

SOCIETY COUNTS

Quantitative Skills in the Social Sciences and Humanities

1. The British Academy is deeply concerned that the UK is weak in quantitative skills, in particular but not exclusively in the social sciences and humanities. This deficit has serious implications for the future of the UK's status as a world leader in research and higher education, for the employability of our graduates, and for the competitiveness of the UK's economy.

THE PROBLEM

2. The UK has traditionally been strong in the social sciences and humanities. In the social sciences, pride of place has gone to empirical studies of social phenomena founded on rigorous, scientific data collection and innovative analysis. This is true, increasingly, of research in areas of the humanities. In addition, many of our current social and research challenges require an interdisciplinary approach, often involving quantitative data. To understand social dynamics, cultural phenomena and human behaviour in the round, researchers have to be able to deploy a broad range of skills and techniques.
3. Quantitative methods underpin both 'blue skies' research and effective evidence-based policy. The UK has, over the last six decades, invested in a world-class social science data infrastructure that is unrivalled by almost any other country. Statistical analyses of large and complex data sets underpin the deciphering of social patterns and trends, and evaluation of the impact of social interventions.



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- 4. With moves towards more open access to large scale databases and the increase in data generated by a digital society – all combined with our increasing data-processing power – more and more debate is likely to turn on statistical arguments. Providing citizens with the means to understand, analyse and criticise data becomes ever more integral to the functioning of a democracy.
 - 5. There is a skills deficit. In higher education, almost all disciplines require quantitative capacity, but students are often ill-equipped to cope with those demands. They then leave university with skills inadequate to the needs of the workplace – be it in business, public sector, or academia.¹ Students are graduating with little confidence in using what skills they do have , having had little practice in applying them.² Employers often lament the lack of quantitative skills in the workplace. This deficit is UK-wide, with official reports showing weaknesses amongst undergraduates in Scotland³ and Wales.⁴
 - 6. The extent and quality of training in quantitative methods at undergraduate and postgraduate level is generally below the standard set in other countries. There is a dearth of candidates with good quantitative skills to go forward to doctoral training, and an inadequate supply of graduates with the numerical skills that are in demand in the workplace.

WHY HAS THIS HAPPENED?

LONG-TERM VULNERABILITY

- 7. This is not a new problem. Causes include: the ageing of the cohort of quantitative social scientists who had led work in this area; a lack of training of high level quantitative social scientists particularly in the 1990s; a long-standing lack of emphasis on quantitative methods in many courses and programmes of study; insufficient attention in degree programmes to methodology and the systematic organisation and production of empirical evidence; and teaching quantitative methods in ways that failed to relate adequately to the course, skills and research interests of the students concerned.

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- 1. Advisory Committee on Mathematics Education (2011) *Mathematical Needs in the Workplace and in Higher Education*. London: ACME
 - 2. MacInnes, J. (2010) *Proposals to Support and Improve the Teaching of Quantitative Research Methods at Undergraduate Level in the UK, Final Report to ESRC*
 - 3. McVie, S., Coxon, A., Hawkins, P., Palmer, J., Rice, R. (2008) *ESRC/SFC Scoping Study into Quantitative Methods Capacity Building in Scotland. Final Report*
 - 4. Maio, G., Moore, G., Moore, L., Orford, S., Robinson, Whitfield, K. (2007) *ESRC/HEFCW Scoping Study into Quantitative Methods Capacity Building in Wales*

THE SCHOOLS GAP

8. The problem starts in schools. Too many students enter higher education with poor numerical skills, little confidence in their mathematical abilities or an appreciation of their relevance. This is a severe handicap in developing quantitative skills more generally. The UK is dramatically behind many other countries in the study of mathematics after sixteen. England, Wales and Northern Ireland had lower levels of participation in upper secondary mathematics than any other country in a recent study of 24 countries.⁵ They were the only countries in which fewer than 20% of upper secondary students study mathematics. Levels of participation are slightly higher in Scotland, but still well below those recorded in the majority of other countries. A recent report commissioned by the Conservative Party in opposition spoke of a ‘national disgrace’.⁶
9. The Advisory Committee on Mathematics Education (ACME)⁷ estimates that of those entering higher education in any year, some 330,000 would benefit from recent experience of studying some mathematics (including statistics) at a level beyond GCSE, but fewer than 125,000 have done so.⁸ ACME also estimates that we need another 150,000 students to study mathematics after GCSE to what they call a ‘social science’ level.

