ROYAL STATISTICAL SOCIETY

DATA | EVIDENCE | DECISIONS

Response to British Academy call for evidence on Skills in the Arts, Humanities and Social Sciences

The Royal Statistical Society (RSS) is a learned society and professional body for all statisticians and data analysts, with more than 8,000 members in the UK and across the world. As indicated in our strategic goals[1], our statistical literacy initiatives, and our *Data manifesto*, the RSS supports education for society to become more statistically literate, and would like to see increasing participation in mathematics and statistics education that is appropriate to people's present and future choices. Education for statistical literacy needs to develop in the social sciences and humanities, as well as in the other scientific, creative and technical subjects that people study. Our manifesto note on education and skills for the data economy provides our views on education at greater length, which we paraphrase here.

What do we mean by skills?
Statistical literacy – being able to interpret, evaluate, and communicate data – is a necessary skill that everyone should have the opportunity to develop. In an increasingly data-rich world, everyone needs to be able to understand, analyse and critique data in their lives: as learners, as employees and as citizens. So, rather than just providing abstract numbers, statistics teaching should relate to real situations in which students should have an interest. This can help to resolve number-phobia by making numbers part of everyday problem solving.

To help address statistical literacy, we advocate statistical enquiry as a way of understanding the world that is transferable across a range of subjects and situations. In the statistical enquiry cycle, students learn to state a problem and to plan their own statistical or analytical approach. They then collect their data, or source existing appropriate datasets. They process, analyse and present their data, and then they interpret and communicate their findings to address the stated problem.

For those people expected to participate in the British Academy's 'Flagship Skills' project, which "aims to deal with high-level skills … including in the early stages of a career in research", statistical enquiry should already be a familiar process, and higher level research skills should also develop which draw on (for example) domain knowledge and on deeper understanding of methods.

What skills should the arts, humanities and social sciences develop?
We are pleased that many fields of social science and also the growing field of 'digital humanities' place growing importance on scientific skills and what we term 'data skills'. This has been very well recognised in the British Academy's programme on quantitative skills and 'Count Us In' and 'State of the Nation' reports.[2]

From our responses to previous policy consultations we would particularly emphasise the following three points:

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[1] Royal Statistical Society Strategic Plan 2014-2018 [PDF], available from: http://www.rss.org.uk/Images/PDF/about/strategy-summary_flr.pdf

[2] Reports available from British Academy (2016) 'Count us in and State of the Nation' [webpage], http://www.britac.ac.uk/node/3424/

1. Before students reach degree level education or training, educators in school need to be able to address students' problems with numeracy, and link their learning of statistical and data skills to subject contexts. Exemplifying the need for this, 'mathematical skills' requirements have been specified by the Department for Education for science and social science A levels in England, however, the RSS and the Advisory Committee on Mathematics Education concluded in 2015 that 'while [sample exam] questions require statistical awareness, they will not help learners to develop competence and confidence in applying statistical methods or interpreting results'[3] To embed statistics and data skills, teachers need to also have sufficient guidance on statistical and mathematical elements of their subject, and continuing professional development (CPD).

2. In higher and further education and training, and in industrial and university research settings, concerted efforts are needed to address the statistical basis for research findings. This is needed to support the integrity of research as well as to develop students' skills. Where post-doctoral training and fellowship money is lacking, this is a serious concern for bringing on the next generation of trained researchers. Meanwhile, concentration of funding in fewer, larger departments has helped develop statistical specialisation in those hubs that are gifted with investment, but threatens the quality of research as a whole in universities where statistical groups have been relegated to a service role, or disbanded altogether. The research system needs more skilled statistical instructors who work across disciplines, and must ensure that they do not fall 'in between' the criteria for funding.

3. Social statisticians have played a major part in the development of methods now considered mainstream and which are widely used across the social sciences and beyond, such as multilevel modelling, structural equation modelling and survey sampling. This points to the fact that, although there have been great efforts to raise the quantitative skills of social scientists – such as, for example, the 'Q-Step' programme across 18 UK universities – we also need to engage statisticians with social science problems. Recruitment of statisticians into social statistics has been relatively small and diminishing, and there is a need to grow the pool of researchers in the social sciences who have skills based on deep mathematical understanding.

What skills do employers want?
The UK presently faces a major gap in skills for the data economy. We need investment in education and training to support industry growth, to widen participation in data-driven industries, and to develop good practice across all data-literate professions. For our future use and understanding of data, it will be essential that more new entrants to the job market understand how to work with large complex data sets and analyse them using technology.

Requirements for new skills in industry are closely allied to the growth of digital technology, data, and data science. There a regional challenge to uneven growth, whereby some places and

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[3] RSS & ACME (2015) *Embedding Statistics at A level: a report on statistical requirements and assessment across A level courses in Biology, Business, Chemistry, Geography, Psychology and Sociology* (PDF). Available from: http://www.rss.org.uk/Images/PDF/publications/embedding-statistics-at-a-level.pdf

educators may find it easier than others to support data skills. The rate at which young people decide to continue into higher and further education varies considerably across different regions of the UK[4]. Jobs and links with employers will also be unevenly distributed: analysis by the think tank Nesta finds that although most regions of the UK have seen expansion in their high tech employment, these jobs are most numerous and form the greatest share of the economy in the South East, London, the East, North West, and Scotland, where they accounted for between 10.6 and 12.8 per cent of all jobs[5].

What skills are needed for the future?
We need to broaden young people's access to education and training in the mathematical sciences, statistics, data science and experimental science, and their awareness of technology and its applications. Students in the social sciences need to have sufficient opportunity to practice statistical enquiry using real data that they have collected or sourced, and to access expertise. Teachers across disciplines also need support to ensure they are confident and competent to pick up on, and address, problems with numeracy, statistical literacy and data skills. Furthermore, as data analytics is increasingly adopted in the humanities and social sciences, consideration needs to be given to the skills that are required in a wide range of employment settings, as exemplified by the current and foreseen data analytics skills needs in STEM[6].

To address emerging issues to do with the public communication of science and statistics, including rapid spread of viral headlines and occasionally 'fake' news through social media, we have also pointed to the need for strong collaboration to support critical thinking skills[7]. The arts, humanities and social sciences make a large and important contribution to the development of this field, and to the quality of public debate.

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[4] HEFCE (2015) 'Young participation in higher education: A-levels and similar qualifications' (webpage). Available at: http://www.hefce.ac.uk/pubs/year/2015/201503/

[5] Bakhshi, H. Davies, J. Freeman, A & Higgs, P (2015) *The geography of the UK's creative and high-tech economies* [PDF], London: Nesta. Available from: https://www.nesta.org.uk/sites/default/files/geography_uks_creative_high-tech_economieswv20151.pdf

[6] The Royal Society & RSS (2016) *Data analytics: the skills need in STEM* [PDF], available from: https://royalsociety.org/~/media/events/2016/11/data-science-workshop/data-analytics-conference-report-16112016.pdf

[7] Royal Statistical Society evidence to the Culture Media and Sport Select Committee 'Fake news' Inquiry, publication pending.