



# The 'Crisis of Number': Informed Citizens, Competent Social Scientists

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Whether we like it or not – and whether our students like it or not – the contemporary world runs on numbers. There is hardly a single issue in public life, in civil society, in the world of employment, business and management, or even within the domestic home, which does not depend on counting, measuring and calculating – and crucially, *reasoning* with number. Both as ordinary members of the public, and as social scientists, we need to acquire better skills in quantitative methods in order to make sense of what a recent Economic and Social Research Council (ESRC) document described as the 'seismic changes' in our modern, diverse and dynamic society, and to tackle the 'increasingly complicated questions about UK economic competitiveness' posed by 'the relentless pressures of globalisation' (ESRC, 2008: 2).

The dramatic demand for greater national capability in quantitative analysis – the 'crisis of number' – can be met in a number of ways by improving education at any point from primary schooling, through to continuing professional development in mid-career. The specially commissioned contributions that make up this collection focus on *basic quantitative methods in undergraduate teaching and learning in the social sciences*, because we see undergraduate education as the pivotal stage for enhancing quantitative skills, and the social sciences are a major source of future analytical expertise. Thus what we offer in this book is an argument, supported by evaluated examples, rather than a 'cookbook' of teaching recipes. Only in the most general sense is this a 'How to Do ...' book.

The chapters come from a network of researchers who have recently completed major projects or reviews in response to ESRC initiatives (see ESRC, 2006). The lesson from these studies is that what undergraduates encounter, and how they react to it, determines their numeracy levels when they come to make career decisions and enter the graduate workforce. In an era when over a third of all young people go through higher education, the

habits of thought and advanced technical skills acquired during a university education have never been more significant. In particular, it is from this body of students that the next generation of postgraduates and future social scientists are selected.

Our argument for improving skills in quantitative methods is based not only on the vocational needs of 'Great Britain Ltd' for technically proficient professionals – although we do accept that this is important – but also on an ideological vision of active and critical citizens in a democratic society. An additional goal is to see the internal intellectual evolution of each of the social sciences. Of course, there are many ways in which such developments in knowledge and understanding can take place: raising the profile of quantitative methods is but one of them. However, this last theme both broadens and balances our case. Our advocacy is not dependent on a narrow view of mass higher education as primarily utilitarian, or economically functional, unlike those of both major British political parties for some time now (e.g. Department for Education and S 1987; Department for Education and Employment, 1999). We do not see the pay-off for quantitative methods as being solely what it offers for the job market or for employers: knowledge and skills have value in their own right, a value that is intrinsic to the disciplines themselves, rather than instrumental, and which does not lie simply in the commodification of learning or reduction in intellectual standards as part of a crude performative conception of the contemporary university (Barnett, 2005; Barnett and Coate, 2004).

As part of our commitment to this wider and deeper model of higher education, the central importance we attach to developing quantitative expertise in research methods training does not ignore or denigrate other methods of research and social analysis. On the contrary, we believe that the contribution of quantitative methods, and the problems currently associated with acquiring the necessary skills, can only be appreciated first as part of how students experience research as a whole, and second by seeing how research fits into the rest of the curriculum. Our intention is that by addressing the problems of teaching and learning quantitative methods encountered by social science undergraduates, we can make a case for seeking, and in some concrete ways, achieving a new *balance* and synthesis of analytical tools for understanding today's world. We do not claim that quantitative methods are sufficient *on their own* but equally, without them, the alternative methods of understanding and analysis available to us are similarly inadequate. The particular strength of a comprehensive quantitative approach is not numeracy *per se* but the rigour it introduces from the philosophy of social science to reasoning, the research process, and the relationship between empirical evidence and theoretical statements.

Nonetheless, even to be active citizens we need to understand a plethora of social phenomena which impinge on our lives: an ageing population or arguments over alternative therapies; benefit payment levels or bullying at school; climate change or crime; devolution or drugs; the environment or education; friendship choices or family sizes; gender discrimination or

genetics; health or housing needs; and income, inequality and immigration, let alone religiosity, sexuality, taxation, unemployment, voting, warfare, xenophobia, youth or zealotry. Without resorting to numbers – sizes of groups, frequencies of occurrence, rates of change, distributions across locations – these cannot be fully comprehended. If we have no intellectual tools to measure interactions and effects we cannot explain which ‘things’ are linked others, let alone develop interventions aimed at changing complex causal relationships. What do we know about production, productivity, profitability, predicted markets or personnel unless we have the numeracy skills to manage our economy?

