ESRC/SFC Scoping Study into Quantitative Methods Capacity Building in Scotland

Final Report
May 2008

Susan McVie, University of Edinburgh
Anthony P.M. Coxon, University of Edinburgh
Philip Hawkins, Sigma Essex Research & Consultancy
Jackie Palmer, University of Edinburgh
Robin Rice, University of Edinburgh

Acknowledgements

This scoping study was funded jointly by the Economic and Social Research Council and the Scottish Funding Council. The research was carried out in early 2007 by a multi-disciplinary team based at the University of Edinburgh, led by Susan McVie of the School of Law. The other co-applicants were Professor Anthony Coxon, Honorary Professorial Fellow in the School of Social & Political Studies; Philip Hawkins, Co-Director of Sigma Essex Research & Consultancy; Jackie Palmer, Data Manager in the School of Law; and Robin Rice, Data Librarian in the University of Edinburgh Data Library.

The study team would like to thank all those who participated in this research study. These include Heads of Departments and staff involved in teaching, research, computing and library services within the Scottish Higher Educational Institutions; senior executives from the Scottish Government; Directors from a range of social research organisations based in Scotland; and senior members of the Scottish voluntary sector. Thanks are also due to the academics from the Scottish social science research community who generously gave of their time and ideas in preparing this research; and to the Welsh scoping study team led by Professor Laurence Moore who shared their research materials and their draft report (see Lynch et al 2007).

Executive Summary

- There has been widespread concern about a UK-wide deficit in quantitative skills amongst social scientists since the 1960s, especially in relation to the rapid pace of change within the industry and the lack of adequately trained computing scientists.
- Despite experiencing a relatively industrious period in the late 1960s and 1970s, Scotland's provision of quantitative methods within social science is now extremely patchy and as bad, if not worse, than that in the rest of the UK.
- Scotland has a similar demographic profile to the rest of the UK in terms of social sciences; but Scottish Higher Educational Institutions (HEI) are under-represented in other respects (e.g. representation at the Essex Summer School).
- In Scotland, disciplines such as Economics, Accountancy, Business Studies and Psychology, which already have a quantitative reputation, have better resources for assessment, training and improvement of mathematical, statistical and general quantitative skills of their graduate students than other disciplines.
- Undergraduate courses are mainly focused around generic rather than specialised quantitative methods teaching, although there is more specialist provision at postgraduate level, but this again is centred around the 'usual' disciplines.
- Most teaching and research involves fairly general methods and statistical techniques, although there are a few people experienced in more 'advanced' methods. There is a widespread need for continuing professional development training in Scotland across all sectors, mainly at the more advanced level.
- There are a few, small-scale centres of expertise in Scotland, but most quantitative researchers are spread across a range of institutions and disciplines. There are no large-scale networks or centres, and this is viewed as key to building capacity.
- There are three general barriers to developing quantitative methods capacity in Scotland. In order of importance, these are 'antipathy' (reluctance by students, staff and HEI colleagues to engage with quantitative methods); 'accessibility' (availability of/time for training); and 'enabling' (lack of funding, collaborative opportunities and data access).
- Scotland is a relatively 'data rich' country, with a proliferation in recent years of Government funded surveys. However, self-reported usage of Scottish datasets is low and there is a general failure to make the most of available data in Scotland.
- Computing and library support services are not well tuned to the needs of quantitative capacity building. Basic levels of support, such as finding resources on the web and offering assistance to access these, are provided; however, students get little extensive user support or instruction in use of datasets and staff do not get support for statistical consultancy or teaching data analysis skills in computer labs. Greater communication and collaboration between support and research staff is needed.
- There is support in Scotland for a long-term, strategic approach to building capacity and there are good reasons for developing a specifically Scottish strategy.
- A national strategy must include a variety of activities at a range of different levels, such as: boosting numeracy in secondary schools; better engagement with both undergraduate and graduate students; strengthening links between academia and potential employers; more training through continuing professional development; and mentoring for early career researchers.

- Boosting capacity will require cultural and structural changes within many institutions and disciplinary areas. Universities and funding bodies must provide strategic investment in order to build a strong infrastructure capable of supporting a critical mass of quantitative trained researchers in Scotland.
- The recommendations from this study include creating a Scottish Centre for Social Science Research Methods and establishing a Scottish Summer School.

Contents

1. Introduction

This report presents the findings from a scoping study funded by the Economic and Social Research Council (ESRC) and the Scottish Funding Council (SFC) into the capacity building needs of quantitative methods in Scotland. The research was commissioned as part of a wider review of the need to strengthen the research infrastructure and expand quantitative research capacity in the UK. The study involved a range of sectors, including the Scottish Higher Educational Institutions (HEI), central government, private research organisations and the voluntary sector. It was carried out by a research team comprising representatives from the School of Law, the Data Library and the School of Social and Political Science within the University of Edinburgh and Sigma Essex Research & Consultancy.

It is intended that the findings of this research be used by the ESRC and SFC in their strategic development activities and feed into a UK-wide review of capacity building needs in the use of quantitative methods in both teaching and research. This introduction sets out the historical and research context against which this review took place, focusing in particular on important developments in Scotland. It also presents some additional background information of relevance to the main aims of the study.

Historical background

This study was commissioned against a backdrop of longstanding and widespread concern about a UK-wide deficit in quantitative skills amongst social scientists. Problems arising from a skills capital deficit were first identified as early as the late 1960s. During this time, there was rapid, extensive and paradigmatic development in computing and research methods, particularly within the US. Hanan Selvin at UC Berkeley was commissioned by its Survey Research Centre to assess the impact of computers on survey analysis. He argued that computers made it possible to deal with the inherently multi-variable and complex causal models needed in the social sciences and that this would enable a methodological revolution. At the same time, Chicago was developing computer software that subsequently became SPSS and Harvard was developing powerful models, methods and software in social networks and mathematical sociology and in computer-assisted text and content analysis. Around the same time, social scientists at Ann Arbor, University of Michigan, were at the forefront in developing ordinal equivalents of multivariate methods and other models.

Concerns were raised about the rapid pace of change within the industry and the lack of adequately trained computing scientists, which prompted the ESRC and other UK-based professional organisations to launch a range of initiatives aimed at drawing more students into the field. The US developments had a particular impact on events in Scotland in the late 1960s and 70s, however. The Edinburgh Regional Computing Centre and its constituent Program Library Unit were based on IBM machines (rare at the time in UK due to government home procurement policy), which made it possible to introduce innovative US software such as SPSS (which was subsequently promulgated by Edinburgh to the rest of the UK). It also facilitated the export and worldwide distribution of new quantitative social science models and programs developed in Scotland (especially at Edinburgh, Strathclyde and St Andrews Universities in clustering, econometrics, psychometrics, content analysis and Geographic Information Systems). Quantitative social scientists in Scottish

Universities were swift to develop communication networks and publications (such as the Quantitative Sociology Newsletter) which circulated research information, teaching materials and computer programs. Scotland hosted a number of large-scale national studies using complex study designs and, pre-1992, there were strong cross-institutional connections via the inter-university Scottish Business School.

At the UK level, the decline in quantitative research skills was highlighted by the ESRC in Horizons and Opportunities (1987), which identified a wide discrepancy between supply of quantitative social scientists and demand from potential employers. Evidence from a range of reviews carried out in the intervening period suggests that the decline has neither halted nor reversed (see for example Skinner 1999; Rendall 2003; Williams et al 2004; HEFCE 2005; Mills et al 2006). More than 10 years on, the crisis in quantitative social science has led to this being identified as one of the most vulnerable subjects in higher education (HEFCE 2005).

Previous research has indicated that a variety of both internal and external barriers have contributed to this problem. The apparent unpopularity of mathematics and statistics amongst students of social sciences has made it difficult to recruit suitably motivated students and teachers alike (Williams et al 2002). Social science undergraduates with an aptitude and enthusiasm for quantitative methods are relatively rare, and fewer still progress to study such subjects at postgraduate level. While modern developments in computing and the internet have brought benefits in terms of improved research design, statistical modelling and access to datasets, they have also put heavy demands on staff in terms of teaching and research (Skinner 1999). The speed of methodological innovation over the last 50 years has created a steep learning curve for academics to keep up with contemporary developments, but this has not been matched with encouragement or opportunities for re-skilling and professional development (unlike in many other European countries, such as Switzerland). In addition, a lack of local support services for teachers who wish to incorporate data analysis into their substantive courses has compounded the problem (Rice et al 2001).

A review of Scotland's data needs in the post-devolution period was recommended some time ago (Bechofer 1998 cited in Skinner 1999). This scoping study represents the first such review in this area. However, there have been recent indications that quantitative capacity in Scotland is as diminished as in other parts of the UK, if not more so. The Demographic Review of the UK Social Sciences identified advanced quantitative methods as a problematic area nationwide (Mills et al 2006). A number of centres of expertise were named in the Review document, but none of these are situated in Scotland. Furthermore, the National Centre for Research Methods (NCRM), established in April 2004 as part of the ESRC strategy to improve standards in research methods UK wide, has little involvement from Scottish institutions. In a consultation exercise carried out by NCRM to review research methods needs across the UK (Bardsley et al 2006), no-one from the academic community in Scotland was consulted. And of the 38 awards made to date under phases I and II of the ESRC Research Methods Programme, only three have gone to Scotland, two of which were for quantitative projects.[1]

[1] Longitudinal Data Analysis for Social Science Researchers (Round 1) and the Scottish Social Survey Network (Round 2), both led by Vernon Gayle and Paul Lambert at Stirling University.

Demographic profile

A Demographic Review of the UK Social Sciences was carried out in 2005, based largely on HESA data (Mills et al 2006). The Demographic Review presented a general profile of UK social science; however, it is particularly relevant to summarise the emerging similarities and differences between Scotland and the rest of the UK ("RUK")[2], so that the findings from this study can be viewed against that comparative background. The Scottish data are broadly similar to RUK in almost all characteristics (see Coxon and Hawkins 2007), although there are small, significant and patterned differences. These differences are highlighted below.

Social science staff
Scotland contains 8.4% of the UK population, but has a slightly higher fraction (9.4%) of social science staff within universities. Compared to RUK, the social science staff in Scotland:

- are slightly older on average (although in terms of replacement there is no greater evidence of a coming "crisis of replacement" in Scotland, other than a slight under-recruitment of younger staff);
- are more likely to be permanent (82%) than in the RUK (74%) for almost all disciplines;
- include slightly higher proportions in the higher grades (professor and senior lecturer);
- and have almost the same fraction (around two-thirds) of staff who are research-active (RAS), but
    - Education has a markedly low percentage of RAS
    - and Social Work, Law and Communication have considerably higher fractions of RAS.

Research excellence[3]
The proportion of social science departments achieving a 5 or 5* grade in the Research Assessment Exercise is a commonly-used indicator of "research excellence". When Scotland's 14 Universities are ranked by the number of 5/5* departments in the last RAE, the top half consists of the "older" universities (in order: Edinburgh, Glasgow, Aberdeen, Stirling, St Andrews, Strathclyde and Dundee). These universities account for all of Scotland's 5/5* departments[4]. In addition:

- their departmental grades are higher than equivalent departments in the lower half (mainly post-1992) universities; and
- they support a wider range of social science departments.

Postgraduate students
Pro rata, the proportion of PhD registered students (9%) is very slightly lower in Scotland than the proportion of social science staff within Universities. The disciplines with the largest proportion of doctoral students are Education and Psychology (57%) and Business Studies (25%). Scotland has proportionately fewer MA students (7%) than RUK, although these also dominate strongly within the discipline of Business Studies (48%).

[2] RUK includes England, Wales and Northern Ireland.
[3] Obtained from HERO (Higher Education and Research Opportunities in the United Kingdom) data.
[4] Table 3.3 of the Scottish Demographic Review presents detailed information of departmental RAE rating by discipline and Scottish university (Coxon and Hawkins 2007).

Typology of social science disciplines
The Demographic Review also presents a typology of social science discipline, based upon a set of demographic descriptors (see Mills et al 2006, p34-35), forming three distinct groups (shown in the panel below). Once again, although there are important differences between Scotland and RUK, the overall picture is one of considerable similarity. With regard to differences:

- For all disciplines except Law, Scottish departments have a considerably larger proportion of permanent staff;
- Law is positioned quite differently in Scotland, in the midst of the social sciences (highly comparable to Sociology and Anthropology), whereas in the Rest of the UK it is positioned with Town and Country Planning and Business and Management;
- The percentage of PhD students is higher in Scotland (except for Economics and Education, and even here the difference is small at less than 5%).

Three disciplinary groups identified by the Demographic Review:

GROUP I:	Town-Planning, Business, Communications and Education
GROUP II	Social Policy, Psychology and Linguistics form a loose cluster
GROUP III:	Law, Sociology and Anthropology form a tight cluster in Scotland, with Politics and Economics closely adjacent.

UK Data Archive usage

In order to establish the relative interest of Scottish academics in the UK Data Archive, data were requested on the total number of registered users at UK institutions between June 2004 and February 2007, including both the Economic and Social Data Service and the UK Census Programme. These data showed that there were more users per institution, on average, in Scotland than in the RUK. There were a total of 3,850 registered users across 41 Higher Education (HE) and Further Education (FE) institutions in Scotland (an average of 94 users per institution), compared with 37,976 users across 507 HE and FE institutions in RUK (an average of 75 users per institution). When HE institutions were considered in isolation the results were similar: there were 198 users per Scottish HEI compared to 166 in HEI across the RUK. One Scottish institution was ranked amongst the top ten users (at tenth place) and a further one appeared in the top 20.

EDINA was asked for statistics on the demand to download maps from the Ordnance Survey data available via their Digimap service to gain a sense of data usage for geospatial analysis. They were only able to provide usage statistics for logins, which includes viewing maps online; however, the data show that usage was lower for Scottish institutions than RUK. In the financial year 2006/07, 12 institutions in Scotland held 21,827 online sessions, compared with 237,665 sessions by 83 institutions from across RUK. This gives an average of 1,819 sessions per institution for Scotland and 2,863 sessions per institution across the rest of the UK. Data on the size of institutions cannot be presented as this would compromise anonymity.

Essex Summer School attendance

The Summer School at the University of Essex offers the UK and Europe's most comprehensive training programme for social science data collection and analysis aimed at both postgraduate students and HEI staff. Started in 1967, the School offers a wide range of courses that use both lectures and practical sessions. Most courses deal with techniques of data collection, analysis, and model building, although some non-statistical courses are also offered. An intensive preliminary course on mathematics for social scientists is offered to those who feel they need to improve their basic skills. Originally sponsored by ICPR, the terms of the grant stipulated that participants should be drawn from all over Europe. Over the years, the School has had participants from over 100 countries. Statistics for the last six years indicate that the total number of participants from Scotland has increased slightly in real terms (from 9 in 2001 to 14 in 2006), but has remained stable at around 4-5% of the UK participants. Given that Scotland contains 8.4% of the UK population and 9.4% of social science HEI staff, Scottish participants are well under-represented at the Essex Summer School.

School curriculum information

There is a commonly reported perception, identified by many of those consulted for this research, that the "problem" of the low take-up of quantitative research methods in the social sciences lies in part with the schools sector. Although reviewing the situation in schools was not part of the remit for this scoping study, it was highlighted by two of the respondents to our staff survey:

> *"Stop dumbing down in schools (especially the curricula of e.g. Highers and A levels) and make kids do more maths there."*
>
> *"Work closely with schools to improve secondary level mathematical training."*

The suggestion is that fewer school students take Mathematics and/or Statistics at Higher level in Scotland or A-level in England and Wales than was once the case and that the curriculum in these subjects is less rigorous than it once was. As a consequence students entering the social sciences at undergraduate level are assumed to be less well prepared for quantitative research.

Whilst Tomlinson (2004) in the report on the 14-19 Curriculum and Qualifications Reform implicitly acknowledged some of these issues in England and Wales, the situation is quite different in Scotland where Highers offer a broader curriculum at post 16 than A-Levels and where Mathematics is the second most commonly studied subject at Higher level (see table 1.1). In Scotland, at least there is no evidence of any significant decline in those taking Mathematics at Higher level. However, our survey of Heads of Departments, although limited in scope, indicated that only 30% of social science courses at degree level had a Mathematics qualification as a pre-requisite. In other words, whether or not there has been a decline in those taking Mathematics at Higher or A-level, most university departments in our survey did not consider it an important entrance requirement.

