Introduction

1. The British Academy welcomes the opportunity to respond to this inquiry. The Academy has undertaken extensive work to address the deficit in quantitative skills (QS) in the UK, through its Quantitative Skills Programme (QS), a 5-year programme funded by the Department for Business, Innovation and Skills (BIS). The programme was guided by the British Academy’s High Level Strategy Group for Quantitative Skills, chaired by Professor Sir Ian Diamond FBA.

2. The response makes the following key points:
   - Quantitative skills (QS) are vital for all citizens, enabling them to participate more fully in the democratic process, enhancing research in universities and in the work place, and supporting the economy.
   - Social sciences, and even the humanities, provide a rich context for the development of ‘STEM skills’, in particular QS, in addition to mathematics and science.
   - There needs to be a range of alternative routes for the study of QS post-16, including in further education.
   - The inclusion of QS in social science curricula throughout the education pipeline could help to deliver ‘STEM skills’ to underrepresented groups including females and students from disadvantaged or ethnic minority backgrounds.
   - The recruitment, retention and professional development of data-literate teachers across the sciences, social sciences and humanities are important.
   - The Q-Step Programme should be rolled out nationally.

3. This response draws on the Academy’s Count Us In report which offers a vision of how the UK can rise to the potentially transformational challenge of becoming a data-literate nation.1 The findings and recommendations in Count us in are supported by evidence outlined in State of the Nation: A review of evidence on the supply and demand of quantitative skills.2 Measuring Up: International case studies on the teaching of quantitative methods in the social sciences provides examples of best practice and innovation in the teaching of qualitative methods and statistics to undergraduate social science students in 16 universities around the world.3

What is the STEM skills gap that needed to be addressed?

4. The British Academy is the UK’s national body for the humanities and social sciences. The Academy believes that STEM skills are not only developed in traditional STEM disciplines, and that quantitative skills (QS) are vital for all citizens, enabling them to participate more fully in the democratic process, enhancing research in universities and in the work place, and supporting the economy.4 Moreover, a number of subjects, including geography and economics, provide a rich context for the development of quantitative skills throughout the education journey – and not just subjects which are formally labelled as mathematics or science, which can wrongly be seen as the only place to teach statistical and numerical understanding.

---

4 Ref: Count Us In and State of the Nation

The Academy defines QS as the ability to reason using numbers. This includes an understanding and appreciation of probability, error and inference; confidence in the manipulation of numbers; an understanding of the possibilities and limits of measurement; and understanding the role of evidence in testing and modifying our understanding of social processes.
5. Research commissioned by the Academy found that undergraduate social science students in many universities in Europe, North America and Australasia reach much higher levels of achievement in quantitative skills than even their best UK counterparts. This is due to more curriculum time devoted to the study of methods, greater focus on the collection, evaluation and analysis of empirical evidence and university teaching staff with more advanced quantitative skills, including post docs and postgraduates.  

6. The demand for quantitative skills in the UK workforce will continue to grow, with changes in the nature of work as a result of increasing competitive pressures, the development of technology and growing availability and use of data. It is not just in professions where a high level of QS is intrinsic to the nature of the role, such as economists and accountants where such skills are vital; there are many jobs where data literacy is an essential element, including nurses needing to calculate medical doses and civil servants responsible for reviewing evidence on the effects of government policies.

7. Moreover, growing numbers of firms are now committed to data-driven decision-making, using the increased availability of ‘big data’. Such firms have need of employees with hybrid skills sets, combining quantitative, computing and analytical skills with business understanding and the ability to communicate. The development of QS within a range of disciplines beyond traditional STEM subjects offers a valuable opportunity to respond to this need.

How was this need addressed?

British Academy initiatives

8. The Academy’s QS Programme (2011 – 2016) sought to address the deficit in QS in the UK through a number of initiatives including advocacy, capacity building and fostering high-level debate.

9. The Programme sought to raise awareness of the deficit and highlight the importance of QS for society, the economy and the individual through the following publications:

- **Society Counts**: a position statement on the importance of QS, published in 2012.
- **State of the Nation: A review of evidence on the supply and demand of quantitative skills**: a comprehensive evidence review on current levels of demand for quantitative skills (QS) in the UK and the extent to which this demand is matched by supply, published in 2015.
- **Count Us In**: a policy report offering a vision of how the UK can rise to the potentially transformational challenge of becoming a data-literate nation, published in 2015.
- **Measuring Up: International case studies on the teaching of quantitative methods in the social sciences**: examples of best practice and innovation in the teaching of qualitative methods and statistics to undergraduate social science students in 16 universities around the world, published in 2016.
- **Stand Out and Be Counted**: a guide aimed at students in the social sciences and humanities, challenging many of the myths that surround quantitative skills and illustrating the concrete steps that can be taken to become adept at handling numbers and statistics, published in 2013.

