Skills in Mathematics and Statistics in Sociology and tackling transition

Julie Scott Jones and John Goldring
## Contents

1. Foreword
2. Summarised findings and recommendations
   1. Introduction
   2. Findings and recommendations
      1. Notable findings
      2. Recommendations
3. Background
4. Research objectives and methodology
   1. Research objectives
   2. Methodology
5. Main findings
   1. How quantitative is UK Sociology?
      1. The use of numbers in Sociology
      2. Discipline guidance on quantitative methods
      3. What are student perceptions of Sociology, pre and post entry to university?
   2. How well does the secondary sector understand the higher education requirements in quantitative methods within Sociology?
   3. What are the issues that students face in relation to quantitative methods within the transition from school to university?
   4. What are the specific support needs for students in relation to undergraduate quantitative methods?
      1. A life course approach
      2. More time and more quantitative methods
      3. Curriculum innovation
      4. Testing and feedback
      5. Laboratory support
      6. Pedagogically informed practice
      7. Challenging stereotypes
      8. Incentivising quantitative methods for students
   5. Who teaches quantitative methods within university Sociology and what are their support needs?
      1. A demographic shift
      2. Quantitative methods teachers
      3. Resource intensive teaching
      4. Teacher attitudes and perceptions
      5. Delivery and innovation
      6. Supporting quantitative methods staff
6. Conclusion
7. References
8. Acknowledgements
9. About the authors
Foreword

This report is one of a series commissioned by the Higher Education Academy STEM team to look at mathematical and statistical skills in a range of discipline areas. This report seeks to contribute to existing knowledge about this area within the context of Sociology.

At the start of the study a list of areas for consideration was provided by the Higher Education Academy. These encompassed the way in which mathematical and statistical skills form part of the discipline landscape, the signalling higher education provides about the need for these skills, sector requirements within the discipline (e.g. from accreditors and Quality Assurance Agency subject benchmark statements), the use of diagnostic testing and the support provided for students to improve and develop their mathematical and statistical skills. The methods used in the study in Sociology consisted of (i) a literature review; (ii) survey work; and (iii) two discussion events.

The mathematical requirements of a Sociology degree are often assumed to be low while the actual demands for skills in quantitative methodology and statistical work can be substantial and challenging. This disparity provides particular challenges in Sociology and specifically for staff who wish to more effectively teach quantitative methodologies. Despite the development of pedagogic strategies for empowering staff, research on this topic has been patchy. The present study aims to address this issue and to provide a sound evidence base to inform future discussion, policy developments and teaching practice in the discipline.

Dr Janet De Wilde
Head of STEM, The Higher Education Academy

Dr Mary McAlinden
Project Lead, The Higher Education Academy

Dr Helen Jones
Discipline Lead for Sociology and Criminology, The Higher Education Academy
I Summarised findings and recommendations

Introduction

Sociology is a key social science; 7,000 students graduate in this discipline from 112 universities annually. Approximately 30,000 students study the subject at A-level. Sociology incorporates key mathematical skills within its teaching of quantitative methods1. This is not Mathematics in the strictest sense but involves the statistical analysis of primary and secondary data. The majority of Sociology degree programmes teach quantitative methods within compulsory research methods modules, where it must jostle for curriculum space with qualitative methods, which are deemed more accessible and “easier” by students and staff alike.

Quantitative methods at all levels of the discipline have become increasingly marginalised and “vulnerable” over the past twenty years: there is a decline in the number of quantitative methods-specialist staff; quantitative outputs are low; and the number of postgraduate quantitative researchers is low. Students show low levels of engagement in the subject for a range of reasons including: “Mathematics anxiety”; lack of support with Mathematics; lack of exposure to quantitative methods within non-research methods modules; lack of priority given to quantitative methods within curricula; lack of prominence of quantitative methods within the wider discipline; and poorly trained teachers. Staff, too, often face a number of obstacles to successful teaching of quantitative methods, including: poor training; lack of departmental support for quantitative methods; student disengagement; lack of suitably qualified staff; low staff confidence and motivation.

The problems facing quantitative methods within universities are well documented, but less attention has been given to the issues facing students as they transition from A-level or equivalent to university level Sociology, specifically in relation to quantitative methods. This then was the focus of the Higher Education Academy (HEA) Science, Technology, Engineering and Mathematics (STEM) project.

A literature review was undertaken at the start of the study, and three surveys were developed to follow on from this. One survey was aimed at staff teaching within Sociology and a second survey was directed at heads of department or those with responsibilities for organising teaching in Sociology (taken together these form the HEA STEM staff survey). The third survey was for students taking degree programmes within Sociology. All of the surveys were developed within the full HEA STEM project team to ensure that, as far as possible, a consistent approach was adopted to the work across the full spectrum of disciplines involved. The surveys were in circulation in the Spring and early Summer of 2013.

The last strand of the work was a set of HEA STEM Tackling Transition events for the various disciplines. In Sociology, two events were held. The first provided an opportunity for staff working in Sociology in higher education to meet and discuss the areas of interest with colleagues in the pre-university sector and other key stakeholders in the discipline, and the second was for A-level Sociology teachers. The discussions were recorded and collated with the other data obtained during the work.