While we eschew crude recasting of complex human issues into simplistic numerical form, a lack of basic arithmetic competence is a severe handicap for the individual, and a collective impossibility for a complex technology-based society. If numeracy has become so important for everyday living, how much more so is it vital for today’s social scientists at all levels to be competent in the use of quantitative methods which combine number with argumentation and exposition. It has become essential that we possess a critical awareness of the sources and validity of quantitative information, have the capacity to apply statistical analysis to raw data, and can engage and reason with numerical evidence. Without a strong base of quantitative methods in social research, and further integration of quantitative research skills acquisition into the curriculum, the social sciences in Britain will continue to fail to realise their potential contribution to the common good, and lose their current high standing in the international academic community.

This has recently been dramatically illustrated by the International Benchmarking Review sponsored by ESRC, the British Sociological Association and the Heads and Professors of Sociology group (ESRC et al., 2010). Although the international panel of independent experts found that UK sociology ranked second in the world (behind the Americans) it raised doubts about the true extent of claims to international reach and influence. The low levels of quantitative numeracy in UK sociology inevitably has isolated British sociologists not just from international collaboration but reduced their capacity even to appreciate the extensive quantitative work produced in other countries and reported in other nations’ sociology journals. Poor quantitative skills can isolate a discipline from the rest of the world, restrict its development and damage its international standing.

If the more obvious characteristics of numeracy in terms of operational skills with number as the only issue, it might be easier to move forward. However, it is fundamental to good practice of quantitative methods that we see them not simply as technical dexterities, but as part of a logical system of reasoning. Numbers themselves are not more important than the framework of the philosophy of social science that contains them. In the same way, other forms of data and analysis also have their part to play. The chapters in this collection, being based on the one hand on empirical research studies, and on the other hand, drawing on case studies and qualitative data to

sustain our argument, aim therefore to be a more than technical contribution to the ‘crisis of number’ debate.

## The structure of the book

The contributors to this collection come from a range of social sciences. While the explorations and interventions they have made have chiefly been within their own disciplines, they have also kept in mind the wider ramifications of their work, and some of the chapters, such as Jonathan Parker’s comparison of several different countries, or Jackie Carter’s updating of the Jorum project, look at the social sciences as a whole. Each of the ESRC-funded projects was free-standing, but the common themes that emerged from them demonstrate the benefit of collecting together the experiences of the project teams. This delivers wider dissemination of their several ‘message’ and opens the prospect of having a more influential impact than could be achieved by individual reports or articles addressed to and read in separate disciplines.

All of the chapters have been specially written for the book. This introductory chapter and Chapter 2 are intended to give an overview and also to allow licence for the editors to express their own personal views – with which not all of the other contributors would necessarily agree! These lead into the next three chapters, each of which is directed at presenting a framework for thinking about teaching quantitative methods.

Jonathan Parker’s international survey (Chapter 3) provides breadth, in the form of a comparative international benchmark against which to set our current practices in the UK. He reports how the Scandinavian/north European model tends towards a more coherent pattern of developing research methods skills, concluding that key issues are how quantitative skills are integrated with other research methods, and how these methods are spread through the whole of the curriculum. Quantitative methods do not exist in a vacuum. Becoming a graduate who can practise their discipline takes more than that: ‘two modules do not turn undergraduates into social scientists’. Disciplines vary, with business studies and economics placing most emphasis on quantitative competence, whereas politics is the social science devoting least time to research methods. In North America, initiatives such as the Integrating Data Analysis project have begun to gain ground, but the issue remains that the individual members of staff who teach methods cannot achieve change on their own: teaching teams as a whole have to be willing to work collectively to introduce changes that promote student use of research skills. The chapter concludes with some examples and a checklist of questions that anyone teaching or designing modules in research methods should ask of themselves and their colleagues.