10. To address the deficit in QS skills amongst social science researchers, the Academy provided the following grants:

- 1 Postdoctoral Fellowship;
- 19 Small Research Grants;
- 44 Skills Acquisition Awards: enabling early career researchers to develop and enhance their quantitative skills by spending time with a mentor at a specialist centre. Up to £10,000 was available for a period of up to 12 months.

---

5 Measuring Up, [http://www.britac.ac.uk/node/4188](http://www.britac.ac.uk/node/4188)
• 9 Skills Innovator Awards: extending the Academy’s support to promote innovative research methods using quantitative skills, be that through skills development, acquisition, collaboration or dissemination. Up to £15,000 was available for a period of up to 12 months.

11. The British Academy has also commissioned a research team, led by the University of Manchester and including researchers from Loughborough University and the University of Edinburgh, to provide an up-to-date systematic review of research into the issue of mathematics anxiety, analyse its implications for policy and practice, and identify potential interventions and gaps in our knowledge.

12. In addition the Academy undertook the following two capacity building partnerships:

• University of Essex Summer School: Undergraduate Summer School Scholarships: Over three years, the QS Programme provided funding for scholarships to the University of Essex Summer School for over 200 students with the aim of enhancing the data skills capability of undergraduates in the social sciences.

• ESRC-HEFCE-BA Collaboration: Undergraduate Quantitative Methods Initiative, Curriculum Innovation and Researcher Development Initiative: along with ESRC and HEFCE, supported the Researcher Development Initiative (RDI), a project aimed at training quantitative methods to undergraduate teachers.

13. Through the Programme, the Academy continues to convene a High Level Strategy Group for Quantitative Skills (HLSG) which brings together people and organisations committed to spreading and deepening data skills in the social sciences. The Group’s activities include high-level knowledge exchange; maintaining a strategic overview of data and quantitative capacity in UK institutions; advising on short and long-term priorities for data skills in higher education. The Group is chaired by Professor Sir Ian Diamond FBA and includes Fellows of the Academy, the Academy of Social Sciences, the Nuffield Foundation, Nesta, the Royal Statistical Society, the Royal Society, the Economic and Social Research Council, the Higher Education Funding Council for England, the Department for Education, the National Statistician and the Department for Business, Energy and Industrial Strategy.

**Q-Step**

14. The Q-Step Programme, where quantitative skills are developed as part of social science higher education programmes, is now in its fourth year of operation. It is funded by the Economic and Social Research Council (ESRC), the Nuffield Foundation and the Higher Education Funding Council for England. 6 15 Q-Step centres have been established at universities across the UK, along with three further affiliates. The Q-Step approach is to fully integrate QS training within module or degree programmes in subjects including education, geography, law, linguistics, political science and sociology. The integrated (as opposed to ‘bolt-on’) approach, which allows contextualisation of quantitative skills, together with a substantial increase in curriculum time devoted to these skills, has been critical to its success, in engaging students and enabling them to understand the relevance of the skills they have developed.

15. The mid-term review of the Q-Step Programme found that it has made good headway in achieving its objectives, as well as identifying further possible approaches. The Programme is currently funded until 2018-19, with further evaluation planned in 2017. The universities involved have committed to maintaining the staff posts created to enable delivery of the programme approach for five years beyond that point.

16. At university level, the Academy recommends that the Q-Step programme be rolled out nationally, building on the success of the first three years of this six-year experimental programme, to ensure that all social scientists have a firm grounding in quantitative skills. The

---

6 [http://www.nuffieldfoundation.org/q-step](http://www.nuffieldfoundation.org/q-step)
Academy has also held initial discussions about a comparable approach to improving QS in humanities disciplines, and would be happy to discuss this further with the Committee.