---

1 QM is sometimes used as an abbreviation for quantitative methods.
Findings and recommendations

Notable findings †

1. The HEA STEM staff survey showed that most quantitative methods content is delivered via standalone research methods modules that may cover both quantitative and qualitative methods.

2. In the HEA STEM staff survey, the majority of respondents identified year two as the place where compulsory modules with a substantive amount of quantitative methods content are taught.

3. The HEA STEM Tackling Transition teachers’ event demonstrated that A-level teachers give low priority to quantitative methods for a number of reasons, including syllabus demands, personal skills and confidence, lack of technical support and resources, and other teaching demands.

4. At the time of writing, the A-level Sociology syllabus provides only a basic knowledge of quantitative methods and affords students no opportunity to conduct primary or secondary data analysis.

5. The Quality Assurance Agency (QAA) subject benchmark statement in Sociology does not specify the type and level of quantitative methods expected of a Sociology graduate.

6. Sociology does not have a professional skills accreditation system, as there is in other disciplines such as Psychology. There is no compulsion for departments to deliver quantitative methods to a nationally agreed, standard curriculum.

7. The base entrance requirement for Sociology degrees is a grade C in GCSE Mathematics (or equivalent), which has been identified as failing to provide students with confidence or competence in a range of mathematical skills.

8. In the HEA STEM student survey, over a third of students said that they struggled with quantitative methods. More than half of these students felt “anxious” when using Mathematics/Statistics and a slightly smaller proportion found working with numbers “challenging”.

9. In the HEA STEM staff surveys a high proportion of staff believed that for students who struggled with quantitative methods “Mathematics and Statistics anxiety” and “lack of confidence” were factors that inhibited their development.

10. In the HEA STEM staff survey, none of the institutions offered diagnostic testing of Mathematics/Statistics skills on entry for Sociology students.

11. In the HEA STEM staff survey, the majority of forms of mathematical/statistical support offered to students were optional. For example, 70% of staff identified “departmental drop-ins” as the most common form of support.

12. The HEA STEM staff survey found that the more challenging quantitative methods tended not to be practised or assessed as much as the simpler methods. For example, about one third of respondents stated that multivariate analysis and regression were not covered at all and if they were, they were rarely assessed.

† The participants in the HEA STEM surveys and events were self-selecting and in some cases the sample sizes were small. Detailed information on sample sizes and the response rates for specific questions is given in Section 4.
Recommendations

1. The QAA subject benchmark statement in Sociology should be reviewed at the earliest opportunity to include information specifying the type and level of quantitative methods that should be present in degree programmes in Sociology.

2. Key stakeholders in the Sociology discipline should consider the development and adoption of an accreditation scheme for quantitative methods within Sociology degree programmes to provide an incentive for the inclusion of specific quantitative methods content within university Sociology curricula.

3. Staff with responsibility for managing degree programmes in Sociology should consider incorporating diagnostic testing of students’ skills in Mathematics/Statistics at the start of Sociology degrees, and using the results to inform feedback and other follow-up actions.

4. Key stakeholders in Sociology should provide better signalling to the pre-university sector about the value of quantitative methods in Sociology degree programmes. Staff with responsibility for Sociology degree programmes should provide clear information about the quantitative methods content in their degree programmes.

5. Key stakeholders in the Sociology discipline should engage with developments related to post-16 qualifications in (i) Sociology (with particular reference to quantitative methods components) and (ii) Mathematics (e.g. “Core Maths”).
2 Background

Sociology is a key social science; 112 universities in the UK offer single honours degrees in Sociology, producing around 7,000 graduates annually (British Sociological Association, 2013a). Approximately 30,000 students study the subject at A-level every year (British Sociological Association, 2013a). Sociology emerged in the early 19th century as one of the so-called “social sciences”, which sought to understand society via the analysis of empirical data (Ritzer, 2007). Sociology’s approach to data collection was traditionally divided between qualitative and quantitative approaches; the former privileging meanings, beliefs and understandings, the latter identifying trends and patterns. Qualitative Sociology tends to utilise unstructured interviewing and participant observation as key forms of data collection, whereas quantitative Sociology tends to collect data via large-scale surveys and secondary data analysis of pre-existing datasets (Ritzer, 2007). Research methods in Sociology are influenced by wider discipline trends; thus, the use of quantitative methods was the central approach in UK Sociology until the 1960s, when qualitative approaches began to become popular and remain so today. The fact that the UK has one of the best-funded and supported social science data infrastructures in the world reflects the early prominence of quantitative methods in UK social science. However due to a shortage of researchers skilled in quantitative methods these datasets are underused (British Academy, 2012).