Table 1.1: Trend in entries for each subject at Higher in Scotland, 2001 to 2005[1]

ALL CANDIDATES						PERCENT CHANGE
SUBJECT	**2001**	**2002**	**2003**	**2004**	**2005**	**2004/2005**
English[2]	16,123	28,910	29,624	28,873	28,707	-1%
Mathematics	20,730	19,790	19,966	19,394	19,181	-1%
Chemistry	9,903	9,560	9,292	9,271	9,411	2%
Physics	10,015	9,580	9,489	9,286	8,952	-4%
Biology	9,309	9,274	8,920	8,852	8,943	1%
History	7,758	7,908	8,088	7,891	8,128	3%
Geography	7,984	7,733	7,809	7,407	7,419	0%
Modern Studies	7,513	7,900	7,762	7,738	7,397	-4%
Art and Design	6,810	7,200	6,908	6,895	6,664	-3%
Business Management	5,833	5,908	5,977	5,845	5,977	2%
Economics	1,160	1,042	972	847	715	-16%
Sociology	338	468	521	600	636	6%
Psychology	1,186	1,951	2,440	2,779	463	-83%
Psychology (new)[3]					2,349	-
Totals (all subjects)	147,796	164,004	166,885	165,575	164,142	-1%

Notes:
[1] Extract from table NH1 which shows 10 subjects with highest numbers of entries in 2005 plus social science subjects.
[2] The low figure for 2001 is due to the phasing in of Higher Still English, which took longer than for other subjects (the figures shown exclude the old Highers).
[3] There was an overlap in 2005 between the old and new psychology curricula before the latter was rolled out nationally.
Source: Scottish Qualifications Authority

Sociology as a subject in its own right, although increasing in popularity, is rarely studied in Scottish schools, and is taken as a Higher mostly by students in Further Education. Psychology and Economics, whilst more likely to be studied than Sociology, are also minority options, again more likely to be studied in FE rather than in schools. In schools, the social science option most often studied at Higher level is Modern Studies, one of the ten subjects with the highest numbers of entries. The Modern Studies curriculum at Higher level involves study of political and social issues in the UK and internationally, but, unlike the Sociology curriculum, has no requirement for any research methodology either quantitative or qualitative. Whilst outwith the scope of this study, it would be valuable to investigate whether school students' experience of the modern studies curriculum at Higher level colours their expectation of the curriculum in social sciences at university. Although a basic understanding of graphs and tables is a requirement, there is little need for in-depth mathematical knowledge or proficiency.

2. Aims and methods

Aims

The main aim of this scoping study was to review the quantitative methods capacity building needs in Scotland. A broad definition of quantitative methods was applied in this review. The term was taken to include research design, data collection methods and analytical techniques (ranging from basic descriptive statistics to more complex modelling methods). It is important, however, to acknowledge the issue of defining what is 'quantitative' as it gives rise to substantive as well as semantic problems (see Appendix 4 for a detailed note on this point).

The objectives of the study were to:

- establish the provision of quantitative methods teaching within social sciences at undergraduate and postgraduate level in Scottish Higher Educational Institutions (HEI);
- pinpoint critical mass of quantitative teaching and/or research expertise;
- explore the main capacity building needs of Scotland; and
- recommend how and where to boost capacity in this area.

Methods

This scoping study had four main strands to its methodology, which are described in detail below.[5] In addition to these formal methods of research, the study team were involved in consulting a range of groups and individuals, including the ESRC Quantitative Methods Subgroup, the International Benchmarking Review team, the research team based at Cardiff University involved in an equivalent scoping study for Wales and a range of prominent individuals within the social science community of Scotland.

Strand 1: Survey of Heads of Departments within Scottish HEI
In order to get a strategic view of the provision of quantitative methods teaching and research within the 14 Scottish HEI, the Heads of Departments (HoD) or equivalent in all social science disciplines were sent an email with a link to a short online survey. HoD were targeted in the first instance to try and maximise response rates, an approach recommended by Bardsley et al (2006). HoD were identified using existing data from the Demographic Review, supplemented by online searches and network contacts. At least two reminders were issued to HoD to respond to this survey.

The survey contained departmental level questions about staff and student numbers; quantitative methods courses offered and numbers of staff involved in teaching quantitative methods; mathematics requirements or training for students; numbers of staff and doctoral level students involved in quantitative research projects; and some

[5] In addition to the four strands mentioned, it was originally planned to carry out a systematic review of syllabi and regulations for selected social science courses offered by Scottish HEI. However, this was not possible within the scope of the review due to the poor response to the HEI surveys and difficulties in accessing the necessary materials.

general questions about the role of quantitative methods and particular strengths within the department, and views about ways to improve capacity in Scotland.

Strand 2: Survey of research and teaching staff within Scottish HEI
The second strand of the research was linked directly to the first, as HoD were asked to provide the names and email addresses of up to four members of teaching and/or research staff working within their department who were involved in using quantitative methods. These staff members were then sent an email explaining the purpose of the study and providing a link to a further online survey.

This survey contained a more detailed set of questions on the background and activities of staff members. This included details about their own academic qualifications, professional training and career development; involvement in using quantitative methods in teaching and/or research; collaboration and publications experience; particular skills and expertise in quantitative research design and statistical analysis; views about the barriers to improving quantitative research and teaching in Scotland; and some attitudinal questions about how capacity could best be increased.

Strand 3: Survey of information support services within Scottish HEI
In light of previous research evidence that had shown local support services to be crucial in the development of quantitative capacity (Rice et al 2001), we included a further online survey targeted at HEI staff working within library and computing services. The aim of this survey was to identify the extent and nature of information services available to staff within Scottish HEI.

This survey included questions on the extent and nature of central user support for various activities, including acquiring and improving knowledge about datasets; computing provision, support and training for various data analysis packages; support for staff in acquiring datasets, using datasets for teaching and accessing various national data services; and availability of specialist staff members to offer support services.

Strand 4: Contact with key stakeholders
Boosting capacity of quantitative methods in Scotland has implications for organisations other than the HEI, so interviews were held with representatives from three key stakeholder groups with an interest, both as consumers and potential employers, in the improvement of quantitative capacity. First, the Scottish Government is a major funder of Scottish social research, much of it involving large-scale quantitative surveys and programme evaluation. The work of the Analytical Service Divisions within the Government relies on recruiting suitably trained researchers, statisticians and economists. Second, the last ten years has seen a large increase in the number of commercial research companies moving into the social science market and conducting quantitative projects in Scotland. They are also major recruiters of quantitatively trained social researchers. Third, the voluntary sector is involved in a large amount of research activity and commissions a certain amount of survey work. The views of each of these three stakeholder groups were sought with a view to contextualising the role of the HEI in this competitive marketplace.

3. Results from the surveys

Strand 1: Heads of Department survey

The survey for Heads of Department (HoD) was intended primarily as a way to solicit the names and email addresses of departmental staff involved in teaching and/or research using quantitative research methods for the staff survey. It was also used to obtain a numerical overview of each subject area, including size of department measured by numbers of teaching and research staff; numbers of undergraduates and postgraduates; and the number, topic and level of research methods courses offered. Three open-ended questions were designed to elicit respondents' views on the role of quantitative research methods in their department, departmental strengths in this area and how research capacity in the Scottish social sciences could be substantially improved.

Institutional representation and disciplinary profile
The response to the survey was disappointing. Of 90 HoD contacted by email, only 23 (25%) responded, even after a number of reminders. This immediately raises problems in terms of the representativeness of our resulting sample. The main issue is one of bias: in what ways is our "sample" likely to be unduly under- or over-representative of factors that relate directly to the variables within the study?

There was some systematic missing information that cannot be compensated for i.e. totally missing universities and totally missing disciplines:

- No responses were received from three universities. Eleven out of fourteen universities contacted responded but no departmental responses were received from Heriot-Watt University (with a Business Studies Department), Robert Gordon University (with a Politics and a Law Department) nor Queen Margaret University College (with a Psychology, Business and Adminstrative Studies and Mass Communciations and Documentation departments). Arguably, these institutions contain few social science departments and are not crucially involved in graduate training.
- No responses were received from two disciplines: Geography (with five departments in Scotland) and Anthropology (with three departments in Scotland). These are more serious omissions, as there is no way we can compensate for them.

There is one way in which we can estimate the importance and relevance of the bias. One variable common both to our population and to all Scottish HEI departments is their 2001 HERO RAE rating, which is one of the very few indicators for which information is known for the population and for our sample. Table 3.1 combines a good deal of relevant information. It shows:

- all the Scottish HEIs and their constituent social science departments (excluding those universities which did not respond);
- it includes each department's relevant 2001 RAE rating; and
- it identifies departments which did respond. These are emboldened, underlined and italicised, thus : ***x***

Table 3.1: Table of Scottish Institutions and Departments, Survey Response and RAE Ratings (HERO RAE 2001)

	Economics	Education	Linguistics	Manage-ment & Business Studies	Politics & International Studies	Psychology	Social Policy & Admin-istration	Social Work	Statistics	Socio-legal Studies	Sociology	Other	Total response
Aberdeen	3a			3a	4	4			4	***5***	***5***		2/7
Abertay				3b		3b						***0***	1/3
Dundee	3a	3a			4	4		***4***		***5***	3b		2/7
Edinburgh	***4***	4†	5	***4***	***4***	5	***4***		4	5	5		4/10
Glasgow	***4***	4	***4***	4	5	5*	4		***5***	5	4		3/10
Glasgow Cal.		3b	3b	3a	***0***	4							1/5
Napier	***0****			***3b***					3b	3a		0†	2/4
Paisley				2		***0***	3a						1/3
St Andrews	***4***			4	5	***5****			5				2/5
Stirling	4†	***4***		4		5		***5***			0†		2/5
Strathclyde	4	***4***		4	***5***	***4***			4	5	3a		3/8
Total Response:	4/8	2/6	1/3	2/10	3/7	3/10	1/3	2/2	1/6	2/6	1/6	1/2	23/69

* 0 = No RAE rating

† Senior members of staff at these universities were interviewed as part of this scoping study, but responses were not submitted by their Heads of Department.

In terms of subject disciplines, compared to the overall response rate (23/69, 33%):

- Economics, Politics and Social Work have better response rates;
- Statistics and Sociology have lower response rates.

In terms of universities, the variance is much less; Glasgow Caledonian has a low fraction of responding departments and Napier has a high response rate.

The initial suspicion that RAE level could be a systematic biasing factor turns out not to be the case (the median RAE score for the sample and for the non-sample is 4), and indeed, no other characteristic is apparent as a biasing factor. Hence, despite the sample's shortcomings and with the caution that three universities and two disciplines are excluded, the sample turns out to be reasonably acceptable.

More encouragingly, the purpose for which the HoD sample was constructed was satisfactorily accomplished. The HoD survey resulted in the successful elicitation of the names and email addresses of departmental staff who undertake research methods teaching. In all 54 staff involved in teaching or research involving quantitative methods were identified of whom 35 (65%) responded. It was clear too that these staff were not limited to the individual departments/subject areas responding (see results of strand 2). Quantitative methods teaching and research is often conducted by members of staff from across a number of subject areas within social science schools or departments and by those who responded.

HoD survey responses

Although the low response-rate to the HoD questionnaire means that the data cannot be taken as fully representative (thereby making estimation of population characteristics hazardous), there are nonetheless important questions of research training and capacity present in the HoD questionnaire which are of considerable relevance to these questions and are unlikely to be affected by these technical deficiencies.

Responses to the HoD questions are grouped under four headings (the questionnaire is included as Appendix 1):

- Mathematics training and background
- Involvement in quantitative research
- Type of research methods courses at undergraduate and postgraduate levels
- Open-ended questions about improvements in research capacity

Mathematical training and background

In one-third of the departments (7/23) a mathematical qualification was a pre-requisite for one or more degree courses. Information was not collected on which specific courses or graduate levels required a mathematical qualification; however, the departments concerned are overwhelmingly in the "financial" cluster: Economics, Business and Accountancy (plus one Education department).

Closely allied to this was a question about support training in mathematics. A slightly higher fraction (10/23) of departments provided support training in mathematics, and the answers to both questions are closely matched (Sokal matching coefficient: 0.67). Again, those providing this form of support are from the "financial" cluster (and the same Education department).

The strong impression given by these data is that not only does a certain cluster of disciplines have a similar profile in terms of training characteristics, but that issues around variation in individual students' competencies are dealt with in these disciplines systematically at the earliest stage of graduate training. In the case of Economics (and, in a different manner, Psychology), this is done on an inter-university basis through SGPE (the Scottish Graduate Programme in Economics[6]). This includes a set of 2-week pre-sessional courses in Mathematics and Econometrics, aimed at remedying deficiencies, improving skills and ensuring a common level of competence up to and including probability theory and matrix algebra. It is clear that the disciplines with the best provision for assessing deficiencies and bringing students to a common level are the very ones with the best general standard of quantitative skills. This could be a model for other disciplines in Scotland, given sufficient collegiality.

Involvement in quantitative research
HoD were asked how many staff and PhD students were involved in quantitative research within their department. The distribution of numbers of quantitative staff and PhD students is markedly skewed. Putting the distributions together, departments tend to have few (4 or less) quantitative people – insufficient to form a quantitative "core" – or they have a large number (15 - 80), with a third of the departments scattered in the middle ranges. PhD students are even more concentrated in the extremes (30% of these departments have one or less quantitative PhD students). Not surprisingly, the answers to the two questions correlate very highly (r=0.90) and departments with a quantitative tradition (Economics, Statistics and Psychology) have broadly similar high numbers of both staff and PhD students involved in quantitative research.

For the departments that responded to our survey – biased somewhat towards the less research-active – the picture is very clear. Disciplines such as Economics, Accountancy, Business Studies and Psychology, which already have a quantitative reputation, have developed better resources for assessment, training and improvement of mathematical, statistical and general quantitative skills of their graduate students. Some other select departments in disciplines, such as Political Science and Education, have developed a similar pattern (showing that up-skilling can be accomplished), but other disciplines either have little need for quantitative skills or demonstrate little concern about systematic improvement. We have no reason to believe that the situation is any different outside our "sample" and, indeed, it may be the case that the contrast is even greater.

Type of research methods courses at undergraduate and postgraduate levels
HoDs were asked to specify the types of research methods courses in their department's undergraduate and postgraduate schemes. Earlier work (Williams 2002) had shown that a major distinction existed between general (or generic) research methods courses and specialised courses. The distinction covers a number of subsidiary differences:

- *General* courses tend to be *about* research methods of design and analysis and cover characteristics common to several traditions; they may (but usually do not) involve use or manipulation of empirical data and practical exercises. Very often they are methodological in character, covering semi-

[6] See http://www.sgpe.ac.uk/about/overview.html retrieved 25/04/07

philosophical issues like the nature of sociological knowledge, and whether measurement is possible in the social sciences, rather than dealing with the detail of research procedures. As the name suggests, they are usually intended for a broad audience and are often compulsory in nature.

- *Specialist* courses are usually optional (or specific to a particular course-scheme), focussed in form and aim to train in the nature and practice of particular research or modelling skills. They may be either quantitative, or qualitative, or both.

(i) Undergraduate courses

All university social science departments have at least one undergraduate research methods course (as required by the ESRC), but the main differentiator is, again, the type of discipline:

- Psychology, Economics and Business Studies have more methods courses pro rata than other disciplines, but Economics (and linguistics) have few generic courses and predominantly rely on specialist courses, while Psychology and Business Studies have an equal mix of both types.
- All other disciplines (both "central" such as Sociology and Politics, and more practically-oriented ones) have at least one undergraduate research methods course, but only a few (those that have developed a 'quantitative' reputation) have specialist courses.

The question of the background competence of students in these courses is moot. Is the relative lack of specialist (quantitative) courses in the social sciences due to lack of interest and/or training on the part of staff? Or is it due to the undergraduate students' antipathy (a factor repeatedly reported by staff in studies of the "central" social sciences[7])? Or, indeed, is it due to the students' lack of prior training or exposure to basic quantitative methods?