CONFIDENCE WITH NUMBERS

10. Most young people between the end of mathematics GCSEs and the start of university have a gap of between two and four years. It is therefore not surprising that students feel anxious about quantitative methods, mathematics and numeracy. Students may be arriving at universities having forgotten much of what they did know, and many of those that have studied mathematics post-16 may have struggled. One study of sociology undergraduates found that 43% of students said they had had a bad experience of mathematics at school. A similar percentage (41.9%) regarded themselves as not good at mathematics and just over half (52.4%) expressed anxiety about learning statistics.⁹ A recent Nuffield Foundation study¹⁰ showed that the mathematics and quantitative skills covered in various social science subjects at A Level vary significantly between exam boards and in the options covered within each board. In some subjects, two

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5. Hodgen, J., et al (2010) *Is the UK an outlier? An International Comparison of Upper Secondary Mathematics Education*, London: Nuffield Foundation
 6. Vorderman, C., et al (2011) *A World Class Education for All Our Young People*
 7. ACME is an independent committee, operating under the auspices of the Royal Society, that aims to influence Government to improve mathematics education
 8. Advisory Committee on Mathematics Education (2011) *Mathematical Needs in the Workplace and in Higher Education*
 9. Williams, M, Payne, G., Hodgkinson, L. Poade, D. (2008) ‘Does British Sociology Count? Sociology Students’ Attitudes toward Quantitative Methods’ *Sociology*.42: 1003–1021
 10. Nuffield Foundation (2012) *Mathematics in A Level assessments: A report on the mathematical content of A Level assessments in Business Studies, Computing, Economics, Geography, Psychology and Sociology*

students could get the same grade when one used no mathematics at all, while another gained nearly half their mark from exam questions requiring mathematical reasoning.

11. It is vital that this pre-university gap is filled and that students continue to refresh their quantitative skills, especially in areas such as statistics, which can appropriately be used in a high proportion of school subjects before arriving at university. We therefore welcome the government's commitment to encourage the vast majority of pupils to improve their quantitative skills right through to the age of 18.¹¹

TEACHING QUANTITATIVE METHODS

12. Another reason for the poor skills of undergraduates is the dearth of academic staff able to teach quantitative methods in ways that are relevant and exciting to students in the social sciences and humanities. Insufficient curriculum time is devoted to methodology in many degree programmes. As few as one in ten university social science lecturers have the skills necessary to teach a basic quantitative methods course.¹²
13. Furthermore, such courses are often taught in isolation, and can appear irrelevant to the core discipline. Quantitative methods are taught most effectively when embedded within the wider undergraduate degree course, allowing students to understand the context for, and application of, the methodology. International best practice in the teaching of quantitative methods integrates methods training and hands-on research into the mainstream of academic subjects.¹³

SIGNALLING

14. Students tend not to be aware of how useful these skills will be to their employability. Broad numerical skills are valuable in careers in business, charities and the public sector. In a wide range of businesses, quantitative skills are now essential. Businesses need their staff to be able to make effective use of statistics and probability.¹⁴ Quantitative skills and the use of statistical software packages are integral to such tasks as costing, risk assessment and quality control, as well as in coping with everyday problems. The value of quantitative skills for future employment needs to be actively communicated to students.

11. <http://royalsociety.org/news/gove-at-rs/>

12. MacInnes, J. (2010) *Proposals to Support and Improve the Teaching of Quantitative Research Methods at Undergraduate Level in the UK, Final Report to ESRC*

13. Jonathan Parker. (2011) 'Best Practices in Quantitative Methods Teaching' in Payne, G., Williams, M. eds. *Teaching Quantitative Methods: Counting on the Social Sciences*

