as part of their degree were asked to estimate the proportion of students using a significant quantitative element in them (e.g. analysis of official published data, secondary analysis of microdata, or original survey producing simple descriptive statistics). The results appear in Table 2.4:

Table 2.4 Dissertations /Projects using QM

Proportion using QM	%	N
50%+	9	5
25-49%	17	9
10-24%	15	8
5-9%	28	15
0-4%	30	16
Don't know	NA	5

Two things stand out from these results. First is the range of responses. It is a reasonable assumption that departments where high proportions of students include quantitative data are those in which students are encouraged or supported in some way to do so. The second is that in well over a half of all departments *less than one in ten student projects had a significant quantitative element*. As both the Manchester and Southampton pilots showed, and discussions in departments confirmed, it was very rare for students to base a dissertation or project upon the analysis of secondary data, despite the easier accessibility and opportunities for analysis of such data that now exist.

The survey asked QM teachers about the nature of their post, experience in HEIs, origin and level of their knowledge, the number of staff in the deprtment where they worked and their estimate of the number of staff in the department capable of teaching and introductory course on QM. Tables 2.5 and 2.6 give the results.

Table 2.5 Characteristics of social science QM teachers

Type of contract	%	(N)
In a permanent post	89	100
In a promoted post	54	92
Knowledge of QM skills		
Basic	27	98
Sometimes use advanced QM	36	
Regularly use advanced QM	38	
Basis of QM skills		
Self taught	37	98
Postgraduate training	48	
Specialist courses	13	
Other	2	
Externally funded research in previous 3 years?		

no	21	98
1 grant	36	
> 1 grant	42	
Publications using QM in previous 3 years		
None	38	98
1 publication	13	
> 1 publication	49	

Table 2.6 QM teachers and their departments

(medians)	**Years in dept.**	**Years in HE**	**Number Permanent academic staff**	**Of which with QM skills**	***N***
Geography	7	9.50	21.5	5	*6*
Politics IR	7	10	20	3	*7*
(Soc) Anth	5.5	10	15.5	0	*8*
Sociology; Soc Pol; General	5	12	18	3	*51*
Criminology	8	13.5	22.5	2	*12*
Other soc sci	7	9.5	40.5	5	*7*
Service (stats; research; psych)	3.5	4.5	20	10	*7*
All	5	10	18	3	98

Three conclusions emerge from these findings. The first is that the teaching base for QM is *fragile*: in many departments it is dependent on the skill of only two or three staff. Since this was a study of QM teachers departments with low numbers of QM staff or none at all will be underrepresented. Thus the global picture is almost certainly even worse. Second, although many QM teachers are academics with substantial experience and most regularly used advanced QM techniques in their work, *they are also busy with research work*: half had published more than one work in the previous three years using QM and two fifths had held more than one externally funded research grant. Given the the national shortage of QM skills and the level of demand for research that uses them, this finding is unsurprising. However it means that the teaching base for undergraduate QM is yet *more* fragile: most of those currently doing it have other (possibly much more rewarding) demands on their time. Finally those doing 'service' teaching had less experience. While the figures are low, this may reveal a tendency of 'service' supplying departments to allocate such non-core teaching to more junior staff

Teachers were asked about any constraints on their QM teaching. Table 2.7 gives the results.

Table 2.7 Constraints on QM teaching

Student support load	52
Class sizes	51
Curriculum space	46
Teaching assistance	46
Preparation time	35
Marking load	29
Access to computing facilities	27
IT support	18

N = 72

The top four constraints, each mentioned by around a half of respondents, relate to the *fragile teaching base and curriculum space*. There are not enough teachers, not enough time to teach, classes are too big and the individual support many students require is therefore difficult to give. Further comments about constraints on teaching related to lack of sufficient staff with expertise to teach or assist in teaching (6); disinterest or lack of support from departmental colleagues (6); lack of curriculum space (3) poor previous knowledge or motivation of students (3):

> *The research methods team is somewhat isolated within the division - there is a perception that doing 'statistics' is regarded as 'manual labour' amongst purely theoretical staff*
>
> *The department does not see quantitative methods as a priority, and that knowledge of standard deviations and means are more than enough knowledge to complement what is otherwise a qualitative methods training.*
>
> *There is only me in the subject area with an in depth range of quantitative skills. My main focus is in PG teaching. I am part-time and cannot cover all the UG courses as well.*
>
> *One reason we have not moved to making quantitative methods compulsory for all students was lack of staff support and the logistical problems of large class sizes. The capacity of computer clusters would be overwhelmed by the number of sessions, not to mention students needing to complete assignments. A dedicated Politics computer cluster would be necessary but funding is an issue.*