Although Chapter 4 is not based on a recent ESRC grant, Martin Bulmer’s past involvement with ESRC and other policy projects, major

contributions to the research methods literature, and involvement in the teaching of undergraduate and postgraduate quantitative methods give him a unique position to provide a historical perspective. Chapter 4 is thus a personal guide to 'How did we get to where we are now', providing background depth to contemporary debate by drawing on his 40 years' experience of promoting research methods in social policy and sociology. Apart from its intrinsic interest and careful accounting of events and personalities, it provides a sharp sense to the historical contexts in which our ideas about quantitative methods were formed. The teaching of research methods is not an abstract discussion: it was grounded in institutions, curricula, individual career ambitions and competition for scarce resources in specific locations and times. It is all too easy to forget or misinterpret earlier episodes that shaped today's framework of attitudes. A deep-rooted resistance to, and even resentment towards quantitative methods in particular, and rigorous methods training in general, was an important feature of the development of later academic 'fashions' and current styles of research. Chapter 4 provides a salutary reminder that today's challenges are remarkably similar to those of the 1970s – and are still awaiting resolution.

Chapter 5 draws mainly on sociology, in particular a national study of what students – as against academics – say about the experience of learning research methods. Malcolm Williams and Carole Sutton present data on the maths backgrounds of students, and link this to how 'scientific' they believe their chosen discipline to be. Students' attitudes towards methods and the degrees of difficulty reported with quantitative elements are associated with their assessment performances. The research implies further support for placing students' *experiences* at the centre of thinking about how the subject is taught, while the second part of the chapter illustrates this with a case study of students' reactions to a field(work) trip.

Chapters 6 and 7 describe two experimental projects in curriculum innovation. Sean Carey and Katharine Adeney have developed a new research methods module in politics, which could be adapted for other subjects. Their approach starts with trying to engage student interest by lots of attention to up-to-date examples. They see students as not only having anxieties about number *per se*, but also that their 'reluctance can also come from a denial that quantitative analysis has any place in the study of politics despite the pervasiveness of numerical data in the making of political argument'. It follows that students first need to be shown that this is a misplaced view. Only when students are gaining confidence does the module move on to more conventional statistics. In the light of earlier comments about how methods teaching is presented, an important feature in the success of this innovation has been the strong base of support from politics colleagues.

The two linked projects reported by Jane Falkingham and Teresa McGowan (Chapter 7) were aimed at a more disparate range of social science undergraduates, but with a more focused goal. The first dealt with enhancing the integration of quantitative methods skills in the broader undergraduate curricula, with a focus on first and second year undergraduates

and courses. The project used focus groups to explore not only student attitudes, but staff views as well. Having identified a number of difficulties, the team then ran a ‘consultancy’ service to supply examples to lecturers. This worked in two directions: the methods staff received a flow of substantive social science exemplars, while the other staff were supplied with numeric case studies that they could build into their core topics. The second project aimed at ‘increasing the use of quantitative methods in third year undergraduate dissertations in disciplines where use of such methods has been historically low’. The distinctive approach was to offer supplementary tuition in vacations, and to recompense students for the potential loss of earnings this entailed. While this is not a model that can easily be adopted without special funding, the promising outcome was that an increased number of volunteers signed up for the next academic year – when there was no financial incentive!

This attempt to encourage secondary analysis of large datasets is echoed in Chapter 9 by Jo Wathan and colleagues at the Cathie Marsh Centre for Census and Survey Research (CCSR). Again, volunteer groups of students interested in criminology and sociology were offered extra tuition (in the form of practical workshops and specially prepared handbooks) as well as small financial incentives. The fact that these projects felt it was necessary to offer financial rewards is itself an indication of staff perceptions of how resistant many students are to quantitative methods, although as the project developed, it became apparent that continued student involvement did not depend on the financial incentives. The project confirmed initial assumptions about the low awareness among undergraduates of the extensive holdings of datasets by the Economic and Social Data Service, and that there were barriers set up by difficulties in accessing them. The teaching intervention increased student confidence, and a number of dissertations incorporated secondary analysis, involving students in an extra workload commitment which the research team feel may not fully rewarded in most dissertation marking-schemes.