Sociology, at university level, incorporates key mathematical skills within its quantitative methods curricula. This is not Mathematics in the strictest sense (although students often refer to it informally as “maths”) but involves statistical analysis. The past decade has seen a series of reviews that highlight the increasing deficit in quantitative methods skills within UK Sociology including: Rendall (2003), Williams et al. (2004), Higher Education Funding Council for England (2005), Lynch et al. (2007), McVie et al. (2008), and MacInnes (2010). Parker et al. (2008) highlighted that the UK is falling well behind in quantitative methods skills in comparison with international competitors. As the British Academy (2012) recently highlighted, the deficit in quantitative methods skills is an intellectual, economic and political problem.
3 Research objectives and methodology

Research objectives

This research is one part of a larger project that seeks to explore the key problems that students face in their transition from school to university level study; specifically in relation to mathematical and statistical skills across a number of disciplines. The disciplinary focus of this particular research is Sociology, which places most statistical work within quantitative research methods. The key objectives of this research were to explore the following issues.

• How quantitative are UK Sociology degree programmes?

• How are numbers used in Sociology: what differences are there in how quantitative methods are taught across undergraduate programmes in UK universities? How are quantitative methods skills developed within undergraduate Sociology programmes?

• What are student perceptions of Sociology, pre and post entry to university?

• How well does the secondary sector understand the requirements of quantitative methods within university level Sociology?

• What are the issues that face students in the transition from school to university, in relation to quantitative methods skills?

• What are the specific support needs for students in relation to undergraduate quantitative methods?

• Who teaches quantitative methods in Sociology, at university level, and what challenges do they face?

Methodology

The authors reviewed the existing literature on quantitative methods within Sociology; this review identified a range of key issues relating to quantitative methods within UK Sociology. A number of key social science databases were searched, including Sociological Abstracts, International Bibliography of the Social Sciences (IBSS), Applied Social Sciences Index and Abstracts (ASSIA), British Humanities Index, Web of Science, and PsycINFO. There were a number of key websites that were useful for document searches, including those of the Economic and Social Research Council (2014), Royal Statistical Society (2014), Nuffield Foundation (2014), and the British Academy (2014). Key search terms included “quantitative methods”, “teaching quantitative methods”, “maths/stats anxiety”, “teaching Statistics”, and “sociology and QM”. It became apparent that a small group of academics (e.g. Payne and Williams, 2011) is responsible for much of the key literature on the UK’s quantitative methods “problem”. Although this work is useful and highlights many of the key issues, it nevertheless promotes only a few perspectives on these issues. Much of the existing literature represents the historical need to chart the decline in quantitative methods and identify key issues.

The HEA STEM project team developed three questionnaire-based surveys. The questions used in the Sociology survey were tailored to the Sociology discipline in terms of language and likely quantitative methods content, and the surveys were delivered via email; two of the surveys targeted staff (taken together, the HEA STEM staff survey in Sociology), the other undergraduate students (the HEA STEM student survey in Sociology).
The staff survey elicited responses from two separate groups of staff, heads of department and the staff who lead quantitative methods modules. The staff survey had 35 responses (13 of whom were heads of department, 22 were lecturers) from 27 universities across the home nations; albeit that the majority (23) were in England. The response rate was low at about 24% of institutions, but there was a diversity of type of institutions. All 22 lecturers had current experience, or experience within the last five years of teaching quantitative methods on their degree programme, the heads of department were not asked about their teaching experience.

The student survey elicited only 166 responses, which is a very low response considering that over 20,000 students study Sociology in UK universities. The low response may in part be attributable to the survey being distributed during the summer term when most students are involved in examinations or have finished their studies for the year. Low student interest in the subject matter may also be a reason for the poor response. The small sample of students limits the utility of the data, particularly in respect of representativeness and generalisability.

Additionally, two informal HEA STEM Tackling Transition events were held; the first, in York in February 2013, was with a small group (20) of key stakeholders in relation to quantitative methods and Sociology, including representatives from the British Sociological Association, and the Economic and Social Research Council. The second event was at a British Sociological Association Teaching Sociology study group event in Nottingham in June 2013 and involved a small group (15) of A-level Sociology teachers. It was considered important to seek the views of A-level teachers with respect to quantitative methods within A-level Sociology as there is little available literature on this issue.
4 Main findings

How quantitative is UK Sociology?

Since the 1960s there has been a discipline shift within Sociology away from its quantitative roots, creating a sort of “culture war” within, which has been a privileging of social theory over empirical methods generally, and a promotion of qualitative over quantitative approaches. Blane (2003) contends that there is a widespread perception both within and outside of UK Sociology that it is qualitative and theoretical. Williams et al. (2008) labels this an “anti-positivist backlash”; a clear casualty has been the critical scrutiny of empirical data, with 44.1% of undergraduate sociologists claiming that they do not “trust” Statistics. Parker et al. (2008) noted an “anti-quant” culture in UK Sociology. One way to measure the extent to which UK Sociology is quantitative is to look at the work of sociologists themselves, via their published outputs. Payne et al. (2004) reviewed the quantitative methods element in articles published in the four main Sociology journals between 1999 and 2000. Only 14 articles were quantitative; the majority of empirical articles were qualitative. The type of quantitative methods approaches within these articles was basic, with most being univariate analysis, and only one article featuring multivariate analysis.