17. Encouraging the development of QS through the social sciences (as in the Q-Step approach) and humanities also offers the potential to deliver ‘STEM skills’ to student groups which traditional STEM subjects fail to attract. Students in the social sciences and humanities are predominantly female.7 The Q-Step Programme at Manchester Metropolitan University is an example of how strong quantitative skills can be gained by students from disadvantaged or ethnic minority backgrounds, without a strong track record in mathematics.

Pathways for quantitative skills

18. A contributing factor to the lack of QS among UK undergraduates in humanities and social sciences is the low take up of maths beyond the age of 16. Ideally, quantitative skills should be compulsory for all up to 18, with courses designed to develop the ability to apply mathematical knowledge in appropriate ways to particular situations, not just basic arithmetic skills. The Academy looks forward to the findings of Professor Sir Adrian Smith’s Review of Post-16 Mathematics Provision in England, which is due to report very shortly, and hopes that the recommendations it makes support a move in this direction.

19. To enable more students to continue to study QS post-16, there is a need to continue to develop and promote alternative routes – in addition to A-levels in England, Wales and Northern Ireland and Scottish Highers and Advanced Highers in Scotland, including by the inclusion of quantitative content in subjects beyond traditional STEM disciplines. Qualification development should not be seen as a zero-sum game, where expanding one route leads to the contraction of another, but as a means of adding to the total numbers of young people learning quantitative skills.

20. New Core Maths qualifications, designed to appeal to students who have gained a C grade or better at GCSE but do not currently take A-level mathematics, are a welcome first step in addressing the issue of premature specialism. The focus in the curriculum on applying maths and on data is particularly welcome. However, there is a danger that schools/colleges facing teacher shortages, funding issues, or too focused on GCSE performance league tables will be disincentivised. University admissions policies will also be crucial in incentivizing take-up.

21. Further education colleges must not be neglected. Many young people moving on to a wide range of careers in which a facility with numbers will be important – from nurses needing to calculate medical dosages to laboratory technicians preparing solutions – spend their first years post-16 in the college sector. It is therefore important that QS is built into curricula across the range of courses offered at FE colleges, including vocational courses.

22. Firmer links could be built between school and college education and the workplace through continued support for the apprenticeship route, further and continuing training and other schemes that allow people in work to up-skill. The apprenticeship route combines employment-based training with part-time attendance in vocational education classes or workshops related to the field of training. It is, therefore, in principle well suited to developing quantitative skills which can be applied in workplace settings.

Building capacity and professional support for teachers of quantitative skills

23. The supply of suitably qualified and trained teachers is critical to the successful delivery of QS in all these routes. This goes beyond the need for specialist teachers in mathematics. Teachers of the sciences, social sciences and the humanities also need to incorporate numerical evidence and data into their teaching. Therefore, the recruitment, retention and professional development of data-

literate teachers are important. This will require a strategic approach to considering the teaching workforce, at primary, secondary and college level.

24. Policymakers, including government, will need to focus on recruitment and retention numbers and also on the quality of teachers’ skills. Quantitative skills education in both teachers’ initial training and in their ongoing professional development will need to be improved.

25. Universities could, using the experience of Q-Step where relevant, help with maths based CPD across the school curriculum. This might be through the development of teaching and learning materials (for pupils and for teachers), provision of CPD sessions, and knowledge transfer around the advantages and pitfalls on-line learning. These are all areas where Q-Step has built up a pool of knowledge about how best to deliver these skills from a narrow teaching skills base.

Conclusion

26. The UK needs to move to a situation where it is normal for science, social science and humanities students to have developed significant quantitative skills in school, and for this to be thought of dynamically, so that as provision improves at secondary level, universities can then strengthen their entry requirements.

27. The British Academy believes that in addition to STEM subjects, humanities and social sciences provide an excellent context for the development of data and numeracy skills. This could be achieved through the establishment of a range of alternative routes for the study of QS post-16, including in further education. Through its QS programme, the British Academy developed innovative strategies and made a list of recommendations on key measures to implement to strengthen and widen the teaching and learning of STEM skills in the UK Education system. This included research funding, the establishment of capacity-building partnerships and policy reports offering a vision of how the UK could rise to the potentially transformational challenge of becoming a data-literate nation.

28. Moreover the British Academy has shown its support for the full roll-out of the Q-Step Programme at University Level and will look into similar approaches to improve QS in the Humanities disciplines and subsequently develop new measures to target student groups which traditional STEM subjects fail to attract.

January 2017