Here, as in the subsequent discussion with respect to graduate-level competence, the evidence is conflicting, or we simply do not know. We know that Scottish students generally arrive at university with better mathematical skills than their English counterparts (see section on school curriculum information in section one), but there exist virtually no systematic studies of what the content and level of students' prior quantitative skills amount to, in almost any discipline, and this must surely be a high priority for investigation, as it underpins almost all other issues debated under the rubric of "quantitative deficit" not only at the graduate stage, but in its preceding ones.

The content of courses was difficult to assess within the remit of this study. Many universities publish (either on the web or in hard-copy) some details of courses, but these are far from comparable in either detail or substance. Understandably perhaps, for this is a safer precautionary measure than exposing intellectual property to unacknowledged borrowing (a factor frequently expressed by directors of research methods courses in the more prestigious universities of the US). Though such detail

[7] We are grateful to Professor Malcolm Williams for discussions on this matter, and in association with his current ESRC grant " Student Perceptions and Experiences of Quantitative Method" and earlier work. The opinions are, of course, our own.

is an important contribution to understanding what happens in research methods training, it requires subsequent and more subtle investigation.

(ii) Postgraduate Courses

Much the same applies to postgraduate research methods training courses as to their undergraduate counterparts, and the balance of general versus specialised courses is similar. Virtually every department has a postgraduate research methods course of some form, and overall, there is an almost even balance of types of course (27 general to 24 specialised):

- Economics has the most courses, and an even spread of general versus specialised, but a more common balance is more specialised than general – a hardly surprising reversal of undergraduate courses.
- The specialist courses are more concentrated in the usual disciplines: Economics, Psychology, followed by Business and Political Science. Social Work and Social Policy respondents reported having no specialist methods courses.

Shortcomings in the quantitative background of the postgraduate students are assessed and remedied in Economics, in the national pre-sessional courses (see above) and to a less formal or integrated extent in Psychology. The shortcomings are neither assessed, nor systematically remedied, in other disciplines, though the Edinburgh Graduate School for Social and Political Studies is investigating the use of e-learning procedures to do this. The deficiencies do not just arise from the school system at postgraduate level, but also from variation in the level and content of a student's previous experience in undergraduate research methods courses at other universities or other disciplines. It is therefore all the more crucial that some remedial system be put in place at the graduate level than at the undergraduate level. At present only Stirling University in Scotland offers graduate degrees (Masters and Doctoral) expressly in Quantitative and Applied Social Research.

Comparing the content of postgraduate (general) research methods courses is even more difficult than for undergraduate courses. For ESRC recognised courses, the 2001 Disciplinary Guidelines[8] provide a flexible framework for syllabus and course content. But disciplines also differ widely in the extent to which professional associations determine, assess, recommend and monitor the form and content of courses (Psychology and Economics provide the best examples of such detailed oversight, see for instance Kelly and Howe 2006). There is an even more pressing need for a detailed cross-disciplinary and cross-institutional study within Scotland of the content of postgraduate training courses.

Open-ended questions about improvements in research capacity

Respondents to the HoD survey were asked to express their views about changes in quantitative research methods training that would improve the research capacity of Scottish social science. There were four common themes that ran through the HoD responses to this question:

[8] See: http://www.esrcsocietytoday.ac.uk/ESRCInfoCentre/opportunities/postgraduate/pgtrainingpolicy/index62.aspx Retrieved 24/04/2007

(i) Establishment of a Scottish inter-university consortium/centre for research methods

Such a centre was usually viewed as being discipline-specific and was suggested by HoD from Politics, Sociology, and Social Policy. In Economics this, of course, effectively already exists through the Scottish Graduate Programme in Economics which may be one possible model, although this is geared specifically to postgraduate students enrolled in the programme.

(ii) Establishment of a "centre for excellence"

This was also conceptualised as pooling resources from a network of Scottish universities, but also offering more extensive training in research methods, such as through summer courses and intensive workshops/modules throughout the year. This would be aimed at postgraduates, post-doctoral students and staff. Such a centre could also offer web-based resources and e-learning courses.

(iii) Provision of basic mathematics and statistics courses

A number of respondents referred to the poor mathematical and statistical skills of those entering social science courses and emphasised the need for basic mathematics and statistics courses to help students overcome what is sometimes a fear of numbers. Blending substantive issues with quantitative methods throughout undergraduate and graduate courses would also help students to perceive the relevance of quantitative methods training.

(iv) Provision of courses for staff

Several respondents referred to the need for more opportunities and support for staff to up-skill and re-skill, both to keep up with developments (or indeed, re-train) in relevant quantitative research methods.

Strand 2: Teaching and Research Staff Survey

It is notable that 65% (35/54) of those whose names were provided by their HoD did, in fact, respond. The low response rate overall, however, makes it impossible to say whether the results of this scoping exercise are an accurate representation of views from all staff involved in teaching or research using quantitative research methods across all social science disciplines in Scotland (as discussed in strand 1). However, the participants did raise a number of similar concerns around the issue of capacity building to those raised by members of the social science community who were interviewed more broadly (see section 4 of this report).

Institutional representation and disciplinary profile

Looking at the institutional spread of the staff who responded to this survey, the highest proportion (11, 31%) was from the University of Edinburgh. This was followed by several responses from the Universities of Glasgow and Strathclyde (6, 17% each) and Aberdeen (4, 11%). One or two responses each were received from Dundee, Glasgow Caledonian, Napier, Paisley, St Andrews and Stirling Universities. There were no responses from Abertay, Robert Gordon and Queen Margaret Universities. One unsolicited response was received from Heriot-Watt, although there had been no response from the HoD, which indicates that at least one staff member took the trouble to forward the survey on to others.

Respondents to the staff survey did not cover all subject disciplines. The most commonly represented disciplines were Political Science and International Relations (7, 19%), Sociology (6, 17%) and Psychology, Economics and Education (4, 11% each). In addition, there were responses from academics working within the fields of Linguistics, Law, Criminology, Geography, Management, Social Policy, Statistics and Socio-Legal Studies.

Staff survey responses
Responses to the staff questions are grouped under eight headings (the questionnaire is included as Appendix 2):

- Demographic profile and educational background
- Continuing professional development and cross-sectoral experience
- Experience of teaching quantitative methods
- Current research using quantitative methods
- Quantitative knowledge, usage and training needs
- Views on capacity building needs
- Other barriers to quantitative capacity building in Scotland
- Ways to increase capacity in Scotland

Demographic profile and educational background
The majority of those who responded were male (22, 61%) and in the older age-groups. Fifty eight percent of respondents (21) were aged 45 or older, while only 14% (5) were aged under 35. The vast majority of respondents were teaching staff, including 11 lecturers (31%) and 12 senior lecturers (34%). A further 10 (28%) respondents were at professorial level. Only 3 (8%) of the respondents described themselves as researchers, of whom one was in a senior position.

All but 3 of the respondents had two (47%) or three (44%) degrees, and 25 (69%) were educated to doctoral level. Amongst those with more than one degree, the majority (29, 81%) had pursued the same or similar disciplinary studies throughout their education career, while a small number (7, 19%) had moved between disciplines. In addition 28 (78%) were currently working in the same disciplinary area as their most recent degree. The pattern, therefore, is one of relative stability with regards to subject interest indicating that early methods training was subject specific. Only four respondents had studied degrees specifically in Mathematics or Statistics.

Sixteen (44%) respondents had degrees from Scottish universities, of which half (8) had only studied in Scotland; the remainder (8) also had degrees from other parts of the UK, overseas or both. Amongst those respondents who had not studied for degrees in Scotland, most (11) had English degrees only, while 6 had degrees from overseas and 3 had studied both in the UK and abroad. In total, 14 (39%) had degrees from overseas universities.

Continuing professional development and cross-sectoral experience
About two thirds (22, 61%) of the respondents said that their degrees had been all or mostly quantitative, while the rest had studied quantitative methods to a lesser degree. Nevertheless, only 14 (39%) reported having had continuing professional development (CPD) in quantitative methods. CPD was only slightly higher amongst those who had predominantly quantitative degrees (9, 41%) compared with those who did not (5, 36%). A broad range of CPD courses was described, mostly sponsored by

employers. These included courses focusing on complex analytical techniques (to study latent class analysis, structural equation modelling, various types of regression modelling, multi-level and longitudinal analysis). They also included courses on either generic or more specialised research design issues, and software training (e.g. SPSS, R). Four respondents had attended the Essex Summer School and two people mentioned attending courses to learn about using specific datasets.

Although all respondents were in academic posts, the majority (28, 88%) had experience of conducting quantitative research within another sector. The largest proportion (61%) reported having used quantitative methods within the public sector, while 42% (15) had experience of working in the private sector. A smaller proportion (17%) had used quantitative methods while working in the voluntary sector.

Experience of teaching quantitative methods
Most of the respondents (64%) reported involvement in teaching 'generic' quantitative research methods at either undergraduate or postgraduate level. Nineteen (53%) reported teaching a generic course at undergraduate level, and 17 (47%) at postgraduate level (with 13, 36%, teaching both). Six respondents taught only at undergraduate level, and four only at postgraduate level.

Respondents were asked to provide specific details of any specialised quantitative methods courses that they were involved in teaching. Although nineteen (53%) respondents provided information about 34 different courses, by their description many of these would fall under the definition of generic courses. For example, 23 of them were compulsory courses, which is less likely to be the case for specialist courses. Of the remaining courses, 10 of which were specified as non-compulsory, only six stood out as offering training in more complex quantitative methods. These included four courses in intermediate or advanced level Statistics or Econometrics; and two courses offering advanced survey methodology training.

Overall, the mean number of hours taught on any one course was 23.9, with a median of 20 hours. The minimum number of hours taught was 4, but one respondent reported spending 60 hours teaching on one course (the class size was particularly large and it is possible this person was double teaching the course). In total, sixteen of the 34 courses involved more than 20 hours of teaching in one year for the respondent. These figures relate to teaching time only, and do not include time spent preparing for classes.

The average number of students ranged from 6 for some postgraduate courses to 240 for one large undergraduate class. The mean number of students taught in the last year was 59.6 per year, with six courses involving more than 100 students. Of the 34 courses described, 13 were taught at postgraduate level and 21 at undergraduate level. In addition to teaching courses, nineteen respondents (53%) stated that they were also supervising doctoral students who were using predominantly quantitative methods for their studies. Most (10) had only one PhD student, although six were supervising two students and one respondent reported supervising eight quantitative doctoral students.

Current research using quantitative methods
All but three respondents (91%) stated that they were involved in current research projects involving at least some quantitative methods, a third (11) of whom said this applied to all their research work. Three out of four had direct experience of applying for funding and/or publishing quantitative research during the previous five years. Nineteen (53%) had been successful in applying for funding for quantitative research in the past five years, of which 9 (25%) had also had applications rejected. Only one had applied without any success. Twenty two (61%) had had articles based on quantitative research published in that time period. A quarter of respondents (9) had no such experience.

Only five respondents (14%) reported being associated with a quantitative research centre or network. The nature of these centres/networks was specific to the subject discipline of the respondents, but noone reported being affiliated with any of the major national research centres such as the NCRM. Nevertheless, the majority (28, 78%) of respondents were collaborating with at least one other person on quantitative research. Roughly equal proportions were collaborating with someone from their own department (20) as were collaborating with someone from a different institution (19). Around half that proportion (10) said they were collaborating with someone from a different department within their own institution. Amongst those who were collaborating with others, a small group (6) reported collaborating within and between institutions.

Respondents were asked whether they were involved in any innovative work to develop new techniques of quantitative methods or analysis. Nine respondents described work which they felt came within this remit. Two were involved in the development of web-based tools to assist teaching and learning activities. The remaining seven were involved in more methodological developments. These included experimental work to improve social survey measures; new techniques for analysing time series data; improved measurements for social network analysis; methodological advancement in the use of spatiotemporal data; and new techniques for modelling historical data.

Quantitative knowledge, usage and training needs
Respondents were presented with a list of different types of quantitative research methods and analytical techniques, ranging in complexity. For each method or skill, they were asked to indicate whether they fell into one or more of four categories:

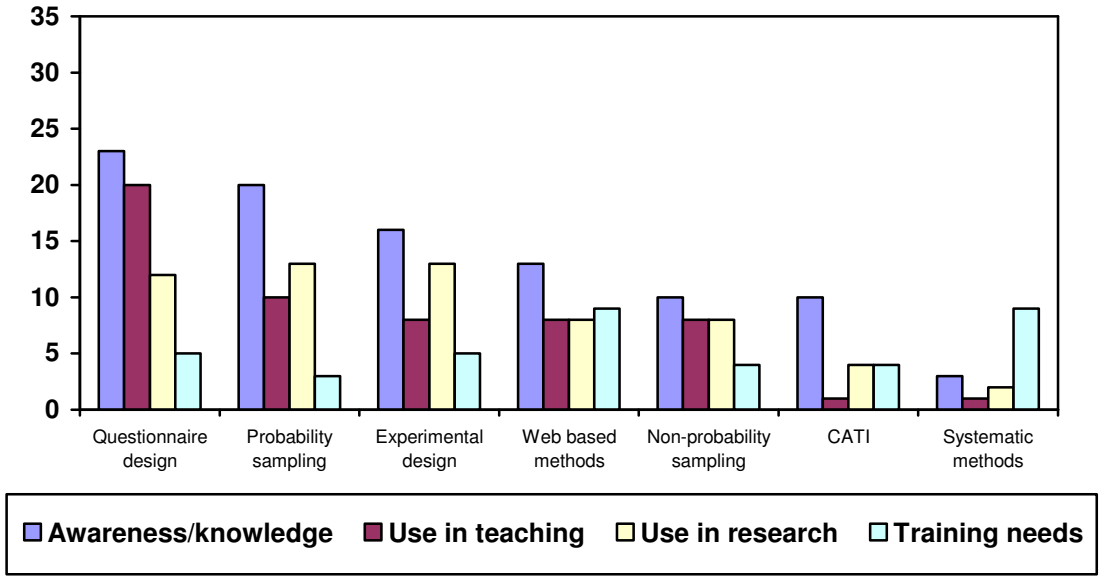
- *Good knowledge or awareness*: having a good understanding of the method or feeling comfortable reading published research that uses the method;
- *Currently teaching or supervising*: either at undergraduate or postgraduate level, or on other educational programmes (including PhD supervision);
- *Use in research*: including current or past research, but excluding collaborative work where someone else used the method;
- *Further training*: whether they felt in need of preliminary or additional training in this method (whether at an elementary or advanced level).

The questionnaire included seven quantitative design issues ranging from simple sampling techniques, such as probability and non-probability, through to more complex systematic data collection, such as pair-comparisons and triads. Overall 33

respondents ticked at least one of the boxes in this section, with most respondents reporting some degree of good knowledge or awareness of one or more of the methods (28, 78%) and/or usage of the methods in their own research (27, 75%). Slightly fewer (22, 61%) stated that they were involved in teaching one or more of these methods; and less than half (15, 42%) of respondents stated that they required training in this area.

The results for each item are presented in figure 3.1, which indicates that level of knowledge is greater than extent of use in either teaching or research, although how much greater varies by method type. The highest level of awareness and teaching usage was in general questionnaire design, which is not surprising given the extent of generic research method courses taught by these respondents. There was a reasonable level of knowledge about probability sampling, and to a slightly lesser extent, research designs involving either experimental or quasi-experimental methods; however, fewer respondents had good awareness of non-probability sampling designs. These methods were not commonly used in current teaching; although respondents were slightly more likely to have used them in their own research. Despite the relatively low levels of knowledge about some of these techniques, few respondents felt that they needed training in these methods.

Figure 3.1: Level of knowledge and/or usage of quantitative design methods (n=33)



Levels of awareness were also somewhat lower for more sophisticated methods of research design, such as computer-assisted telephone interviewing (CATI) and web-based methods of data collection. Level of usage of web-based methods, both in terms of teaching and research, was on a par with non-probability sampling techniques; while use of CATI was rarely reported. More systematic methods of data collection (such as pair-comparisons, triads or sorting techniques) were clearly not well understood or used, although training in such methods was in some demand. Overall, few respondents stated that they required training in research design, but more advanced and cutting edge techniques appeared to be most in demand.