The International Benchmarking Review of Sociology (Economic and Social Research Council et al., 2010) compared articles in the 2008 British Journal of Sociology with the American Review of Sociology in relation to quantitative methods. It found that 66% of articles in the American Review of Sociology were quantitative, compared to 47% in the British Journal of Sociology. This statistic suggests that quantitative methods output in the UK has risen dramatically since Payne et al.’s (2004) research. However, of the 47% of quantitative methods articles in the British Journal of Sociology, only half of the first named authors were British. An assessment (in 2009) of end of term award reports for Economic and Social Research Council- funded Sociology projects found that only 21% were solely quantitative in approach (Economic and Social Research Council et al., 2010). Quantitative methods outputs are low and reflect the cultural shift within the discipline in the UK.

The use of numbers within Sociology

What differences are there in depth of treatment of quantitative methods across undergraduate programmes in UK universities? How are quantitative methods skills developed within undergraduate Sociology degrees?

Williams et al. (2004) and MacInnes (2010) surveyed Sociology departments in the UK and found that most quantitative methods content was taught in generic research methods modules. Data from the HEA STEM staff survey in Sociology echoed these findings, with 59% (16 of 27) of institutions offering one core research methods module that offered 50% or more quantitative methods within it; and 30% (8 of 27) offering two, 7% (2 of 27) offering three and 4% (1 of 27) offering four. Data from the HEA STEM staff survey also shows that the majority of programmes skew towards qualitative methods and only 37% (10 of 27) of respondents claim that their programmes are evenly balanced between qualitative and quantitative methods (Figure 1). Williams et al. (2004) found that 50% of their sample institutions claimed to be balanced, whereas 30% offered more qualitative. It should be noted that the low response to the HEA STEM staff survey means that the data may not be seen as truly representative of the state of quantitative methods in UK Sociology degree programmes, and care should be taken not to generalise too much from these data. That said, the data shows similar responses to the earlier Williams et al. (2004) survey.
MacInnes (2010) identified the problem of “crowded” research methods modules, where there is often little opportunity for the sustained development and progression for students’ quantitative methods skills. The International Benchmarking Review of Sociology (Economic and Social Research Council et al., 2010) also highlighted the small amount of quantitative methods within undergraduate Sociology and that few programmes formally assess students’ quantitative methods skills. Williams et al. (2008) found that descriptive statistics, univariate analysis, basic correlation and hypothesis testing dominated undergraduate quantitative methods curricula; systematic bivariate and multivariate analysis were not commonly found.

The findings from the HEA STEM staff survey highlighted this superficial approach to quantitative methods, with a similar over focus on descriptive statistics and univariate analysis. MacInnes (2010) found that there was too much emphasis on students having knowledge of a specific concept and yet were not offered, typically, the opportunity to practise or be assessed in that concept. In the HEA STEM staff survey, following MacInnes’ (2010) approach, a distinction was made between the teaching of key concepts and their practice and assessment; the survey showed that the more advanced the concept, the less likely it was to be assessed (see Figure 2).
The HEA STEM staff survey shows that 37% (13 of 35) of respondents state that regression and multivariate analysis are not covered, whereas simpler material, such as univariate analysis and descriptive statistics, are taught according to 89% (31 of 35) and 97% (34 of 35) of staff respectively. These data echo MacInnes (2010) and Williams et al. (2008); quantitative methods in the curriculum are basic and not suited to developing students’ appreciation of the complexity of statistical analysis.

**Discipline guidance on quantitative methods**

Undergraduate curricula in Sociology are based on the QAA subject benchmark statement for the discipline (Quality Assurance Agency, 2007). The benchmark statement identifies Sociology as an “evidence-based discipline” (p.1), which “employs a wide diversity of research strategies and methods” (p.1). The points are generic and place little onus on the development of specialist quantitative methods skills. The generic nature of the benchmark statement means that Sociology programmes have great freedom in what they wish to cover and in what depth. There is no compulsion for Sociology students to do specific statistical work, i.e., actually working with numbers. In contrast, the subject benchmark for Psychology (Quality Assurance Agency, 2010) explicitly states that Psychology programmes should cover “advanced statistical analyses”. It then goes on to list some of the techniques that should be covered. The International Benchmarking Review of Sociology (Economic and Social Research Council et al., 2010) highlighted the quantitative methods weakness in UK Sociology, in comparison with other nations who expect Sociology students to have specific quantitative methods skills on graduation. Psychology makes a useful comparison as it has maintained its popularity and its high quantitative methods component within the higher education marketplace. The key
factor for Psychology is the role of the British Psychological Society in accrediting degree programmes. This accreditation is attractive to students as it offers a career-entry set of skills. The comparison with Psychology is useful and it is not surprising that the Economic and Social Research Council’s strategic advisor on quantitative methods in undergraduate teaching has produced a scoping document (MacInnes, 2012) on the feasibility of a degree level qualification for quantitative methods skills within the social sciences, including Sociology. The study (MacInnes, 2012) suggests either a British Psychological Society accreditation route, or a standalone national qualification, and also offers a useful list of specific quantitative methods skills and competencies. At the time of writing, consultation on the scoping document with quantitative methods networks within the UK social sciences has just been completed.