14. Confederation of Business and Industry (2010) *Making It All Add Up; Business Priorities for Numeracy and Maths.*

THE NEED FOR QUANTITATIVE SKILLS

THE UK AS A LEADER IN WORLD CLASS RESEARCH IN THE SOCIAL SCIENCES AND HUMANITIES

15. The deficit has implications for the UK's claims on world-class standing in research in the social sciences and humanities. Their intellectual health will be impoverished if they do not engage fully with these approaches. The critical need for quantitative research is not confined to any particular field but, rather, applies to disciplines drawn from the full spectrum of the social sciences – and increasingly, of the humanities.
16. Advanced quantitative skills are required to exploit fully the UK's investment in its social science data infrastructure. This embraces the 46, 58, 70, Millennium and (future) birth cohorts supported by the research councils; others have been amassed by national statistical agencies, for example the Census or the General Household Survey; and still more by government departments, industry, commerce, and the National Health Service. In addition, administrative data are an increasingly important source for the understanding of many social issues.
17. Technical innovation has spread quantitative analysis to new disciplines and facilitated new analytical techniques. The revolution in information technology over the last 40 years has transformed the collection, dissemination and analysis of data. The UK already has a rich, varied and easily accessible data infrastructure. The increased emphasis on open data – and new sources of information from social media, transaction and administrative data – create tremendous opportunities for research.
18. We cannot embrace these opportunities without the necessary skills. Yet international studies have shown that we are falling behind in some subjects.¹⁵ We have an urgent need for methodologists able to break new ground in statistical techniques, with a clear mission to develop methods for use with social science data; informaticians, able to manipulate and manage data from a single large source or from multiple sources; social scientists grounded in a particular discipline, able to undertake detailed analyses of large and complex data sets; and social scientists able to interpret and understand statistical results and statistically based argument.¹⁶

15. Economic and Social Research Council, Political Studies Association, British International Studies Association (2007) *International Benchmarking Review of UK Politics and International Studies*; Economic and Social Research Council, Heads and Professors of Sociology, British Sociological Association (2010) *International Benchmarking Review of UK Sociology*.

16. British Academy contribution to the Higher Education Funding Council for England consultation on Strategically Important and Vulnerable Subjects (SIVS)

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- 19. Furthermore, quantitative skills can help researchers in the social sciences and humanities to engage with other disciplines in the sciences and engineering, and to work in interdisciplinary teams. A lack of quantitative understanding can limit intellectual dialogue. It may also limit our ability to engage with cutting-edge research in other countries. Lecturers will not be well equipped to research, or teach, if they cannot grasp fully the quantitative literature.

STATISTICAL LITERACY FOR UK GRADUATES

- 20. The British Academy has frequently emphasised the need for well-rounded graduates, equipped with core skills, if the UK is to retain its status in research and higher education.
- 21. These core skills start with quantitative methods. The skills standardly deployed, for example, in the natural sciences and engineering are no longer synonymous with or restricted to particular subjects; these skills are now relevant and necessary well beyond traditional science, technology, engineering and mathematics (STEM) subjects. The changes required to develop these skills in graduates is relevant across the university curriculum. We must therefore seek to apply some of the methods and thinking that are being used to bring about curriculum change through the STEM initiative.

SKILLS FOR EMPLOYMENT

- 22. Quantitative skills are important for employment. A survey of business sectors found a remarkable degree of unanimity on the mathematical needs of employers.¹⁷ The Confederation of British Industry (CBI) has defined numeracy broadly and identified the ability to ‘interpret and respond to quantitative data’ as one core maths skill important to the workplace.¹⁸
- 23. Employees need to interpret data, contribute to problem solving and to quality improvement. Businesses need their staff to be able to make effective use of statistics and probability. However employers from a range of sectors are dissatisfied with the elementary numeracy skills of applicants and serving employees.¹⁹ In the 2012 CBI Education and Skills Survey, 55% of employers reported widespread weaknesses in numeracy skills. Two-thirds of their businesses are concerned about their employees’ ability to spot errors in data.
- 24. Quantitative skills are also a formal part of the abilities required of civil servants. The Policy Skills Framework, for instance, recommends that officials know how to

17. Advisory Committee on Mathematics Education (2011) *Mathematical Needs in the Workplace and in Higher Education*

18. Confederation of Business and Industry (2010) *Making It All Add Up; Business Priorities for Numeracy and Maths*

19. UK Commission for Employment and Skills (2010) *Skills for Jobs: Today and Tomorrow, volume 2: The Evidence Report*

use a sound evidence base, including the ability to ‘interpret a range of quantitative and qualitative evidence accurately’.²⁰ Senior civil servants consulted for this position statement stressed the need for those entering the public sector to have a good understanding of quantitative evidence. There is a need for specialist technical quantitative skills in bodies such as the Office for National Statistics, Government Economic Service or Government Social Research Service. These bodies also need their colleagues in the rest of the public sector – and indeed citizens in wider society – to have the skills to understand and critically engage with their data.