A longer bank of questions was posed relating to statistical and other analytical techniques used, ranging from simple descriptive statistics through to more advanced methods such as multi-dimensional scaling and latent class analysis. The results are presented in figures 3.2 and 3.3. Figure 3.2 concentrates on those types of analysis about which there was most knowledge and usage in terms of teaching and/or research, while figure 3.3, which uses the same scale, identifies those types of analysis which were less well used or understood.

Most of the respondents (30, 83%) indicated that they had good knowledge in one or more quantitative method of data analysis. Most confidence was displayed in relation to general descriptive statistical techniques, graphical methods of visualising data and use of contingency tables (such as measures of association and correlation). A moderately high level of awareness was reported in the use of regression techniques, including both ordinary least squares (OLS) and more complex methods such as log-linear, logistic or ordinal regression. Most respondents also understood principal components analysis (PCA) and factor analysis. Figure 3.3 indicates, however, that far fewer of them reported having a good understanding of more technically and computationally sophisticated techniques, such as multilevel modelling, longitudinal analysis and classification techniques.

Descriptive statistical techniques were most commonly used in teaching, although about half of respondents reported using techniques up to the level of OLS regression in their teaching. Respondents were less likely to teach complex regression or PCA/factor analysis, and teaching of more sophisticated techniques was rare. Despite the fact that the majority of respondents to this survey described themselves as teaching staff, it is clear from figures 3.2 and 3.3 that analytical techniques are more commonly used in the course of research activities than in teaching. Notwithstanding the limitations of this survey, it is possible that this may represent a gap that, if filled, could go some way towards addressing the problem of capacity building.

Half of all respondents (18) stated that they would like to undertake some form of training and, although needs were spread across a whole range of methods, respondents were particularly keen to receive training in complex and sophisticated methods of analysis. The most frequently highlighted areas for training were time series and longitudinal analysis, structural equation modelling, uni/multi-dimensional scaling and multilevel analysis.

Figure 3.2: Level of knowledge and/or usage of quantitative analysis methods (n=30)

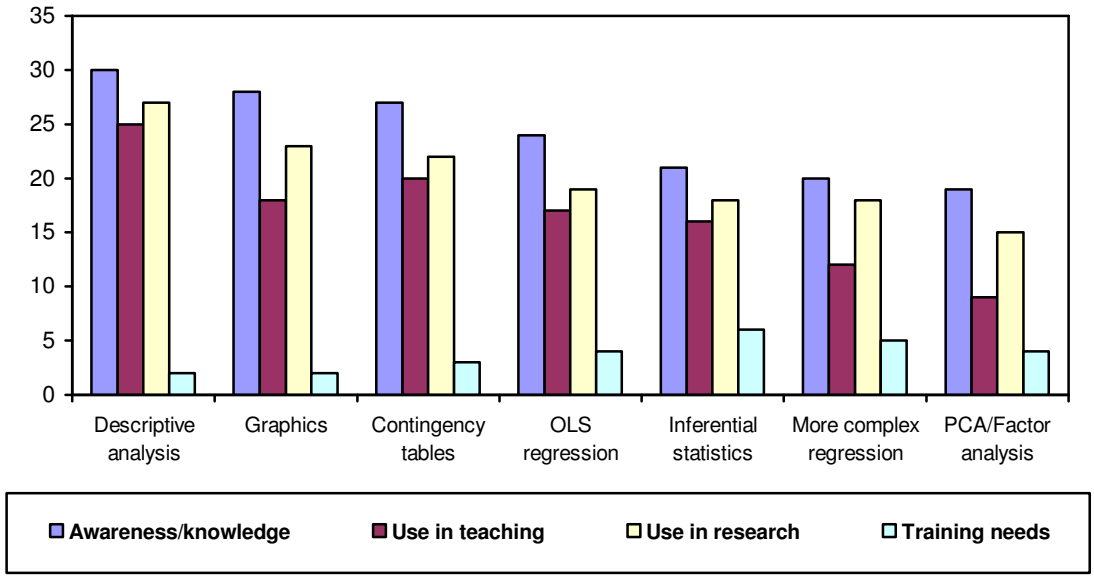
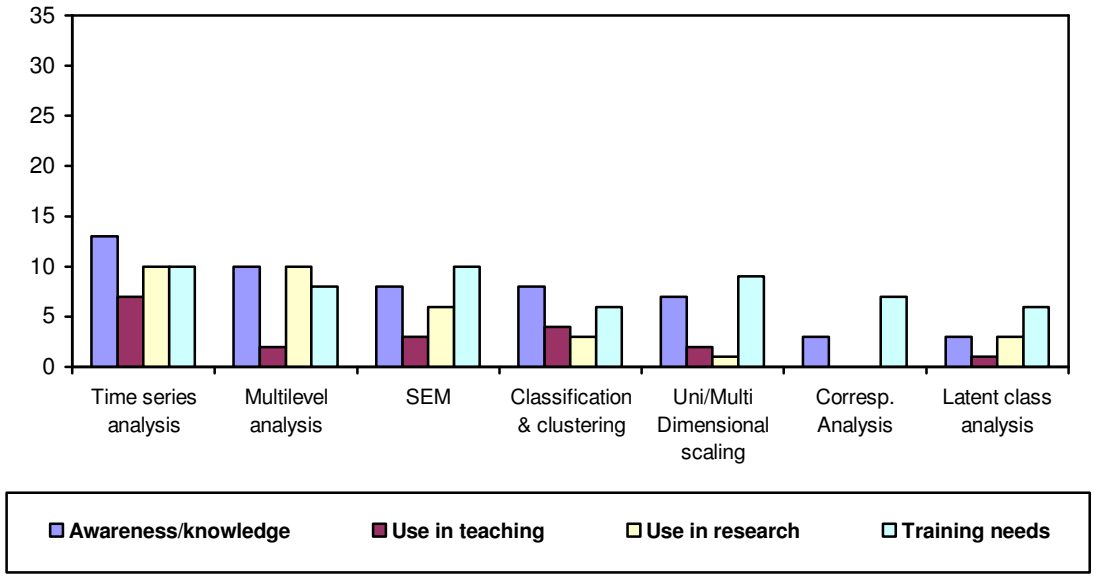


Figure 3.3: Level of knowledge and/or usage of quantitative analysis methods (n=30)

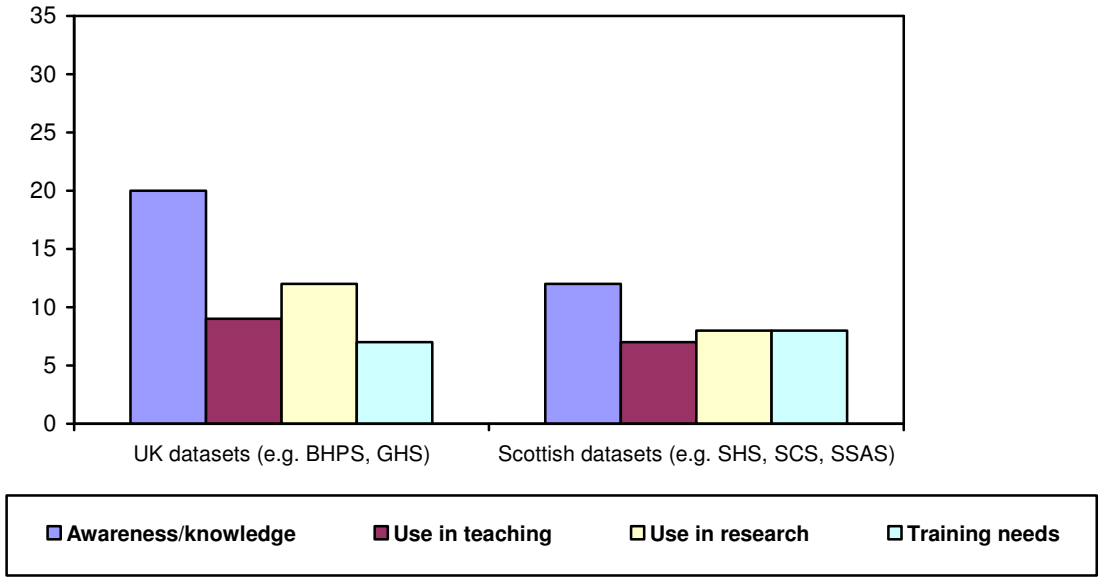


In order to identify whether there were any issues that might be addressed in relation to available quantitative datasets, respondents were asked about their awareness and usage of UK-based datasets, such as the British Household Panel Survey (BHPS) or the General Household Survey (GHS), and also of specifically Scottish datasets, such as the Scottish Household Survey (SHS), Scottish Crime Survey (SCS) and the Scottish Social Attitudes Survey (SSAS). The results are illustrated in figure 3.4, which retains the same scale as in previous charts.

Of those who responded (28), 20 respondents reported that they had a good awareness or knowledge of available UK datasets, but far fewer (12) reported familiarity with

available Scottish datasets. The level of use of either UK or Scottish datasets in teaching was disappointingly low (9 and 7 respectively). Level of use of UK datasets in research activities was slightly higher (12), but usage of Scottish data for research purposes was low (8). In light of the relatively low levels of awareness or usage of such datasets, relatively few respondents stated that they required training in this area. This may be indicative that such datasets have a low profile in Scotland and that publicity might be directed at highlighting their value to potential users. It might also reflect a lack of inducement to use such datasets, financial or otherwise. For example, one respondent highlighted the primary nature of much academic research and stated that "*these datasets often do not contain the questions we are interested in, or they asked out of context*". While another expressed the point of view that survey data was not always up-to-date enough to support emerging research. It was proposed that national survey datasets may be more appropriate for general teaching than specific research purposes; however, figure 3.4 suggests that this is not the case in practice.

Figure 3.4: Level of knowledge and/or usage of quantitative datasets (n=28)



Respondents were asked to identify the types of software they routinely used for conducting quantitative analysis. A wide range of packages were reported (22 in all); although the majority of respondents (27, 75%) reported using SPSS either solely or predominantly. The next most common packages used were Stata (8) and Excel (6). Two or three respondents reported using more specialist software such as R, Lisrel, AMOS, MLWin, Minitab or Microfit. There were also one-off users for a range of other, more mathematical or economics-based, packages. Five respondents did not report use of any analytical software.

Views on capacity building needs

Respondents to the staff survey were asked to give their views on the main barriers to improving quantitative research and teaching within the social sciences in Scotland. A range of potential problems were presented and respondents were asked to give each a score on a 5-point Likert scale, where 1 represented "not at all important" and 5 represented "extremely important". Those problems with the highest scores were,

therefore, perceived to be the greatest barriers to developing quantitative methods capacity in Scotland.

Figure 3.5 shows the average score for each potential problem across the respondents. According to this survey, the greatest barrier to building quantitative capacity within Scotland is the willingness of students to engage in quantitative courses. This concurs with a number of studies carried out elsewhere in the UK and indicates that the problem is as great in Scotland as in the rest of the UK.

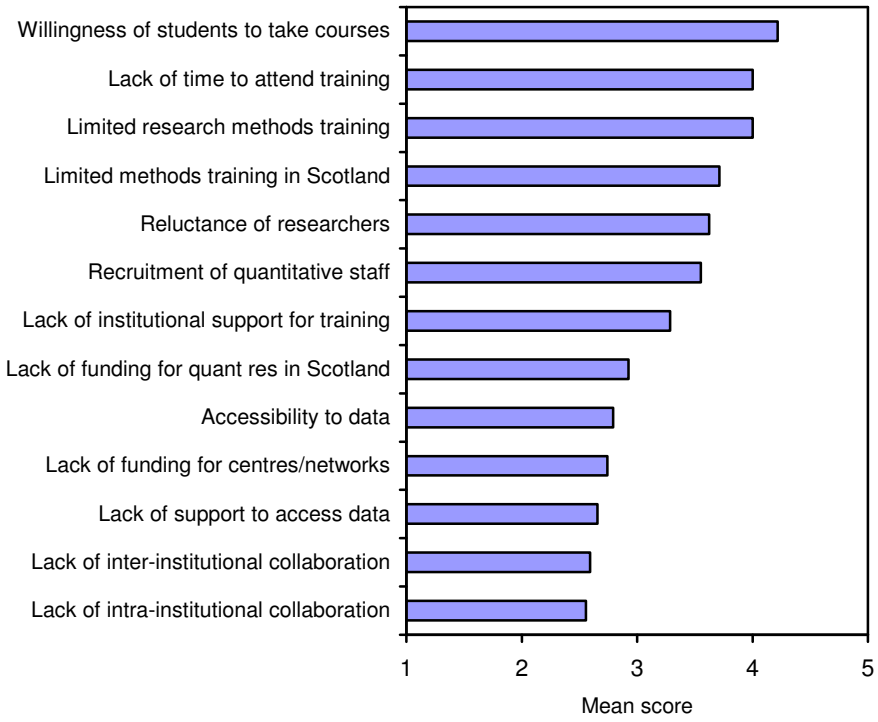
Concern was also expressed about availability of training and the lack of time available for staff to attend training courses, which ranked highly in the respondents' perceived barriers to improving capacity. Interestingly, the limited availability of research methods training generally ranked slightly higher as a barrier than the lack of methods training in Scotland, specifically. Lack of institutional support for training in research methods was considered to be something of a barrier, but slightly less important than these other factors.

In addition to their concerns about the willingness of students to take quantitative courses, respondents highlighted the reluctance of researchers to do quantitative research. This was ranked very closely to the problem of recruiting suitably trained teaching or research staff. Only slightly further down the scale was the issue of lack of funding for quantitative research in Scotland. Taken together, these concerns indicate a need to develop both critical mass and a sustainable infrastructure for those involved in quantitative methods.

Accessibility to data and lack of institutional support for accessing large-scale datasets were ranked fairly low down the list of barriers to improving quantitative methods. This limited concern about the issue of data availability and usability appears to be consistent with the respondents' earlier responses about dataset usage and training needs. One respondent commented on the "lack of variety in major Scottish datasets", which could indicate a need for greater input by academics to the content of large-scale surveys to improve usage.

There was a low level of concern amongst this group about lack of collaboration, either inter- or intra-institutional, which most probably reflects their own experience, since the majority had stated that they were involved in collaborating with at least one other person. A related issue, which also received a fairly low score overall, was the lack of funding for establishing quantitative networks or centres in Scotland. It has been noted elsewhere in this report that there are no centres of expertise to compare with those hosted by universities such as Essex, Lancaster, Southampton and Manchester. Nevertheless, respondents to this survey did not rate funding availability as a particular issue in terms of the potential for developing such centres.

Figure 3.5: Barriers to improving quantitative research and teaching in Scotland (mean scores) (n=35)



In order to visualise how these perceived barriers to quantitative capacity building (as rated by HEI teaching and research staff) relate to each other, cluster analysis of these 13 responses was carried out. Figure 3.6 presents a 2-dimensional map of their judgments.[9] The representation fits the data extremely well. It also shows the result of a separate (hierarchical) clustering of the same data, (revealing a major, fundamental split between the left and right-hand sides of the configuration, and three major clusters) mapped into the scaling solution. The first horizontal dimension is very obviously the "importance" dimension, and projections onto it of the 13 factors reproduces almost exactly the means as figure 3.6.