What are student perceptions of Sociology, pre and post entry to university?

In order to appreciate how students view quantitative methods within the subject, it is necessary to identify how Sociology presents itself as a discipline to prospective students. The British Sociological Association, as the professional body for the discipline previously did not identify quantitative methods as a key element of the subject, on its website. This reticence to publicise quantitative methods as part of Sociology is echoed in publicity materials from universities across the UK, where the qualitative tradition is much more openly discussed. This echoes the discipline’s methodological fashions and prejudices (Ritzer, 2007, Williams et al., 2008). However, in a sense this could be misconstrued as poor marketing, given that the majority of Sociology degrees still incorporate some quantitative methods. More importantly, this reinforces a disciplinary divide and students’ own prejudices towards quantitative methods; Williams et al. (2004) found that the majority of Sociology students did not expect to do statistical analysis as part of their degrees. The HEA STEM student survey found different results, with 73% (121 out of 166) of students expecting to extend their knowledge of quantitative methods during their degrees. Perhaps this reflects a shift in student awareness, linked to the increasing emphasis within universities on career-readiness and employability skills that is increasingly seeing quantitative skills being showcased. This shift has afforded an opportunity for Sociology to acknowledge quantitative methods more freely (Murtonen et al., 2008). For example, the British Sociological Association’s (2013b) new Discovering Sociology brochure identifies “Statistics” as a key employability skill. Students themselves are increasingly aware of the worth of quantitative methods skills (MacInnes, 2010, 2012) but often do not identify quantitative methods-related jobs as “for them”. Quantitative methods remain a marginalised component of the standard curriculum of most Sociology degrees, which is reinforced in students’ perceptions via the dearth of standalone modules in quantitative methods; the low levels of quantitative methods skills required to pass standard research methods modules; and in the fact that so few students pursue quantitative methods at postgraduate level (Williams et al., 2008, MacInnes, 2010).

How well does the secondary sector understand the higher education requirements in quantitative methods within Sociology?

Data from the HEA STEM student survey in Sociology revealed that the majority of students knew there would be some quantitative methods content in their degree and 73% (121 out of 166 students) expected to extend their knowledge of quantitative methods during their degree. This data came from students across all undergraduate years, with the minority being first years (28%, 47 out of 166 students); it would be interesting to survey new entrant students to see if the data was different in relation to expectations.

Although A-level Sociology is not an entry requirement for university Sociology, a large number of Sociology undergraduates have studied the subject at A-level. A-level, therefore, is a key influence in student perceptions of Sociology and
quantitative methods; approximately 80% of students who study Sociology at A2 level pursue the subject at university (British Sociological Association, 2013b). However, there has been no research into the extent to which A-level Sociology prepares students for university level Sociology; there is a need for more data on this issue.

The A-level syllabus for Sociology was reviewed as a means to explore the position and portrayal of quantitative methods within it, the AQA syllabus (AQA, 2012) was chosen as this is the syllabus taken by 43% of all students studying GCE A2 Sociology and is therefore the most popular Sociology syllabus. A-level is taught over two years (AS and A2). Quantitative methods and qualitative methodologies are covered in both AS and A2: Unit two (AS level) and Unit four (A2 level) deals specifically with methodological issues taught in context (Table I).

### At AS level – Sociological methods cover the following:

- Quantitative and qualitative methods of research; their strengths and limitations; research design.
- Sources of data, including questionnaires, interviews, participant and non-participant observation, experiments, documents, and official statistics; the strengths and limitations of these sources.
- The distinction between primary and secondary data, and between quantitative and qualitative data.
- The relationship between positivism, interpretivism and sociological methods; the nature of ‘social facts’.
- The theoretical, practical and ethical considerations influencing choice of topic, choice of method(s) and the conduct of research.

### At A2 candidates should also study:

- The nature of sociological thought and methods of sociological enquiry in greater range and depth, and demonstrate more highly developed skills of application, analysis, interpretation and evaluation than at AS Level.
- The nature of science and the extent to which sociology can be regarded as scientific.
- The relationship between theory and methods.
- Debates about subjectivity, objectivity and value freedom.
- The relationship between sociology and social policy.

Table 1: The A-level syllabus for Sociology (AS and A2 Unit Specifications, AQA).

The curriculum covers a broad range of methodological material; however, there does not appear to be any opportunity to work with numbers directly, meaning that this is a conceptually driven endeavour. The current A-level Sociology syllabus has recently been under review (Department for Education, 2013) and the ‘new’ A-level will roll-out from 2015. In the new syllabus, quantitative skills are stressed as equally as important as qualitative ones; furthermore, there is an emphasis on students working with primary and secondary data. However, there is no specific
listing of what quantitative skills are required. The extent to which teachers have the resources and skills to support student primary research or statistical analysis needs to be examined (Porkess, 2013), something the HEA STEM Tackling Transition event participants highlighted.