SKILLS FOR A MODERN PARTICIPATING CITIZENRY

‘Statistics are the bedrock of democracy, in a country where we care about what is happening. We must measure what matters – the key elements of national well-being. We want to develop measures based on what people tell us matters most’ – Jil Matheson, National Statistician, November 2010

25. Without statistical understanding citizens, voters and consumers cannot play a full part. To call politicians, media and business to account, we need the skills to know when spurious arguments are being advanced. The Royal Statistical Society’s *getstats* statistical literacy campaign captures the importance of data literacy to everyday lives:

‘At every turn we make decisions to which risk, probability and sampling are relevant. Choosing what to buy or planning a journey; deciding on medical treatment and listening to the advice of a doctor; calculating earnings and benefits and how to save and invest: these are statistically rich decisions. We need numerical data to understand the performance of schools and hospitals, but also to understand why league tables can be distorting and unfair.’²¹

OPPORTUNITIES AND EFFORTS TO MEET THE CHALLENGE

26. A range of initiatives are underway. Public and charitable funders of social science and mathematics are seeking to fill the skills gap.

SUBSTANTIAL FUNDING AT KEY POINTS IN THE SKILLS PIPELINE

27. The British Academy welcomes the new £15.5 million funding programme funded by the Nuffield Foundation, the Economic and Social Research Council (ESRC) and the Higher Education Funding Council for England (HEFCE). It is aiming at a step-change in quantitative methods training for UK social science undergraduates. This five-year

20. UK Civil Service (2011) *Policy Skill Framework*

21. ‘*getstats*’, Royal Statistical Society 2012

programme will fund the creation of a network of up to 15 specialist Quantitative Methods Centres to embed quantitative skills in social science undergraduate curricula, to train a cohort of quantitative-skilled undergraduates in a range of social science disciplines, and to help bring about a strategic shift that emphasises the importance of quantitative skills in these disciplines.

28. The Academy also welcomes the ESRC's longstanding commitment to enhance quantitative skills across the full breadth of the 'educational life course': from building new capacity at the undergraduate level to refreshing the quantitative skills of mid-career academics teaching undergraduates and supervising PhD students ('training the trainers'). The ESRC is backing this strategy with significant resources. For example, together with the British Academy and HEFCE, it has commissioned 20 projects – totalling £1.7m – promoting improved undergraduate teaching and training. It will also double the number of PhD studentships using quantitative methods.
29. The Scottish Funding council and Higher Education Funding Council for Wales are partners in the ESRC-led four-year national strategy in quantitative methods.²² The funding councils also have an array of investments to improve quantitative skills in Scotland and Wales, and have conducted scoping studies with the ESRC on the health of quantitative methods in those geographical areas.

PARTNERSHIPS WITH LEARNED SOCIETIES AND SUBJECT ASSOCIATIONS

30. Given the increasing relevance of quantitative skills to individual disciplines, a key route to success will be in working with subject bodies to reform the research and teaching landscape. Subject associations have done significant amounts of their own work to promote quantitative skills. For example, the Royal Statistical Society has been active in promoting statistical literacy in schools, universities, government, media, business and the wider public. The Royal Geographical Society (with the Institute of British Geographers) is also collaborating with the British Academy, piloting new work in quantitative geography with schools and postgraduates.
31. Social science learned societies and subject associations are already engaging with the Quality Assurance Agency (QAA) to ensure that future subject benchmarks give clear and robust requirements for quantitative skills. In partnership with them, the Academy and others are seeking to create expectations of core quantitative skills that can be generalised across different discipline benchmarks, whilst also giving due recognition of unique subject-specific approaches to, and problems regarding, quantification.