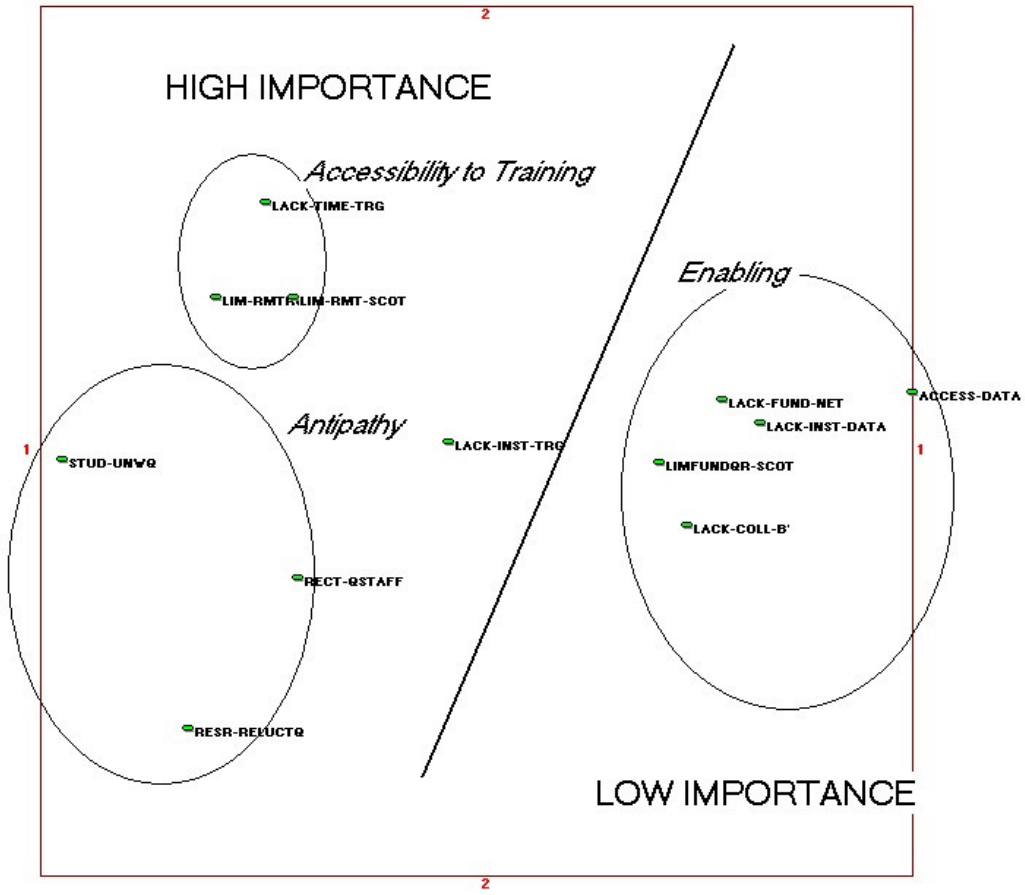
Three basic clusters emerge, each of which contain highly related factors:

- "Antipathy" is the unwillingness of students to take quantitative courses, the reluctance of colleagues to do quantitative research and the lack of institutional support for recruiting quantitative methods staff. These similar factors are the main barriers to increasing quantitative research capacity and emanate from the three major sectors of the University;
- "Accessibility" refers to issues around research methods training – time to do it and availability of training itself, especially in Scotland. These are the second most important category of barriers.

[9] Respondents' Likert judgments of importance of the 13 'barriers' were scaled non-metrically in 2 dimensions, and hierarchically clustered using SPSS-PROXSCAL and new MDSX-MINISSA programs. The obtained badness-of-fit Stress1 = 0.073, smaller by a factor of three than Spence's simulated random Stress value, indicating excellent fit (note: factors 12 and 13 [lack of collaboration between, and within, institutions] occupy the same identical position. The clustering dendogram was mapped into the 2D configuration, and shows a major fundamental split between the areas denoted High Importance vs Low Importance (as barriers to quantitative capacity) and three major clusters.

- "Enabling" encompasses factors which are of low importance as barriers and include factors around limited funding and resources for quantitative research, collaborative opportunity and data-access.

Figure 3.6: Cluster analysis of barriers to improving quantitative research and teaching in Scotland



Other barriers to quantitative capacity building in Scotland

The barriers described in figures 3.5 and 3.6 were confirmed by respondents in their qualitative responses to an open-ended question on this subject. Lack of willingness to do quantitative courses was largely considered to be a school-related problem, with students arriving into higher education to study social science with sub-standard numeracy skills. One respondent wrote that "*this is part of an anti-numeracy culture in which many students view mathematical skills acquisition with deep anxiety*". This is a theme that was regularly reiterated in Williams' (2002) study. Views were somewhat divided on the best way to deal with this problem. One respondent felt that introducing compulsory courses on statistics and research methods in the first year of undergraduate study would 'normalise' the subject and remove some of the anxiety faced by students. However, another felt that "*most researchers do not want to do this and in a free country this is their right*".

Respondents were also concerned that a degree of academic bias towards qualitative methods – both by students and staff – was part of the problem of promoting quantitative methods, particularly within certain disciplines. One person commented that "*the 'cultural' turn and postmodernism devalue quantitative approaches*". There was also concern that funding for interdisciplinary research was not always easy to secure since "*reviewers/referees find it difficult to think outside their own box*" and that people working on the borderline between disciplines had to work harder to gain recognition or publish their work.

Another issue raised was the time and effort needed to teach quantitative methods effectively. Some respondents felt that academics who were not involved in research methods teaching themselves "*fail to appreciate that teaching quantitative subjects requires adequate contact time and that such training in turn should correspond to adequate developmental time in terms of devising exercise and assessment material*". In terms of existing practice, some people felt that quantitative teaching was generally too abstract and not used enough to solve substantive problems. It was felt that teaching could be improved by "*having the time to provide teaching in a way that students would find more accessible e.g. adapting a problem based approach*". Institutional barriers to developing better teaching on quantitative methods included lack of guidance on good practice and the adoption of a corporate rather than a collaborative approach to teaching.

Ways to increase capacity in Scotland

A variety of suggestions were made for ways to increase social science quantitative research capacity in Scotland. Several respondents focused their attention on teaching and training issues and made the following suggestions:

- Working closely with schools to improve the teaching of Mathematics at secondary level, and making attempts to integrate this with the teaching of social science subjects.
- Holding basic skills improvement courses prior to the start of degree courses, with admission contingent upon reaching a satisfactory standard in such courses.
- Introducing quantitative courses as a compulsory part of both the undergraduate curriculum and postgraduate training to improve the general skills base. However, there was also concern that this approach might alienate some students further: *"ESRC funding requirements have shaped how statistics are presented and taught at Masters and PhD level and as a result they are often perceived as compulsory courses which students have to 'get through' and then forget"*.

There were also suggestions for ways in which quantitative methods could be better marketed, both to the student population and the academic community:

- Universities should stress to students that "*knowledge of statistics secures you a job after university to a certain extent*", or at least alerting them to the necessity to upgrade their basic skills.
- Efforts should be made to emphasise the importance of quantitative work in addressing meaningful, theoretical or policy-relevant questions, although it was felt that some disciplines would require a "major cultural shift" in order to embrace quantitative methods,

- A semantic shift away from 'quantitative' or 'qualitative' methods towards 'research methods' and 'evidence-based research' should be promoted.
- Greater financial incentives to attract students into quantitative courses, such as funding quantitative based masters courses.
- Using some form of "positive discrimination" in the grants system to encourage academic researchers to do quantitative research.
- A Scots-based or a more Scots-sympathetic funding body to "generate the variety and quality of datasets required to inspire quantitative analysis"

The availability and funding of training within Scotland was also raised as an issue. Respondents particularly mentioned:

- The need for more funding to be made available to attend existing training facilities, such as that provided by the University of Essex.
- More efforts to develop training courses within Scotland, such as half day courses, summer schools for undergraduates contemplating postgraduate research, specialist skills development courses and night classes for individuals from a range of sectors.
- Accreditation from professional societies might make attendance at such training more attractive.

There did seem to be a lack of awareness about what quantitative work was currently being done in Scotland and where statistical help could be found. Respondents recommended the establishment for a Scottish network or consortium of "*like-minded quantitative researchers and teachers*". It was felt that a collaborative approach to developing quantitative methods was most likely to improve capacity nationally, and that such networks could also be involved in "*working on disseminating the findings of quantitative research to a wider audience*".

Strand 3: Library and Computing Staff Survey

In addition to surveying research and teaching staff, representatives from library and computing services within each of 14 Scottish HEI were asked to complete a survey. Respondents were targeted based on job titles and contact details found on institutional web pages, and one individual each from library and computing services were asked to complete an online survey. If there was no response to this approach, a second contact was approached (if possible). The reminder was issued to all non-respondents prior to the closure of the survey.

Thirteen responses were received from 9 universities (Aberdeen, Abertay, Dundee, Edinburgh, Glasgow, Heriot-Watt, Queen Margaret, St Andrews, Stirling, and Strathclyde). Five respondents were representatives of library services, while the remaining eight were based in computing departments. Again, the response rate to this aspect of the study is low and it is impossible to know how representative these responses are. Nevertheless, the sampling frame is much narrower here and the respondents do span the majority of the HEI in Scotland.

Library and computing staff survey responses
Responses to the questions in this survey are grouped under four headings (the questionnaire is included as Appendix 3)[10]:

- Library services
- Computing services
- User support services
- Ways to support capacity building

Library services
Library staff were asked whether their university provided central user support for a range of services. Library staff from all five institutions who responded indicated that purchasing subscriptions to CD-ROMs and online statistical and financial datasets was a core task of their central services, although only two libraries acquired data sets for a local collection. Four universities provided help materials or web pages about statistical resources or data sets; and two provided a service to promote awareness about new data sets. In all cases, services were provided for staff and students, both at undergraduate and postgraduate levels. However, four out of the five respondents did not know if such support was provided at a non-central location, such as on a departmental basis.

Computing services
Staff from four institutions responded to the computing services questionnaire. They were first asked about the availability of various commonly used computer programmes, either on a site licence or in computer labs. The results, shown in table 3.2, indicate that Excel was the most readily available package, followed by SPSS. Minitab, Microfit and ArcGIS were relatively uncommon; while more sophisticated packages for data analysis were not available at these institutions.

Table 3.2: Data analysis packages on site license or in computer labs (n=4)

Computer package	Number with onsite license
Excel	4
SPSS	3
Minitab	2
Microfit, ArcGIS	1
Stata, SAS, S-Plus and Mapinfo	0

As regards support for the software packages available, all four institutions indicated that they provided documentation, web pages or learning materials for their use, as well as training courses. Such courses were open to staff and postgraduates at all four institutions; but to undergraduates at just two. At only one of the four institutions did computer staff report actively assisting staff to teach using these packages as part of classes or practical sessions.

[10] Given the scale of this survey no percentages are reported in this section.

The majority software demand was for SPSS and this was largely being met by university computing services. However, more specialist packages in demand by quantitative researchers were less likely to be supported, leaving individuals to struggle with software documentation, pricing issues and implementation problems.

User support services
Twelve individuals from nine institutions answered questions about their involvement in assisting users to access various national data services. As can be seen from table 3.3, the majority of institutions did provide user support for at least one or two of the services listed, although provision was relatively diffuse. There was no one service for which all responding institutions gave user support. Government funded data services were relatively well serviced, although there was not even universal support for the Scottish data resources.

Table 3.3: User support to access national data services (n=9)

National data service	Number offering user support
UK Data Archive / Economic and Social Data Service (ESDS)	5
ESRC / JISC Census Programme (CASweb, etc.)	5
Government online data resources (such as ONS, SCROL, GROS, Neighbourhood Statistics, Scottish Government Statistics)	5
EDINA Digimap (online mapping and geospatial data download)	4
ESDS International (at MIMAS)	3

Respondents were asked to indicate more specifically the nature of the support provided to users for these data services, in order to determine the extent of assistance given. Overall, levels of assistance were found to be relatively basic. Table 3.4 shows that five out of the nine responding institutions responded to general user queries and provided some introductory assistance. However, fewer than half of institutions were involved in actual hands-on forms of practical help and only one provided substantial assistance to understand data documentation. This indicates that data users are presumed to have a level of skill in data manipulation and a degree of knowledge of the data being accessed. In addition, staff from only one institution stated that assistance was provided to help lecturers prepare datasets for teaching purposes.

Table 3.4: Types of support provided by library or computing staff (n=9)

Type of support offered	Number offering support
Identifying appropriate service/website based on user's query	5
Instruction/assistance in use of search/download interface	5
Downloading / subsetting / reformatting data on behalf of user	4
Troubleshooting problems using data (e.g. in analysis packages)	2
Consultation on methods or research question	2
Assistance with understanding data documentation or codebooks	1

When asked about which users could gain access to support services, results were mixed. Surprisingly, institutions with more than one respondent did not always agree; this may mean different policies exist for library staff as opposed to computing staff. Of the twelve respondents, six stated that services were available to undergraduates; five said that postgraduates and university staff were supported; but only one indicated that users from outside the university were offered any form of support. Most commonly, if the library or computing staff could not assist users, they were referred to other academic staff, such as supervisors or Directors of Studies (7) or they were directed to the Helpdesk of the relevant national data service (7). Inter-departmental support staff members, such as computing officers, were sometimes used to provide further assistance (4).

Most institutions indicated that they employed at least one dedicated support staff. The most commonly available was a social science computing support officer (5) and a social science reference librarian (4). Fewer institutions had more specialist support staff, such as a GIS specialist or map librarian (2), a data librarian (2) or a statistical consultant (1). Amongst those who had some form of dedicated support available, half indicated that this was available during normal office hours; but the other half stated that this was available by appointment or by email only.

There were some contradictions within institutions that had more than one respondent, and the accuracy of what was reported cannot readily be checked. This may point to a lack of awareness by support staff for specialist support offered by their own institutions. If the information services staff are not aware of forms of specialist support that are offered, then how aware are the staff and students as potential users of the services? The optimistic self-reporting of the depth of support provided points to the potential usefulness of an evaluation by users about services needed and services actually provided. This may best be done at the institutional level.

Ways to support capacity building

Finally, respondents were asked to suggest ways in which library and computing services could help to improve quantitative methods capacity in the social sciences within Scottish HEI. Only three respondents replied to this open question and their views varied. One individual felt that priority should be given to improving student support, and said "*I believe that our Undergraduate Student Computing Support team manager is exploring opportunities to provide statistical advice to students at site libraries*". Another felt that there was a need for more communication between library and research staff, so that library staff were kept aware of what material was being used and how. The third focused on the availability and usage of datasets and stated that "*training courses on using datasets would be very useful*."

Most of the institutions that provided a response to this particular survey did have a reasonable level of infrastructure to support quantitative methods, *for users who approach the support services.* What appears to be lacking is a more pro-active liaison and outreach component, as indicated by the respondent who called for better communication between librarians and academic staff. Generally, there appears to be little collaboration between support services and teaching staff to support quantitative methods in teaching. Yet teaching hands-on data analysis requires much support, both in terms of preparation and in supporting students as they work through data handling and analysis problems.

4. Results from the interviews

Strand 4: Contact with key stakeholders

In order to expand on the findings from the HEI surveys presented in Section 3, ten members of the social science community within Scotland who currently play or have previously played key roles in the development or expansion of quantitative methods were interviewed. In addition, given the much broader contextual importance of expanding capacity in quantitative methods in Scotland, fifteen interviews were carried out with senior executives from the Scottish Government, directors of a number of social research organisations based in Scotland and senior members of the Scottish voluntary sector. The main findings from these interviews are discussed below.

Current capacity in Scotland

As in other parts of the UK, current capacity in quantitative methods was identified by all sectors as being at a relatively low level across most of the social science disciplines within Scotland, with some notable exceptions. Problems were identified in the arenas of academic teaching and research, wider research training, and capacity and recruitment within the public, private and voluntary sectors. Interviewees identified some pockets of expertise, although these are felt to be small scale and, in some cases, at an early stage of development. Overall, it was felt that Scotland was in as bad a position with regards to quantitative capacity as elsewhere in the UK, although not necessarily worse. There was not a perception that Scotland was at "crisis point", but that long-term, strategic solutions needed to be sought rather than quick fix options.

In theory, the social science community of Scotland is perceived to be large enough to support a demand for increased quantitative capacity; however, this is inhibited by a chronic lack of both training and infrastructure to sustain the expansion of quantitative methods. A number of senior interviewees with long academic careers commented at length on the "early flowering" development of quantitative methods in Scotland (see introduction), but also on the apparent subsequent declension. Some attributed this, at least in part, to a lack of governmental support for the development and sustainability of quantitative research in Scotland since the 1960s, not helped by increasingly prohibitive procurement rules. Some also argued that this had been compounded by a lack of strategic investment from HEI in posts for senior quantitative lecturers and researchers. Whatever the reasons, both culture and structure would need rebuilding if Scotland were to regain that earlier eminence, but there is some evidence that the pre-requisites are there.