The British Sociological Association’s Teaching Sociology study group has in recent years attempted to create a dialogue between the two sectors and this work needs to continue. The data from the HEA STEM Tackling Transition event with A-level teachers revealed that the focus in A-level is on teaching the pros and cons of a specific method, whether quantitative or qualitative; rather than in encouraging students to apply or practise the method.

The teachers lamented the removal of student fieldwork and cited a lack of resources (lab space, software, specialist training, timetable space) as an issue for any form of independent student research. Porkess (2013) reiterates some of these issues in his report on Statistics in A-level Sociology and the need for it to change. The way in which A-level is assessed means that teachers can focus on the topics that garner the highest marks. For example, a participant admitted that he did not teach his students significance as it was only worth two marks in the exam paper. Thus, there is the potential that teachers can cherry-pick specific topics and concepts that are worth more and easier for students to understand. This approach should not be a surprise given the pressure on teachers caused by the national exam league tables, but it does impact disproportionately on quantitative methods work.

The A-level syllabus does not allow students to develop or practise fieldwork skills in any methodological approach and the use of Statistics is basic descriptive statistics. The view at the Tackling Transition event was that students would develop and apply research skills (both qualitative and quantitative) at university and that there was not necessarily a need to do this at A-level. There is also the issue that many teachers of Sociology also teach other subjects and may not have a Sociology qualification themselves; thus, they may be deficient in quantitative methods skills and so shy away from the topic. There is a disconnect between A-level Sociology teachers and university sociologists; that needs to be bridged if there is to be a clearer understanding between the sectors.

What are the issues that students face in relation to quantitative methods within the transition from school to university!

Given that all A-level students are taught sociological methods in a similar way, which focuses on concepts rather than actual research, their lack of confidence with quantitative methods work at university may not be due to a lack of familiarity with basic quantitative methods concepts, but rather with an “anxiety” towards numbers (Ruggeri et al. 2008). Students’ prior experiences with numbers, predominantly within the context of school Mathematics, has been noted to be a key factor in perceptions and attitudes; many Sociology students report a poor experience of Mathematics at school (Williams et al., 2004, McVie et al., 2008).

The entry requirements of higher education institutions offering degrees in Sociology were reviewed via data from the Universities and Colleges Admissions Service (UCAS); in terms of Mathematics, the base entry requirement for Sociology degrees in the UK is a pass at grade C at GCSE (or equivalent). GCSE Mathematics has been widely acknowledged as not offering a strong grounding in the subject (Vorderman et al., 2011; Porkess, 2013). Therefore, the Mathematics training of Sociology students is basic and the majority stop all formal Mathematics at age 16. Most quantitative methods content is delivered at year two of undergraduate study, according to the HEA STEM staff survey, so the average Sociology student may have a three-year Mathematics “gap”. It should also be noted that the majority (approximately 70%) of Sociology students tend to be female and tend to have studied a suite of humanities-based A-levels;
thus the majority of Sociology undergraduates have stronger literacy skills and lower level numeracy skills; and possibly privilege the former over the latter (British Sociological Association, 2013a). Students therefore have an “anxiety” towards numbers, based on their school-based educational study trajectories (Onwuegbuzie and Wilson, 2003). In the HEA STEM student survey 37% (62 of 166) of respondents said that they struggled with quantitative methods. When asked what factors contribute to why this was the case, 55% (34 of 62) of respondents said that they became “anxious” when using Mathematics/Statistics and 42% (26 of 62) said that they found working with numbers “challenging”. This “anxiety” with numbers becomes a barrier to learning (Gibbs, 2010). McVie et al. (2008) found that more remedial work needed to be done with students to improve their entry skills. McVie’s report also highlighted the need for universities to have a dialogue with schools; something that was echoed at the HEA STEM Tackling Transition event.

The transition to university level study is under-researched, particularly in relation to quantitative methods, Williams et al. (2008) note that staff design Sociology curricula without paying much attention to the syllabi of A-level Sociology or GCSE Mathematics. Further, university staff presume a range of Mathematics skills that their students may or may not have (Mulhearn and Wylie, 2005). Mulhearn and Wylie (2005) demonstrated the utility in using diagnostic testing to influence teaching strategies and curriculum design. The HEA STEM staff survey revealed that none of the sample institutions offered diagnostic testing of students’ Mathematics/Statistics skills on entry, and when asked what factors staff consider as the cause of students struggling with quantitative methods, 94% (33 of 35) identified “maths anxiety” and 54% (19 of 35) identified lack of numeracy skills. The HEA STEM survey of staff revealed that drop-in services provided by the department (70%, 14 of 20 respondents) were the most common form of Mathematics/Statistics support, as shown in Figure 3.