QM teachers were asked to rate their agreement with a range of statements about QM teaching. In the survey the order of statements was randomised, and are presented in Table 2.8 in descending order of proportions of respondent agreeing with the statement:

Table 2.8 Views on QM teaching

Statement	% Agree*	% Disagree*
Most of the students I teach don´t like numbers	84	3

I enjoy teaching quantitative methods	68	4
Quantitative methods teaching requires more preparation time than other courses	44	15
My interest in quantitative methods marginalises me	34	30
Other substantive courses in the department normally make use of quantitative evidence	31	49
My department sees quantitative methods teaching as a priority	29	47
I have the time and resources I need to teach quantitative methods well	26	39
Quantitative methods are in the mainstream of the discipline here	22	62
Most students are confident about using quantitative methods once they graduate	9	64
Quantitative methods teaching is important for promotion here	9	62
The students I teach enjoy learning quantitative methods	5	38
Extra preparation time for quantitative methods teaching is recognized in the allocation of workloads	0	82

*'Don´t knows and 'neither agree nor disagree' responses are not shown but have been included in the base number from which the percentage agreeing / disagreeing has been calculated.

Only around *one quarter* of respondents felt that QM was a departmental priority, that QM was in the mainstream of the discipline where they worked, or that they had the time and resources to teach QM well. Only one in ten thought QM teaching was recognised for promotion and none reported that the extra preparation time necessary for teaching QM was recognised in the allocation of teaching loads. A rather higher proportion, just under one third, reported that other substantive courses in the department normally used some quantitative evidence suggesting that in the best departments only, things *may* have improved since the JISC study (however the latter did find that graphs and tables were often used by lecturers: on its own this does not represent 'integration'). However it must be remembered that these responses are from QM teachers in departments where courses are being delivered.

Teachers clearly feel that most students do not like numbers and approach QM with a negative attitude. They strongly supported the idea that better student 'numerical literacy' would improve things. This reinforces Williams et al's findings that most students would rather write and essay than analyse data. How are these findings to be squared with students' claims in the same research that QM was something that they expected to study and their denial that they had chosen sociology to avoid numbers? One explanation could be that most QM teaching is poor or uninspiring, delivered by recently appointed staff because they have to do it rather than because they wish to do it. While this may be the case in some HEIs it does not square with the evidence here that the majority of QM teachers are in permanent posts, around half in promoted posts and that all but a handful claimed to enjoy teaching methods, despite the constraints they often encounter in doing so. An alternative explanation lies in the anomalous (and almost certainly unintended) way in which QM has moved from the core of social science disciplines to their margin.

One has only to reflect on the amount of effort devoted by departments to developing students' essay writing skills to put these findings in context. If students had only thirty hours of teaching in the course of their degree in subjects that required them to read articles and monographs and write an essay about some aspect of their content we might well find them to dislike essays and be unconfident about producing them. Few respondents went as far as to claim that their students 'enjoyed' learning QM, but only 40% explicitly disagreed with this proposition. Moreover most said they enjoyed *teaching* QM. I suspect that many QM teachers find QM teaching a rewarding activity because even within the substantial resource and curriculum constraints they face, they witness tangible student *progress*, albeit clearly insufficient to leave students confident about using QM.

Table 2.9 Views of measures to support and improve QM provision

Possible measures to support and improve QM provision. % of QM teachers indicating the measure would be a 'useful support'	(n = 98)
Better student 'numerical literacy'	64
More staff able to share quantitative methods teaching	54
More or better teaching resources available on the web	49
More time for such teaching	46
Better information about existing web resources	42
An 'off the shelf' on-line course with relevant teaching materials	38
More recognition for such teaching	29
Regional workshops for quantitative methods teachers	26
Better support from your institution	25
Better support from other staff in your department	24
A virtual discussion forum for quantitative methods teaching staff	17
Summer schools or short courses on quantitative methods for students	15

Table 2.9 summarises respondent's views about a range of measures that might improve QM provision or support their role as QM teachers. Apart from better preparation in numerical literacy on the part of students, the strongest support was for a larger QM teaching base, more curriculum time to deliver QM teaching to students and more accessible and better teaching resources available on the web. There was also a surprisingly high level of support for a web based 'off the shelf' course, given that this was a survey of staff who already teach QM and who also reported that they invested substantial efforts not just in preparing teaching materials, but in maintaining them from year to year. It may be that the level of demand reflects the difficulty of maintaining this investment in the face of competing demands for staff time.