Academic sector
Within the academic sector quantitative capacity was raised as a problem from a range of perspectives. These included:

- attracting quantitatively inclined students into social science disciplines;
- reluctance amongst undergraduate and postgraduate students to undertake quantitative courses (particularly at more advanced levels);
- lack of desire and/or confidence amongst staff to teach quantitative methods beyond a certain level;

- patchy spread of quantitative expertise across disciplines (with strengths in subjects such as Economics and Psychology, but weaknesses in most other subjects);
- a cultural bias amongst social scientists in some disciplines towards qualitative teaching and research;
- an aging population of lecturers skilled in the teaching of advanced methods;
- a lack of opportunity and encouragement for academic staff to engage in continuing professional development;
- lack of core funding dedicated to quantitative Scottish research;
- and a general lack of numeracy in the wider labour market.

Public sector

As one of the country's major research funders, the Scottish Government identified quantitative capacity as a key element of their strategic development, because of the need to commission high quality research (including several large-scale surveys) to better understand Scottish issues and to develop programmes of evaluation for government initiatives. Over the last ten years, the Government has boosted capacity internally by both significantly increasing their recruitment of government analysts and by carrying out a major restructuring exercise to facilitate much greater cross-professional working between statisticians, economists and social researchers. Although there were still felt to be some infrastructural problems with this professional integration (such as their use of different statistical packages), overall it was reported to have had a very positive effect, adding value to the work of all professional groups and encouraging cross-disciplinary development. Nevertheless, government representatives felt there was room for improvement in the quantitative skills base of their social analysts as a whole.

Private sector

There has also been significant expansion across the private research sector over the last ten years, including the migration north of some of the large social research organisations based in London in the form of Scottish hubs and the extensive growth of many of the pre-existing research organisations based in Scotland. This expansion has been facilitated in large part by the introduction of several new large-scale social surveys and the re-development and increased sample size of some existing surveys. Representatives from the private sector did not express substantial concern about their ability to cope with increasing demand for quantitative research from a range of funders, although recruitment of staff with appropriate research skills was raised as an ongoing issue.

Voluntary sector

The lowest level of capacity was identified within the voluntary sector, which is experiencing the most severe effect of the current evidence led policy culture. Voluntary organisations are increasingly required to give evidence of the effectiveness of their work using quantitative data; however, there is a severe lack of research skill (both qualitative and quantitative) amongst workers and lack of money to invest in training for research activities. Voluntary agencies also suffer the problem of lack of credibility for their research output, which is often rejected by policy makers and academics as unsystematic or methodologically poor, and therefore confined to the 'grey' literature. Yet once it is used or endorsed by academics or government it achieves credibility. Interviewees dubbed this the 'Cinderella' sector

and argued that there was much need to boost research capacity in this area, which has tremendous potential for developing new methodologies and evaluation strategies.

Demand for quantitative researchers

This study identified significant demand amongst potential employers in all sectors for social researchers with quantitative skills in Scotland. Individuals with more advanced expertise were particularly sought after.

Scottish Government representatives indicated that the increasing complexity of the research being commissioned by government had created a dependency for people with more advanced skills in quantitative methods. While interviewees from the private sector research organisations agreed there was a large demand for quantitative research in general, particularly medium to large scale social survey work, they argued that there was a lack of demand for complex analysis by research funders, both government and non-government, which may be reflective of the skills base of researchers involved in the commissioning process. One particular bone of contention was that survey companies were often asked to exclude more complex analysis from their reports as policy clients had difficulty in interpreting such data. There was a clear tension between sectors here. In brief, the research commissioners felt that external capacity for understanding complex research briefs was poor; whereas social survey companies complained that those involved in funding research often produced poorly specified briefs and displayed a lack of understanding of methodological issues.

This contradiction raises an important issue about the ability of social scientists (within all sectors) to both understand the complexities of quantitative research and communicate complex research findings in a more user friendly way. It was particularly stressed within the Scottish Government that there was an increasing need for in-house researchers to possess not only more complex research skills (both quantitative and qualitative) but also be able to communicate research results to policy clients simply and effectively. As a result, employers within all sectors reported a shift in their recruitment policies away from looking for social science graduates who were purely strong on research skills and towards people with a broader range of transferable skills.

Staff working within the voluntary sector reported that they were very large producers of quantitative data, but admitted that this was at a very basic level. They emphasised a very high demand for people with quantitative skills – either through internal training or recruitment – but felt that there were significant barriers on both fronts. People working within voluntary organisations often put a low priority on research work because it is only one part of a much wider range of duties, and they are wary of the perceived difficulty of reaching acceptable academic standards. Meanwhile, the sector as a whole struggles to recruit suitable graduates from social science backgrounds because it is not viewed as a popular or traditional career path. Graduates who are attracted to the voluntary sector may also under-utilise any quantitative skills they have, because these are not directly applicable to their position within the voluntary organisation.

Teaching at school level

An issue raised by many during interview was that of the general lack of numeracy displayed by students in the social sciences entering at university level. Two main reasons were given for this: first, that quantitatively inclined students do not consider social science a credible career option; and second, potential social scientists do not think there is a need to be quantitative. Overall, there is a need to improve both the breadth and depth of mathematical competency amongst potential social scientists and to encourage more quantitatively inclined students into social sciences. Suggestions to do this included integrating the teaching of mathematics and/or statistics with more social subjects within the curriculum; adopting more problem solving approaches to the teaching of mathematics; and introducing students to rudimentary analytical techniques using social science data. It was suggested that the ESRC could liaise with the SFC to produce simple teaching datasets and teaching materials for secondary level education.

Marketing of social science subjects to school leavers was raised as an important way of addressing these problems. Interviewees recommended advertising social science subjects more carefully to students with a mathematical aptitude; and ensuring that potential social scientists were clear that some quantitative knowledge would be a requirement of degree courses. It was also felt to be worth emphasizing that there was potential for reaching senior positions within the social sciences, and that quantitative ability could be a valuable asset in terms of future career development.

Teaching at degree level

One of the key problems for capacity building is addressing the general reluctance amongst social science students to study quantitative subjects at degree level. All interviewees expressed this as an issue and gave their views about ways in which teaching at undergraduate and postgraduate level could be improved to boost quantitative capacity to some extent. It was agreed by most that all degree level social science students should be expected to achieve a certain level of competence in quantitative methods, although there was some disagreement as to what that level should be. Some felt that Scottish HEI should be aiming to get all students up to the same standards of learning as those found in some other European countries and US states; while others felt that a more "horses for courses" approach should be taken, and that students should be encouraged rather than coerced into learning more advanced methods. There was a feeling, however, that any strategy was likely to take some time to take effect and that the growth in capacity for advanced methods was not likely to be extensive.

There was divided opinion about whether resources should be placed on undergraduate or postgraduate level teaching. Some interviewees argued that emphasis should be placed on boosting capacity at the undergraduate level, since that would improve the marketability of students generally and encourage greater numbers to move on to more advanced study. Others, however, felt that this would unlikely to be productive and that effort should be concentrated on increasing the advanced quantitative skills of postgraduate and doctoral level students.

Suggestions for encouraging postgraduate students to study advanced methods included re-branding quantitative courses, teaching them in a much more problem-oriented, subject specific way and taking a more practical, less theoretical approach to teaching (including greater use of large scale datasets). Another suggestion was to increase the availability of financial incentives, such as ESRC funded masters courses centred around particular quantitative subjects. In addition, the ESRC Link Scheme could be extended to allow doctoral students to focus their research around a particular survey and have extended placements with a social research organisation.

There was agreement from all sectors that there needed to be greater communication between academics teaching quantitative subjects and potential employers. Representatives from the public and private sectors, in particular, felt there was an increasing mismatch between the skills of university graduates and their organisational requirements. Representatives from the private sector research organisations felt that they may be able to contribute more to the teaching of quantitative methods, in terms of presenting it in a practical context, although there was some concern about their capacity to do so at a national level.

Continuing professional development

One of the major issues raised by academics, in particular, was the reluctance amongst lecturing staff themselves to teach quantitative methods – either at a basic or an advanced level. The root of this reluctance varied, including having been poorly trained at university themselves, lack of use of techniques learned in early career resulting in attrition of skills, preference for qualitative methods of research and frustration with the amount of effort taken to prepare and teach quantitative subjects. One of the most concerning aspects for many interviewees was the cultural bias within academic institutions against quantitative methods which was felt to have wide-reaching implications for their credibility and reputation. Some felt that lack of institutional support for quantitative methods had also had a more general deleterious effect on the ability of quantitative staff to teach courses to the best of their ability or advance in terms of their own continuing professional development.

Training issues were of particular concern to interviewees from outwith the academic sector, since they very much felt that "it is easier to train recruits than to employ good ones". This had led to a change of culture within organisations, whereby social scientists were more likely to be employed for their broader skills (general competence) rather than their analytical abilities, as these were generally poor. In-house training was almost always used to bring new recruits up to speed, although respondents also highlighted a need for more specialist quantitative training in Scotland. Many interviewees felt that this more specialised training should be provided by the academic sector and that core funding should be made available to universities to run a variety of courses on the application and use of quantitative tools and techniques. It was stressed, however, that other sectors (private, public and voluntary) should be encouraged to be involved in participating in training in order that courses could be marketed to the widest range of participants, thus building capacity across different groups.

Different models of training were suggested, such as day courses, half day courses, evening and weekend courses, to ensure flexibility for a range of participants. The

main concern was that these courses be focussed, accessible and affordable. Interest was also expressed in the university developing e-learning courses and working towards professional accreditation for courses. Respondents were not specific in terms of the types of training they would like to have provided; although one government respondent emphasised the need for more investment in training around the use of neighbourhood statistics, as this is an up and coming area of social analysis and capacity is particularly low here.

There were divided views over the establishment of a Scottish 'summer school' such as that run by the University of Essex. Some interviewees felt it would advantageous to have a facility for running specifically Scottish training and that more people from Scotland would be likely to attend than currently travel to Essex. However, others felt that this would be an unnecessary duplication of effort and that without addressing some of the more fundamental issues involved, this would not boost capacity markedly. It was recommended that resources available to Scotland should be targeted using a more strategic approach, such as being focused on those institutions which displayed greatest investment in quantitative methods, such as those with centres of expertise. It was also suggested that a pool of experienced, quantitative researchers in Scotland should be identified (possibly forming a network) and that these individuals should be funded to provide a) training, b) mentoring of junior researchers and c) an ad hoc advice service for people in Scotland involved in quantitative work.

Caution was urged by one respondent, who indicated that within some organisations there may be a lack of incentive for staff to build up too great an expertise in quantitative knowledge as this is not a necessary requirement for career progression. It was also stressed that there may be a concern that individuals would be perceived as being too "techy" and that this may pose a barrier both to effective communication with non-researchers and, potentially, to promotion. Although not expressly discussed by others, it is not difficult to imagine that this might apply to any of the four sectors given the general problem of antipathy.

A slightly dissenting voice was also expressed by voluntary sector representatives, who felt that workers would be more likely to attend research methods training if this was offered as part of a broader course. In particular, the prohibitive cost of most training courses was felt to be a "*luxury that organisations can't afford*". It was stressed, however, that if training was felt to be particularly relevant, voluntary organisations would pay to attend.

Graduate recruitment issues

It has already been highlighted that employers have particular concerns about the level of quantitative methods training amongst Scottish university graduates, although not, importantly, about the general level of competence and intellectual training. For this reason, employers are turning their attention either to employing those with strengths in these more general skills or to recruiting researchers with some post-university work experience in the research world. There are lessons to be learned here by HEIs in relation to the marketability of students, as students with quantitative skills are valuable commodities.

There is also an advertising campaign to be done on the part of potential employers, however. Interviewees from all sectors indicated that attempting to draw highly competent quantitative students into the commercial, voluntary or public sectors was often problematic because they did not perceive a career in these organisations to be of high academic credibility. In particular, graduates are not attracted into careers within the voluntary sector because this is not considered a particularly lucrative or relevant career pathway; yet the few that do find it very rewarding. It was suggested that these market sectors needed to have more input into HEI training activities, particularly at the postgraduate level, both in terms of highlighting market needs and promoting themselves as potential employers.

Cross-sectoral investment

Although academic respondents to our survey indicated that both inter- and intra-institutional collaboration were the least significant barriers to boosting capacity in quantitative methods in Scotland, interviewees were in agreement that collaboration was the only way to achieve this end effectively in a country of this size. Moreover, there was particularly strong support for encouraging more collaborative activities between researchers from different sectors. In particular, it was stressed that government should encourage more academic researchers to work either with them or independently on analysing government datasets and developing a wider programme of work on key Scottish policy issues, including publications. It was largely agreed that government funding for the analysis of such datasets should be reviewed, but it was also felt that the ESRC could play a greater role in facilitating these relationships.

One example of a successful scheme in this regard is the doctoral scheme funded jointly by the ESRC and UK government departments, which is currently in its second year of operation. Government representatives were particularly positive about this scheme as it has cemented better relationships between the academy and policy arenas. Nevertheless, there have been few awards in Scotland linked to major government datasets, and it was acknowledged that this should be considered as a way of boosting capacity in the medium term. There was some wider interest by the non-academic sectors in involvement in PhD development schemes; however, the reality is that the pay-off from these schemes to the organizations involved would have to be clearly demonstrated.

Representatives from the voluntary sector were especially keen to encourage more collaboration in their research activities both by government and academic researchers. There was strong support for developing collaborative research proposals with academic partners, and developing methods for subjecting voluntary sector publications to peer review, to boost credibility and influence. They were less enthusiastic about developing links with the private sector, as they perceived this to be both costly and of little benefit to their organisations. Proposals by the ESRC to consider funding a “third sector research unit” (or network), dedicated to voluntary sector research that would encourage both experienced academics and graduate students to pursue this type of research, was highlighted as an especially valuable development.

Particularly Scottish issues

Interviewees largely agreed that there was a need to have a specific Scottish strategy to boost quantitative capacity, as there were some issues that were peculiar to Scotland. For example, the scale of the problem is more keenly felt in a small jurisdiction, where the loss of even a small number of quantitatively trained people has a profound effect on capacity. There is a severe lack of high level quantitative experts in academia and other sectors, such as those involved in developing and advancing methods. This in turn restricts Scotland's capacity to establish centres of expertise. Although Scotland is not devoid of quantitatively trained academics, they tend to be dispersed across different disciplines and institutions, with no available mechanism for collaborative or inter-disciplinary working. While it was felt that collaborative centres were likely to be the best approach to capacity building, the fragmented nature of the research community acts as an inhibitor to the development of effective networks.

Within the private sector, there are few in-house staff members trained to an advanced level, due in the main to the severe shortage of such people in Scotland. Most of the large social research organisations, therefore, have any advanced analysis carried out by experts within the broader parent company, all of which are based outwith Scotland. Scottish Government representatives also discussed the need to look outwith Scotland for some types of research, analysis and training to be carried out because of the lack of skills within Scotland. Although understandable in the short term, the farming out of this type of work clearly has implications for the potential to build capacity locally in the longer term.

There are some areas where Scotland has strengths that could be built on and further developed. For example, Scotland has a strong tradition of medical sociology which brings together social science and quantitative methods training. There are also some small centres of expertise, such as the recently established Longitudinal Studies Centre – Scotland, based at St Andrews University, the Department of Urban Studies at Glasgow University, and the Department of Applied Social Science analysis at Stirling University, which could be drawn upon to act as focal points for wider network development. The small scale of the jurisdiction could provide a particular advantage in terms of developing such a network, provided that this was given adequate funding and institutional support.

Devolution in Scotland has created both opportunities and problems in terms of quantitative research. There has been an increased demand for evidence on which to build policy and inform Government, which has been accompanied by a broad expansion in terms of data collection (including several large scale surveys). Scotland is, therefore, a country that is data rich but resource poor in terms of usage and analysis. To exploit the Scottish data fully would require a population of analysts that is proportionately bigger than that in England.