Figure 3: HEA STEM Staff survey: mathematical/statistical skills support. What forms of additional support are made available to students needing extra assistance with their mathematical and/or statistical knowledge and/or skills? (20 respondents, note that more than one option could be selected)
One issue revealed in the survey data is how responsibility for obtaining additional support is optional and relies on the student proactively seeking out help, for example, the majority of forms of student support, identified by staff in the HEA STEM staff survey, were optional, i.e., “drop-ins in the department” (70%, 14 of 20) and online resources (40%, 8 of 20); such optionality places the onus on the student to proactively seek help. However, it has to be questioned how effective this would be, especially in relation to the high degree of Statistics “anxiety” that students often have. Ruggeri et al. (2008) found that “anxiety” was a key barrier to student learning of Statistics. Additionally, given that 69% (24 of 35) of respondents to the HEA STEM staff survey consider a lack of student motivation a key reason for students’ struggle with Statistics, the practicality of optional support must be questioned. Additionally, the fact that so little quantitative methods content is assessed formally, may make students less willing to seek support, as they may presume that they can still pass with only basic quantitative methods skills. Stephenson and Caravello (2007) contrast this poor support with Mathematics with the emphasis given to essay writing skills, within Sociology programmes. In a sense, students struggle with Mathematics on their own and may then be considered to have a poor attitude and low attainment. Yet academics, understand that essay writing and other critical skills need to develop over time, with constructive feedback and support; this approach needs to be extended to mathematical/statistical skills too.

What are the specific support needs for students in relation to undergraduate quantitative methods?

A life course approach

According to MacInnes (2010) and Falkingham (2009a and 2009b), an educational life course perspective should be applied to students’ quantitative methods skills. This means that staff understand and appreciate students’ quantitative methods skills on entry to university. Curricula are designed that progress a student through their studies in an integrated fashion that affords them opportunities to gain confidence and competence in quantitative methods across their degrees and not just in one or two standalone research methods modules.

Data from the HEA STEM staff survey shows that 74% (26 of 35) of staff said that in the second year of their programme there was a compulsory module containing at least 50% of quantitative methods. The corresponding figures for years one and three were 46% (16 of 35) and 17% (6 of 35) respectively as shown in Figure 4. These figures may include some double counting, as there will be more than one response from each institution.

![Figure 4: HEA STEM staff survey. When and where are quantitative methods taught in your programme? (35 respondents)](image-url)
In terms of embedding quantitative methods content within non-research methods modules, the data shows that, the first and final years have the greater proportion of embedded content. The curricula of research methods modules are typically generic in nature and have to cover both methodological traditions in relatively short periods.

Perhaps inevitably, students will only receive a superficial grasp of methodology (Gibbs, 2010). There is also the issue of integration of quantitative methods across a programme, both horizontally and vertically. MacInnes (2010) highlights that quantitative methods content is rarely integrated across or through an undergraduate social science curriculum. Falkingham et al. (2009b) supports this view, contending that quantitative methods is often viewed as a “standalone activity” contained within research methods units.

Quantitative methods content does not do well in the current higher educational marketplace. However, as MacInnes (2010), Williams et al. (2004) and Falkingham et al. (2009b), all highlight; if quantitative methods skills remain in generic research methods units, then there are a number of consequences. Firstly, students may fail to see the "bigger picture", i.e. how methodology relates to the rest of their discipline; secondly, it further marginalises quantitative methods; thirdly, students lack time to practise and apply their quantitative methods skills beyond research methods units (MacInnes, 2010). Students’ perceptions of quantitative methods are also built on the fact that quantitative methods curricula are either too basic, or too ambitious in trying to cram too much in (Williams et al., 2008). Students can be disengaged because they are bored with “dull” univariate analysis or because they are struggling with regression. There is a need to identify what are the quantitative methods threshold concepts and competencies with which we wish our students to graduate (MacInnes, 2010); this would allow curricula to be more clearly designed and build on students’ knowledge as they progress through their programmes (Falkingham, 2009b).

More time and more quantitative methods

As most quantitative methods modules are delivered within compulsory research methods modules, students are often “rushed” through a range of concepts and methods, without sufficient time to practise skills (MacInnes, 2010; Falkingham, 2009a and 2009b). This can be made worse by the tendency to only assess basic quantitative methods skills, such as univariate analysis, thus students fail to receive sufficient time to build and apply more complex statistical skills. The HEA STEM student survey revealed that of those students who struggled with quantitative methods 44% (27 out of 62) of the sample did not feel that they had sufficient practice in quantitative methods. The importance of extra time to practise is that it can build confidence. 53% (33 out of 62) of the students who said that they struggled with quantitative methods agreed that they “lack confidence” with quantitative methods. Confidence in a specific topic can also lead to greater motivation to develop knowledge in that topic further. Williams et al. (2008) notes that, basic statistical analysis will not give students sufficient appreciation of the potential of quantitative methods work; expanding the quantitative methods curriculum may actually pique student interest.