The final three chapters offer some positive responses to the issues raised in the earlier chapters: there is nothing more depressing than ‘contributions’ that define a problem and then leave readers despairing of any solution. Chapters 9 and 10 concentrate on two specific IT-based resources that are available to staff and/or students to use in teaching and learning quantitative methods. Rebecca Taylor and Angela Scott report on ‘METAL’ (Mathematics for Economics: enhancing Teaching and Learning) which originated from a specific academic need encountered by lecturers in economics and related disciplines. This large network project is more directly concerned with basic competence in mathematics than the earlier chapters, but it shares with them the belief that successful teaching requires confidence-building, a demonstration of subject relevance, and the use of examples and case studies from everyday life, which having commonsense meanings for students. The materials that make up METAL are held in the form of downloadable programmes which include tests and self-assessments, video clips and animations

showing mathematical issues in real world settings, as well as more conventional information. The keynote is flexible access and application, presented in 'bite-size' units that can either be a resource of module design, or a supplement for the students' independent learning.

As Jackie Carter explains, the other chapter (Chapter 10) about IT resources for teaching is not uniquely aimed at assisting the learning of quantitative methods, nor does the Jorum facility set out to provide content prepared by specialists in the project team. Instead, Jorum is a cooperative venture which offers a means of lending and borrowing teaching resources. The project maintains the infrastructure and works to promote user participation, but the ultimate success can only be judged by the willingness of lecturers to deposit 'their' materials for others to share. This in turn is related to the ease with which this can be accomplished. The potential of Jorum as a means of building enhanced teaching of quantitative methods is tremendous, and at a resource level, is a further indication of positive steps that those teaching the subject can take in their own institutions.

Finally, in what is almost a coda, Matthew David reflects briefly on the ways in which we can respond to 'the problem' that runs through the book. As somebody who has taught research methods to undergraduates, he objects to being labelled as a 'research methods lecturer': he is a *sociologist* or an *academic* (who happens to be able to teach methods). His own preference for mixed methods reflects this stance, and is a useful counter to any tendencies to see quantitative methods in isolation, or inherently superior. He concludes his call for positive action with examples of encouraging recent developments, and provides some points of contact for 'those wanting to get into the loop'.

This introductory summary of the chapters indicates that we now have more up-to-date, evidence-based knowledge about undergraduate attitudes to, and experience of, learning quantitative methods of social research than in earlier times. Much of this evidence has not been assembled or analysed with traditional quantitative methods, and that is no coincidence. Our argument is not that we need *only* quantitative methods, but rather that good social science research needs to draw on 'mixed methods', and to deploy the methods that are most appropriate to the task in hand. *But we cannot have mixed methods or make an informed choice about which are the most appropriate methods unless we include quantitative methods in our toolbox of research techniques.*

## The changing context

We hope that the contributions in this collection will amount to a better understanding of what has to be done, not just in terms of a fundamental approach, but increasingly in more detailed classroom activities. We also have greater resources in the form of IT resource centres, so there can be less excuse for not attempting a root and branch reform, whether we are talking about the research methods lecturers who will carry the torch, or our colleagues

who can build quantitative illustration and student practice into their modules across the curriculum. We should not underestimate the conservatism of our colleagues. A key measure of success will be the extent to which the curriculum as a whole changes, rather than just the enhancements in the syllabuses of research methods modules.

Nonetheless, it is reasonable to anticipate that teaching and research across the social sciences will, for a variety of reasons, change markedly in the next few years. Although additional resources would make this easier to achieve, the emergence of a new coalition UK government, which rejects Keynesian economics and is ideologically committed to dismantling the public sector, paradoxically may even hasten change within higher education by the pressures of budget cuts and calls for greater 'relevance'. Any discipline that attempts to opt out is going to be increasing isolated, and left behind when it comes to future access to support funding both for capacity building and the conduct of research. This collection offers some choices of change during a period when research foundations and funding councils are developing new priorities and policies. In the words of a recent ESRC document:

more needs to be done to improve the teaching of quantitative methods and to persuade students of its value ... Without improvements at this level, sustained growth at postgraduate level and beyond will continue to be hampered. (ESRC, 2008: 4)

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