5. Conclusions and recommendations

This scoping study has considered a wide range of issues in relation to quantitative methods capacity building needs in Scotland. From the surveys and interviews we have conducted, many suggestions have been made about the problems and issues that need to be addressed. In particular, there was considerable overlap on a number of themes by different individuals and through different elements of the research. Some of the findings can be generalised to other parts of the UK, but others raise specifically Scottish issues that indicate that a separate strategy needs to be developed. This section of the report summarises the main conclusions from the research and presents a series of recommendations stemming from these.

Conclusions

The provision of quantitative methods teaching within the social sciences is patchy across Scottish HEIs, both at undergraduate and postgraduate level, but on the whole it is low. This is in large part due to a high level of antipathy towards quantitative methods by students, staff and at the institutional level. However, within some major disciplines, such as economics and psychology, the culture is different and there is a higher commitment to the importance of quantitative methods. Within other disciplines, provision is high within institutions where there is a core staff of individuals that have built up a level of expertise in quantitative issues relating to the subject area; but in most areas of social science quantitative methods teaching and research are at a relatively low level. Nevertheless, the research community of Scotland would prefer a long-term, strategic approach to improving quantitative capacity rather than a quick-fix approach.

Overall, there is a serious shortage of people with adequate quantitative skills and, even in those discipline areas that are well serviced, training needs were identified. Action is needed to improve quantitative methods capacity at all levels, from school students through to professionals at senior levels. There is a particular need to boost capacity in advanced quantitative methods in Scotland, but this should be addressed as one part of a much wider strategy to improve numeracy and analytical skills of social scientists more generally. There are some good models already in place which support this form of training, such as the Scottish Graduate Programme in Economics, which is an inter-institutional initiative, which could serve as an exemplar for other disciplines. The potential for boosting numeracy skills amongst Scottish graduates is promising due to the large number of school pupils who are successful in achieving Higher Mathematics.

This scoping study did not pinpoint a 'critical mass' of teaching and/or research expertise within Scotland that could compare to some of the best English centres. There are some centres of expertise, including the Longitudinal Studies Centre – Scotland, based at St Andrews University; the Department of Urban Studies at Glasgow University; and the Department of Applied Social Science analysis at Stirling University. However, the majority of the quantitative social science community are spread across the country, within different institutions and across a range of disciplines. There is a strong argument for finding a way to pool these strengths and use them more effectively for training, at all levels, mentoring for early career researchers and ad hoc statistical consultancy and/or advice. To be most

effective, however, these experts would have to be brought together under the mantle of a network, consortium or research centre.

The capacity building needs of Scotland are wide and varied and, to a large extent, reflect those of the wider UK. These range from school level, where social science subjects are not generally studied and where there is no direct association between numeracy skills and social science, to graduate level, where there is a concomitant reluctance to engage with quantitative courses. Lecturing staff themselves have often been poorly taught and feel either ill-equipped or unwilling to engage in teaching quantitative methods, particularly at advanced level. Academics often lack institutional support for carrying out teaching activities in terms of practical support (e.g. the kind of help that could be provided by computing and library staff), a conducive cultural environment (i.e. fellow staff who value quantitative methods) and/or time and resources to get up-skilled through training. As a result, the quantitative skills level amongst graduates entering the job market is relatively poor and employers have to take on the role of training individuals to an appropriate level. Availability of training courses in Scotland is limited, particularly for more specialised or complex techniques, and access to training elsewhere may be limited by a lack of funding. Those in non-academic sectors are increasingly turning to experts outside Scotland to handle complex data issues, which has the potential to drain Scotland's pool of expertise and weaken capacity within Scotland still further.

There is a positive desire to have a capacity building strategy specifically for Scotland for a number of key reasons. First, the problems associated with 'economy of scale' mean that small jurisdictions are particularly affected by even minor fluctuations in the research population which makes it particularly vulnerable to change. Second, if Scottish universities are to provide graduates with the skills necessary to make them employable in the global marketplace, they must ensure that they are trained in the most up to date techniques and to the required level. Third, Scotland in the post-devolution era is data rich and it is essential that it builds a critical mass of researchers interested in exploring distinctively Scottish issues in terms of policy development. Fourth, there is a longstanding lack of funding support for exploring Scottish datasets and investment in Scottish training that needs to be addressed. Finally, Scotland has a small but thriving social science research community; however, if Scottish research is to compete at international level it must be methodologically outstanding and innovative. That requires strategic inward investment.

Recommendations

These recommendations are intended to be neither mutually exclusive nor exhaustive. They may not entirely fall within the remit of the ESRC and/or the SFC; however, this scoping study had identified a broad range of issues and, therefore, includes a broad range of recommendations aimed at addressing these.

1. *Improve integration of Mathematics and Social Science at secondary school*
    - There is a fundamental and chronic need to improve the numeracy skills of Scottish secondary school students entering university to study the social sciences.
    - The SFC should consider revising the Modern Studies curriculum at Higher Level to ensure it gives school pupils a broader understanding of the social

sciences and incorporates a much stronger mathematical component, such as analysis and interpretation of simple datasets.

- With some support from the ESDS Data Archive, Scottish social survey datasets could be adapted for this purpose.
- An empirical study of Scottish school pupils' perceptions of the social sciences and why they choose to study them at university should be undertaken.
- At the same time, better marketing of social science degree courses might encourage into social science those students with strong Mathematics skills who are currently attracted to different disciplines, such as science or business.

2. *Clarifying entrance requirements for social science students*
   - Potential social science entrants must have a clear idea of what will be expected of them in their graduate studies at Scottish universities. This should include a requirement to achieve a certain level of proficiency in quantitative methods.
   - HEI should consider whether they wish to make Higher or A-Level Mathematics a standard requirement for a greater range of social science disciplines; but, at the very least, offer remedial training for students entering into graduate studies with little or no numerical background.
   - It is <u>not</u> recommended that quantitative methods be a compulsory element of every social science degree; but that greater encouragement and support be offered to those who demonstrate 'fear of numbers'.

3. *Improved methods of teaching for undergraduate and postgraduate students*
   - In general methods of teaching quantitative methods courses need to be improved. For instance, courses should be interesting and relevant to the subject discipline, incorporate an appropriate balance of theoretical and practical teaching and, where possible, be problem-based.
   - The overall level and range of teaching quantitative methods courses needs to be raised to match international standards and developments.
   - Investment must be made in developing new and innovative ways of teaching quantitative methods at both generic and specialist levels.
   - Much more specific guidance and training is needed for lecturers who take on responsibility for developing such courses, and greater support needs to be made available both in terms of internal computing and library support (see recommendation 8); but also external support in the form of readily prepared and tested teaching datasets and other materials. [11]
   - Part of this enhanced approach to teaching should involve making less distinction between quantitative and qualitative methods, with far greater emphasis on 'research methods' more generally.

[11] Teaching datasets without related teaching materials are not enough. For an excellent example of an integrated data analysis teaching resource, see the European Social Survey Edunet, developed by the Norwegian Social Science Data Services, http://essedunet.nsd.uib.no/opencms.war/opencms/ess/en/

4. *Greater institutional support for quantitative methods teaching and research*
   - Scottish HEI and other organisations must boost quantitative capacity by providing an infrastructure within which it can grow. This will require both cultural and structural change.
   - Senior HEI staff need to address the current level of antipathy towards quantitative methods at its roots and move towards redressing the cultural bias favouring qualitative methods in some disciplinary areas.
   - Academic staff involved in teaching quantitative subjects need to be supported in their activities, both in terms of practical assistance during teaching and greater encouragement to attend training courses to facilitate skills enhancement and further development of graduate curricula.
   - The creation of more senior posts in advanced quantitative methods, in academia and other sectors, would demonstrate the value of these professional skills and encourage career progression, thus enhancing capacity building.
   - Where it is appropriate, intra-institutional support could be provided for some social science disciplines by developing a scheme similar to the Scottish Graduate Programme in Economics.

5. *Involvement of other sectors in teaching and research*
   - The academic sector in Scotland needs to be more in touch with other sectors, both in terms of teaching and research involving quantitative methods. Currently, Scottish HEI are not producing students with the required research skills for the job market. As with other elements of teaching, there is a need to ensure some level of input from potential employers so that graduates have a clear expectation of what might be expected of them and what opportunities are available to them in career terms.
   - Where possible, it would also be highly desirable to involve individuals from other sectors in teaching activities, particularly at the postgraduate level, to give a practical perspective.
   - The ESRC and SFC should actively promote greater collaboration between academic researchers and those working within the public, private and voluntary sectors in Scotland, and should not be restricted to individuals working within social science as experts from other scientific or business disciplines may also have a valuable contribution to make.
   - Other sectors should also be encouraged to make administrative data more readily available, to enable linkage of such data to other, survey-based datasets.

6. *Greater funding for postgraduate degrees*
   - It is strongly recommended that the funding councils provide financial incentives to encourage some postgraduate and doctoral students to specialise in predominantly quantitative research.
   - The ESRC and Scottish HEI should ensure that a certain proportion of studentships for masters-level degrees or 1+3 awards are specifically linked to Scottish social survey datasets.
   - The ESRC and the Scottish Government should consider using their joint doctoral programme to ensure that several PhD posts are centred around

answering policy questions that could be supported by government survey data.

- It is further recommended that the ESRC consider negotiating with private sector organisations to extend the Link Scheme to encourage students to link their doctoral studies in to a major social survey and carry out extensive work placement within a Scottish social research organisation.

7. *Greater availability of training and CPD*
   - There is a need to encourage greater development of research training within Scotland, aimed at a variety of levels and covering a range of topics. This need is common to the academic, private, public and voluntary sectors.
   - It is recommended that greater investment be made to a) provide more quantitative training aimed at continuing professional development in Scotland and/or b) provide bursaries to help Scots attend the Essex Summer School and other events outside Scotland.
   - There is also a need to fund further research that would lead to a specific 'training strategy' for Scotland.

8. *Improvements to support services within HEI*
   - Work within Scotland to align library and computing services to support e-learning and e-research activities in academic departments must address the specific needs of social science, particularly for quantitative methods.
   - Formal methods of liaison between support services and social science departments should be established so that gaps in support are identified and rectified where resource exists, e.g. supplying additional staff support for teaching students hands-on data analysis in computer lab practical sessions, thus reducing some of the burden on teaching staff.
   - Key skills and transferable skills programmes in institutions should include numeracy and statistical literacy, in addition to information literacy as often taught by library staff.
   - ESDS, the Scottish Government, and other data providers should target key support staff for training opportunities in a 'train the trainers' approach (similar to the programme used by Statistics Canada).[12]
   - ESRC and SFC could work with others concerned with capacity building in quantitative methods, such as the HE Learning Academy, the RSS Centre for Statistical Education and FE Regional Support Centres, through shared projects, sponsorships or direct funding support.
   - Provision of a virtual support service for enquiries from academics and postgraduates about the use of statistical and other advanced methods (perhaps as part of recommendation 9).

9. *Create a Scottish Centre for Social Science Research Methods*
   One way of creating a mechanism for collaboration and inter-disciplinary work would be to establish a Centre for focussing, integrating and advancing social science research methods and applications in Scotland. This would need to be inter-university and inter-disciplinary – building on existing centres of expertise

[12] See section on the DLI Training Programme in http://www.statcan.ca/english/Dli/annualreport0304.htm

- but preferably a uniquely-located physical Centre (rather than a virtual consortium or academy) with a full-time Director, adequate staff at a range of levels and support staff. Such a Centre should be supported in terms of infrastructure by host academic institution(s) and have core funding from the ESRC and/or the SFC. It should also be partly self-sustaining through funding from research grants and by offering services to the public, private and voluntary sectors. It would have an associated College of Fellows (affiliated and/or visiting) who would ensure academic integrity and broad-spectrum involvement.

Specific aims of such a Centre would be to:

- Provide teaching support through guidelines for good practice, identifying possible teaching materials (including Scottish datasets) and, possibly, mounting a Scotland-wide Masters in Applied Research Methods course.
- Identify training needs and coordinate a wide range of training and skills enhancement activities for both academic and non-academic staff, thus promoting continuing professional development. These would be core funded for academic staff and offer reasonable rates for non-academics.
- Facilitate a mentoring service for early career researchers that would involve linking them up with experienced researchers (either in Scotland or elsewhere), where this was not possible within their own institution or organisation;
- Provide a consultancy service offering research advice, guidance and support.
- Develop a set of core research activities in collaboration with other researchers across a range of institutions, disciplines, and organisations, both locally and internationally, on substantive pieces of work and, most importantly, involvement in methodological development.
- Collaborate closely with other national Centres to organise joint events and prevent duplication of effort (it may even be an NCRM Hub or have subsidiary spokes).
- The Centre must have a strategic capacity building role and be involved in monitoring quantitative capacity and identifying gaps or problem areas to be addressed.
- There is no reason why this Centre should be restricted to quantitative methods, but this should be seen as its priority in the first instance.

10. *Establish a Scottish Summer School*

This study did not find overwhelming support for the establishment of a Scottish Summer School; however, low rates of uptake indicate that interviewees have very little knowledge of them or of how flexible and multi-purpose they can be, especially in terms of focussing swiftly on changing and specialised needs. This is especially true of Summer Schools responding to the needs of relatively small countries (the Swiss Summer School and the ECPR Ljubljana School provide excellent examples and precedents). There should certainly be increasing use of both Essex and Ann Arbor (ICPSR) Summer Schools by Scottish students, but the advantages of a running a Scottish School would be to:

- Include regular, repeated and specialised topics and respond to the ongoing work of Scottish academics, diagnosing methodological, applied and training needs.

- Organise courses around specifically Scottish data sets and policy (evidence-based) needs.
- Provide "new perspectives in …" or "recent developments in" courses for young Scottish academics beginning to teach research methods or as part of continuing professional development.
- Respond to rapidly-developing technologies (such as computing visualization and animation of data), methods and software by using Scottish and/or international experts to provide in effect an "all-Scotland" updating facility.
- Offer CAQDAS and integrative qualitative-quantitative courses as the need arises (it is a rapidly developing sector at Essex and it would help widen the focus of a School or Centre).

11. Further research

A *Scoping Study* is precisely that: its purpose is to overcome the comparative lack of knowledge of the current state and likely future development of quantitative research methods capacity in Scotland and identify the relevant factors and interested parties in increasing it. In that sense, the results of this study are preliminary, but it allows us to make recommendations about how further research could be focused.[13]

Our main finding, in one sense, is just how little systematic reliable data there are on issues central to this problem:

- There is no information about people's actual mathematical competence at the various stages from school through graduate studies to beyond. This is a major lacuna, and any future policy will rely on mathematical (and applied) competence being measured at each successive stage in social scientists' careers.
- It is impossible to obtain from published records and material what the actual content and teaching/learning strategies are for research methods courses. Yet without this it becomes impossible to advise about how methodological capacity can be increased. Only if teaching staff are sure that their shared experience is confidential will the necessary information be forthcoming.
- The extent to which assessment of research methods courses involves the views of the students involved is unclear. It is imperative that a future study has student involvement as a central component.
- An integrative focus is possible now we know the basic outlines of process. This should focus on research needs as they relate to research capacity, and thus allow a calibration to be made between needs and capacity at each stage of the process.

[13] In any subsequent study, the response rate problem we have encountered will need explicit treatment. Shortage of time and resources prevented us from dealing with it adequately. Conversion of non-response is a standard procedure in large-scale sample studies (and indeed in small-scale "hard-to-reach" populations), but would need to be written in as a methodological requirement. Even Head of Department is not a stable position, given changes and lag between appointment and publication and differences between information even on the one web-site. A multi-media tactic (official publication, email, telephone, personal visit) is necessary, though slightly more expensive. The same is even more true of both research methods lecturing staff and students, and in the last case the possibility of incentives needs consideration.

- Above all, the process of increasing research capacity and of improving training needs to be done not on an ad hoc or intuitive basis, but on an explicit evidence-based strategy, for otherwise there will be no validated way in which change can occur.

6. Appendices

Appendix 1: Survey of Heads of Department

Personal information and background (all personal information will be kept strictly confidential)

1a) Name:
1b) Your email address
1c) Your Institution:
1d) Name of department:

1e) Please choose the category that best describes the disciplinary field of your department or unit. If more than one category is applicable please detail in "Other".