22. Economic and Social Research Council, Higher Education Funding Council for England, Higher Education Funding Council for Wales (2010) *National Strategy for Building a World Class Social Science Research Base in Quantitative Methods*

A JOINT APPROACH

32. In 2011, the British Academy launched its own programme in support of quantitative skills in the humanities and social sciences, with funding from the Department for Business, Innovation and Skills.²³ Through this programme, the Academy itself has committed to funding, policy and other initiatives. Working with key stakeholders, the Academy seeks both to build capacity and to demonstrate the value of quantitative skills for the health and wellbeing of the education and research base, UK competitiveness, and for individuals and society at large. In addition to partnerships with learned societies and other stakeholders, the Academy has commissioned teaching resources; launched a pilot scheme allowing early career researchers to spend time with a mentor at a specialist quantitative methods centre; and is scoping national recognition of quantitative skills at the undergraduate level.
33. Post-16 mathematics in England may now be changing. ACME has been asked by the Secretary of State for Education to advise on ensuring most pupils study mathematics through to the age of 18. The British Academy and other learned societies in the social sciences and humanities have been working with ACME to find the best approach to increase this proportion. In Scotland a higher proportion of students study mathematics post-16 and taking Higher level qualifications in mathematics, but the same challenges are evident throughout the UK.
34. Committed to a joint approach, the British Academy has recently established a High Level Strategy Group for Quantitative Skills, chaired by Professor Ian Diamond FBA, drawing together senior representatives from key stakeholders including: the Nuffield Foundation, ESRC, Universities UK, the Funding Councils, Office for National Statistics, UK Statistics Authority, Department for Business Innovation and Skills, ACME, Royal Statistical Society, Higher Education Academy and the Russell Group. The aim of the Group is to undertake a joint approach to improving the UK's quantitative capacity, advising on both the long and short term needs for within and beyond the higher education sector.

CONCLUSION: BUILDING ON MOMENTUM

35. The time is now. We must seek to change behaviour to ensure that the UK retains its place as a leader in research and higher education, and that our graduates are equipped with the skills necessary for competitiveness, professional development and employability. A system of funding for higher education that is determined more heavily by student choice means that signalling from all sectors is vital. Now more than ever, persuasive messages must go out from both universities and employers about the value of quantitative skills to prospective students, teachers, parents, and

23. For further information please visit the British Academy's website.

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- school leaders. University admissions tutors must put out the message that the social sciences and humanities value post-16 mathematical and statistical qualifications.²⁴
36. Change will not happen over night, and we are developing a strategy for action and trying to avoid fragmented policy and practice. It is heartening that main funding and leadership bodies in the social sciences have prioritised quantitative skills – but all key partners must continue to work together on developing and delivering a national strategy.
 37. This national strategy will require initiatives targeted across the educational life course and beyond, from the school level, to university, and wider public data literacy. The humanities and social sciences in universities will need to engage with the science and maths communities and with other sectors, such as employers and schools. They will need to learn from best practice nationally and internationally; and ensure that schools and employers are clear about both the value of quantitative skills, and of their place in humanities and social science university degree programmes. This agenda for reform is a formidable challenge, but one that British universities must take up if they are to maintain their leading global position.

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24. The Russell Group of Universities, for example, published a statement about preferred A level subjects, among which mathematics is prominent: *Informed Choices* (2011)

The **British Academy** would like to thank:
the Nuffield Foundation, ESRC, *getstats*, British Psychological Society,
British Sociological Association, Political Studies Association,
Royal Geographical Society (with IBG), Royal Historical Society, Royal
Statistical Society, Socio-Legal Studies Association, Social Policy Association.



BRITISH ACADEMY

In 2011 the **British Academy** launched a four year programme to support Languages and Quantitative Skills (L&QS) in the humanities and social sciences. Through this programme, the Academy has committed to a range of research support, partnerships and other interventions. The programme is seeking both to build capacity and to demonstrate the value of quantitative skills for the health and wellbeing of the education and research base, UK competitiveness, and for individuals and society at large. The British Academy, established by Royal Charter in 1902, champions and supports the humanities and social sciences. It aims to inspire, recognise and support excellence and high achievement across the UK and internationally. The British Academy is a Fellowship of over 900 UK scholars and social scientists elected for their distinction in research. Views expressed here are not necessarily shared by each individual Fellow.



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