Area Studies
Criminology
Development Studies
Demography
Economic and Social History
Economics
Education
Human Geography
Science and Technology Studies
Linguistics
Management and Business Studies
Environmental Planning
Political Science & International Relations
Psychology
Social Anthropology
Social Policy and Administration
Social Work
Statistics
Methodology & Computing
Socio-legal Studies
Sociology
Other (Please specify):

2) Staff and student numbers
In answering the following questions, please include all tenured, contract, part and full time staff, but not temporary tutors or students who may be involved in teaching.

2a) How many teaching staff (expressed as FTEs) do you currently have in your department? (Please exclude staff who are primarily involved in research)

2b) How many research staff (expressed as FTEs) do you currently have in your department? (Please exclude staff who are primarily involved in teaching and counted above)

2c) How many students graduated from your department during the last academic year (2005/6) in the following categories

Undergraduate
Postgraduate (other than Doctorate)
Doctorate

3) Quantitative teaching activities

3a) Are students in your department currently offered any generic research methods courses at undergraduate or postgraduate level?

3b) Other than generic courses, are students in your department currently offered any more specialised courses in quantitative methods or analysis at undergraduate or postgraduate level?

3c) If you have answered "Yes" to either 3a or 3b above please give details of each course below:

Course ID
Course name
No. of taught hours
Compulsory or Non- compulsory
Undergraduate or postgraduate
Generic or specialised

3d) How many of your current staff members are actively involved in teaching quantitative methods courses?

3e) Are there staff members from other departments who assist in the teaching of quantitative methods for any of your courses?

3f) Do any of your students attend quantitative methods courses that are organised and run by another department?

3g) Is a mathematics qualification a compulsory entry requirement for any of your degree courses?

3h) Do you offer any form of support training in mathematics or statistics for those beginning quantitative courses at postgraduate level?
- if "Yes", what form does this take?

4) Quantitative research activities

4a) How many current members of staff are actively engaged in research that is substantially and predominantly quantitative?

4b) How many PhD students do you currently have doing research that is substantially or predominantly quantitative?

5) General questions:
5a) In general, how do you view the role of quantitative methods teaching and research within your department?

5b) Please describe any particular strengths in quantitative methods that your department has, including links with any research centres or networks:

5c) Please suggest any changes in quantitative research methods training, which, in your view, would substantially improve the research capacity of Scottish social science:

We would be most grateful if you will provide us, with their permission, with the names and email addresses of up to 4 colleagues in your department who have experience of using quantitative methods in research or teaching so that we can ask them to complete our staff questionnaire:

Name
Email

Appendix 2: Survey of teaching and research staff

Personal information and background (all personal information will be kept strictly confidential)

1a) Name:
1b) Your email address
1c) Your Institution:
1d) Name of Department:
1e) Your gender
1f) Your age group
1g) The grade of your post

1bh) Please choose the category that best describes the disciplinary field of your department or unit. If more than one category is applicable please detail in "Other".

Area Studies
Criminology
Development Studies
Demography
Economic and Social History
Economics
Education
Human Geography
Science and Technology Studies
Linguistics
Management and Business Studies
Environmental Planning
Political Science & International Relations
Psychology
Social Anthropology
Social Policy and Administration
Social Work
Statistics
Methodology & Computing
Socio-legal Studies
Sociology
Other (Please specify):

1i) Please list your degrees in the table below:

Degree
Subject
Institution

Please indicate below any of the higher degrees listed above which were primarily quantitative in nature:

1j) Have you undertaken any continuing professional development in quantitative methods of research or analysis, such as Essex Summer School or NCRM courses?

If yes, please give details below including, for each activity, course or event title, sponsor, duration and year:

1k) In the course of your career, have you been involved in the practical application of quantitative research methods outside academia? Please tick all that apply:

Yes - in the public sector
Yes - in the private sector
Yes - in the voluntary sector
No

The next section relates to your current involvement in teaching and or research in quantitative methods or analysis.

2a) Do you currently teach on any generic research methods courses at undergraduate or postgraduate level? Please tick all that apply:

Yes - undergraduate level
Yes - postgraduate level
No

2b) If you currently teach any more specialised quantitative methods or analysis courses at undergraduate or postgraduate level please give details of each course below:

Course ID
Course name
No. of taught hours
Compulsory or Non- compulsory
Undergrad. or Postgrad.
No. of students

2c) Are you supervising one or more PhD students who is/will be using a significant amount of quantitative research in their study?

Yes (please say how many
No

2d) How much of your current research involves using quantitative methods?

All
Most
Some
None

2e) In the last five years have you..... Please select any that apply

Published (predominantly) quantitative research?
Received funding for (predominantly) quantitative research?

Applied unsuccessfully for (predominantly) quantitative research funding?

2f) Are you currently associated with any quantitative research centre or network? If Yes, please name the centre or network:

2g) Are you otherwise involved in collaborating with other people on quantitative research? Please tick all that apply:

Yes - with someone in the same department
Yes - with someone in the same university
Yes - with someone from another institution/organisation
No

2h) Are you involved in any 'innovative development' such as developing new research methodologies or statistical/computing systems for data analysis? If yes, please briefly describe the nature of the development and what it involves:

This section of the questionnaire is aimed at getting an idea of the range of skills available across the different social science disciplines in Scotland.

3a) For each method or skill listed, please indicate whether you fall into one or more of the following categories:

Good knowledge/awareness
Please tick this box if you have a good understanding of this method or you feel comfortable reading published research that uses this method.

Currently teach/supervise
Please tick this box if you are currently involved in teaching this method, either to undergraduates or postgraduates, or on other educational programmes. This might include supervision of other researchers (e.g. PhD) in the explicit use of this method.

Use in research
Please tick this box if you are using or have used this method in your research. It is important that you do not include cases where someone, other than yourself, used this method/skill in collaborative research.

Further training
Please tick this box if you would like to undertake training or additional training in this activity either at an elementary or advanced level.

DESIGN
Experimental & Quasi-Exp. Design
Probability Sampling
Non-Probability sampling(inc. Quota, link-tracing, theoretical)
Questionnaire design and construction
Comp.-assisted telephone interviewing
Web-based data collection
Systematic data collection(pair-comparisons, triads, sorting)

ANALYSIS
Simple descriptive stats.
Graphic visualisation of data
Contingency tables (inc. measures of assoc., corr. + dis/sim.)
Inferential Stats. (inc. boot-strapping, simulation)
Time series, Event history, Panel studies
Multilevel Analysis
Regression (MLR)
Log-linear, logistic, ordinal regression
Structural equation modelling
Principal Components & Factor Analysis
Uni/Multi Dimensional Scaling
Correspondence Analysis
Classification + Clustering, Discrimination
Latent Class/Variable Analysis
Network Analysis
Geog. Info. Systems

ACCESSING DATA-SETs
UK Data Sets (BHPS, GHS, etc.)
Scottish Data Sets (SHS, SCS, SSLS)

3b) Please list the software packages you currently use for quantitative data analysis:

This section of the questionnaire seeks your views on the capacity building needs of social science quantitative research and teaching in Scotland.

4) What do you think are the main barriers to improving quantitative research and teaching within the social sciences in Scotland?

Please read the following statements and indicate how important you feel each factor is as a barrier (extremely important, very important, moderately important, slightly important or not at all important):

4a) Accessibility of appropriate data:
4b) Lack of institutional support in accessing data:
4c) Limited research methods training:
4d) Limited access to research methods training in Scotland:
4e) Lack of time to attend relevant training:
4f) Lack of institutional support to attend relevant training:
4g) Willingness of students to take quantitative courses:
4h) Reluctance of researchers to do quantitative research:
4i) Recruitment of quantitative researchers and/or teachers:
4j) Limited funding for quantitative research in Scotland:
4k) Lack of collaboration within institutions:
4l) Lack of collaboration between institutions:
4m) Lack of funding for quantitative centres or networks:

4n) What other factors do you consider are barriers to social science quantitative research and/or teaching in Scotland?

4o) In your opinion how could social science quantitative research capacity best be increased in Scotland?

4p) Have you any further comments regarding social science quantitative research capacity building in Scotland you wish to add?

Appendix 3: Survey of library and computing staff

1) About you

Name:
Email address:
Your job title:
Name of department:
Name of institution:

Please select your primary affiliation (this will determine which Sections you will be directed to)

Library and Information Service *(complete section A & C)*
Computing Service *(complete section B & C)*
Neither *(complete section C only)*

Section A: Library and Information Services

A1) Does the university provide central user services for any of the following? (Yes / No / Don't know)

Answer reference questions about sources of statistical data
Purchase online subscriptions or CD-ROM-based statistical or financial data sets
Select and acquire datasets for a local collection
Provide help materials or web pages about statistical resources or data sets (e.g. survey data, census data, geo-spatial data)
Provide current awareness service (e.g. email, newsletter) about new datasets available locally or through national services

A2) Are any of the above services provided at a non-central departmental level instead of at the Library? (Yes / No / Don't know)

A3) If yes, please explain.

A4) To whom are the above support services available? (Yes / No / Don't know)

Undergraduate students
Postgraduate students
University staff
Non-University users

Section B: Computing Services

B1) Does the university have a site license for any of the following quantitative analysis packages or provide it in computing labs?

Excel
SPSS
Stata

SAS
S-Plus
Minitab
Microfit
ArcGIS
MapInfo

B2) Please give details of any other site-licensed statistical package, not listed above.

B3) Does the computing service provide documentation, web pages or learning materials for using any of these packages? (Yes / No / Don't know)

B4) Does the computing service provide training courses on the use of any of these packages? (Yes / No / Don't know)

If yes, which user groups are entitled to enrol? (Tick all that apply)

Undergraduate students
Postgraduate students
University staff
Non-University applicants

B5) Do computing staff assist lecturers to teach any of these packages as part of classes or lab practicals? (Yes / No / Don't know)

If yes, please indicate the level (undergraduate / postgraduate) and subject of the classes assisted in this way.

Section C: General

C1) Do any computing or library staff assist lecturers with preparation of datasets for teaching purposes? (Yes / No / Don't know)

C2) Do any support staff give direct user support for accessing any of the following national data services? (Yes / No / Don't know)

UK Data Archive / Economic and Social Data Service (ESDS)
ESDS International (at MIMAS)
JISC/ESRC Census Programme (CASweb, etc.)
EDINA Digimap (online mapping and geospatial data download)
Government online data resources (such as ONS, SCROL, GROS, Neighbourhood Statistics, Scottish Government Statistics)

If you ticked no or don't know to all of the above, skip to question C5

C3) What types of support would you say are provided by library or computing staff for any of these services? (Yes / No / Don't know)

Identifying appropriate service/website based on user's query
Instruction / assistance in use of search / download interface

Assistance with understanding data documentation or codebooks
Troubleshooting problems using data (e.g. in analysis packages)
Downloading / subsetting / reformatting data on behalf of user
Consultation on methods or research question

If you ticked no or don't know to all of the above, skip to question C5

C4) To whom are the above support services available?

Undergraduate students
Postgraduate students
University staff
Non-university users

Please explain.

C5) Where else might users be referred for assistance? (Tick all that apply)

Support staff based within departments (e.g. computing officer)
Academic staff (including supervisors or directors of studies)
Helpdesk of national data services
Other
Don't know

C6) Does your university have any of the following specialist staff members? (Tick all that apply)

Social sciences reference librarian
Social science computing support
Statistical consultant
GIS specialist / map librarian
Data librarian
Other

C7) How do users generally gain access to such specialist support?

Personal assistance provided during normal office hours
Personal assistance provided during restricted office hours
Make an appointment
Email service
Other
Don't know.

15. In your opinion, how best could library and/or computing services help to improve quantitative methods capacity in the social sciences in Scottish universities?

Appendix 4: Note on the term "quantitative" and the "quantitative-qualitative" distinction

During the course of this research project (and generally in discourse in the area), the term "quantitative" was used in a wide (and sometimes incompatible) range of senses by different people. This is not merely a terminological confusion, for where it occurs in implicit or explicit contrast with the term "qualitative" it can take on added philosophical, ideological, methodological, technical and pragmatic aspects.

In usage, it can refer to several levels of discourse, and can be used differently within and across levels - hence its incoherence (for a detailed discussion, see Coxon 2005). Some of these levels in which the quantitative and qualitative contrast appear include:

- Paradigms or methodological approaches: in effect, variable-centered (quantitative) *versus* meaning-centered (qualitative) approaches.
- Epistemological positions: Positivism in its common-usage sense (or rather, Empiricism) *versus* Interpretativism, and this is in turn paralleled by nomological and causal methods *versus* rule-following and reasons-based explanation.
- Data conceptualization: formal measurement approaches, such as algebraic representation and variable/attribute levels of measurement *versus* natural-language and speech as data. (It is ironic that within the former "quantitative" approach, "qualitative" is used to mean non-metric or non-continuous measurement.)
- Data collection: here, the contrast is usually between systematic questionnaire-format *versus* discursive data-elicitation, but can often be as trite as "closed-ended" *versus* "open-ended" question format.
- Data analysis models and approaches: appropriate analysis usually follows the General Linear Model and its statistical variants *versus* thematic, semantic and content analytical procedures.

These different meanings are fairly commonplace, but they are also supplemented by an aspect which is probably more potent and influential in research practice: namely a*ffiliative identification*: where one side of the contrast is taken as a label to identify those who follow what is considered the appropriate or authentic research procedures and its contrastive term to un-church those outside it.

It is hoped that the context will make clear the sense in which we and/or the respondents are using the term "quantitative" but this is sometimes not the case, and is the reason why we draw attention to the problem. Even in the most august circles, the term is sometimes used as if the meaning is obvious and in need of no further specification. We would argue that it almost always is.

7. Bibliography

Bardsley, N., Wiles, R. and Powell, J. (2006) *Report on a Consultation Exercise to Identify the Research Needs in Research Methods in the UK Social Sciences.* ESRC National Centre for Research Methods.

Coxon, A.P.M. (2005) "Integrating Qualitative and Quantitative Data: What Does the User Need?", *Forum: Qualitative Social Research*, 6(2), accessible at: http://www.qualitative-research.net/fqs-texte/2-05/05-2-40-e.htm

Coxon, A.P.M. and Hawkins, P.K. (2007) *Demographic Review of the UK Social Sciences – Scotland*. Report to the ESRC, unpublished.

ESRC (1987) *Horizons and Opportunities in the Social Sciences.*

HEFCE (2005) *Strategically Important and Vulnerable Subjects: Final Report of the Advisory Group.* HEFCE Policy Development, June 2005/24.

Kelly, D and Howe, C. (2006) *Training Requirements for Postgraduate research Students in psychology*. York: The Higher Education Academy Psychology Network

Lynch, R., Maio, G., Moore, G., Moore, L., Orford, S., Robinson, A., Taylor, C. and Whitfield, K. (2007) *ESRC/HEFCW Scoping Study into Quantitative Methods Capacity Building in Wales.* Final report to the ESRC and HEFCW. Accessible at: http://www.esrcsocietytoday.ac.uk/ESRCInfoCentre/Images/Scoping%20Study%20to%20Identify%20Quantitative%20Methods%20Capacity%20Building%20Needs%20in%20Wales%20-%20Final%20Report_tcm6-15717.pdf

Mills, D., Jepson, Al, Coxon, T., Easterby-Smith, M, Hawkins, P. and Spencer, J. (2006) *Demographic Review of the UK Social Sciences.* London: ESRC.

Rendall, M. (2003) *Quantitative Research: A Scoping Study for the Learning and Skills Research Centre.* London: LSRC.

Rice, R., Burnhill, P., Wright, M. and Townsend, S. (2001) *An enquiry into the Use of Numeric Data in Learning and Teaching: Report and Recommendations for UK Higher Education.* University of Edinburgh.

Skinner, C (1999) *Review of Social Statistics.* Report to the ESRC and Research Resources Board.

Tomlinson, M. (2004) *14-19 Curriculum and Qualifications Reform*. DFES

Williams, M (2002) *Baseline Study of Quantitative Methods in British Sociology Findings.* Bristol University: School of Sociology, BSA C-SAP Project Funding, ref. 52/A/01

Williams, M., Collett, T. and Rice, R. (2004) *Baseline Study of Quantitative Methods in British Sociology.* Joint funded C-SAP and BSA project report.