Curriculum innovation

Students tend to see quantitative methods as something separate from the rest of their studies (MacInnes, 2010; Falkingham, 2009a; 12) and increasingly there is a push towards embedding quantitative methods within the wider Sociology curricula. The Economic and Social Research Council’s pilot quantitative methods projects (2009) all tried various embedding approaches (see for example Dale et al., 2008, Falkingham 2009a and 2009b, Carey and Adney, 2009). This approach embeds quantitative methods work within substantive modules; but this approach is fraught with logistical and resource implications, alongside non-quantitative methods staff resistance (Falkingham et al., 2009b). Falkingham et al. (2009b) found that the overwhelming consensus from the staff was that the quantitative material helped them to provide students with “hard evidence” and supported their teaching. Conversely, according to Falkingham et al. (2009) there
were a few lecturers who were unwilling to adapt their lectures by incorporating quantitative data, which they suggest supports the view that negative perceptions of quantitative methods are “reinforced by staff attitudes.” It would seem that to embed requires departmental management support; training for staff and a variety of strategies to encourage staff to engage with the process. Embedding allows students to see the relationship between statistical information and their other studies. Without this clear connection, all forms of method can only be viewed in abstraction and not as an integral part of Sociology (Payne and Williams, 2011). Williams et al. (2004) point out that “we need to make the link between analysis and theory clearer.” Thus if the relationship between theory and methods (particularly quantitative) is absent from the undergraduate curricula it is no surprise that students fail to see the connection. The benefits of embedding are clear in that they allow students to relate quantitative methods to the wider discipline, apply quantitative methods concepts to the “real world”, and they can have greater time to develop and practise quantitative methods skills, particularly if quantitative methods are built into assessments.

**Testing and feedback**

Students may not be assessed in their quantitative methods component, if it is part of a larger programme or module and delivered by staff worried about failure rates; the HEA STEM staff survey demonstrated that not all quantitative methods work is assessed (see Figure 2). Yet Williams et al. (2008) point out that there is a definite connection between a positive attitude toward quantitative methods and grades, which are achieved at undergraduate level for quantitative methods work. Good grades can build confidence and encourage students to develop a greater quantitative methods interest. There is also the need to design assessments that will engage students. Focusing assessments on “real world” research can allow students to see a wider applicability to their quantitative methods skills and lend a sense of authenticity to their work (Murtonen et al., 2008, Cuthbert et al., 2012). Parker et al. (2008) note that most undergraduate Sociology programmes lack sufficient opportunities for students to do quantitative methods based research.

Quantitative methods assessments also need to involve Sociology-typical skills, such as dialogic working (in teams), interpretation, and data framing through the use of theory (Cuthbert et al., 2012). Regular formative assessment in quantitative methods skills is required to ensure that staff can chart student progress.

The language of quantitative methods can be a barrier to learning and therefore regular testing in labs, for example, using online quizzes would allow the student to chart his or her own progress. Staff could make use of virtual learning environment (VLE) quizzes to chart the progress of an entire cohort and similarly, the use of instant feedback technologies, such as “clickers” could allow staff to instantly identify a student’s “troublesome knowledge” (Meyer and Land, 2006; Mollborn and Hoekstra, 2010) which blocks learning.

**Laboratory support**

The majority of respondents (91%, 32 out of 35) to the HEA STEM staff survey acknowledged that SPSS™3 is the software used to support quantitative methods on their degree programmes, and such work is typically assessed. It is possible that the emphasis on statistical computing packages is teaching students to “point and click” as opposed to understanding the quantitative methods concepts behind the software, acting as a barrier to learning. Such packages draw users away from the data in order to complete specific actions and manipulate the data. It might be worth exploring the types of computing skills which students bring to

---

3 SPSS is a registered trademark of IBM.
undergraduate Sociology degree programmes and develop teaching programmes accordingly. For example, students are typically quite competent in mobile phone applications and social media forms of communication, as they tend to be user friendly and intuitive. Most quantitative methods work occurs in campus computer labs; labs can be sterile and intimidating places for Sociology students more used to tutorial spaces, which are designed for dialogue. The increased uses of interactive teaching technology in labs may partly alleviate this problem, as would an increase in time in labs, with more support staff.

**Pedagogically informed practice**

Part of the problem with student support and engagement is the lack of prominence given to pedagogy in UK Sociology. If one surveys the UK’s leading Sociology journals, the only articles that refer to pedagogy are the ones cited in this report and they appeared in the journal Sociology.

The British Sociological Association’s teaching group looks more towards schools than universities and its journal is aimed at further education and school teachers of Sociology. Although the HEA is a great champion for pedagogy and pedagogic research, and in a number of universities, it is a contractual obligation for staff to have a teaching qualification/HEA Fellowship within two years of employment, it is still not compulsory for new academics to have a teaching qualification. Nevertheless, more importantly Sociology itself does not seem to place pedagogy at its heart; compare this with the USA, where the American Sociological Association publishes Teaching Sociology, a peer reviewed journal devoted to pedagogy, which has featured a range of articles on classroom technology and quantitative methods issues (Macheski et al., 2008; Wilder, 2009; Burdette and Mcloughlin, 2010; Molliborn and Hoekstra, 2010).

If Sociology staff do not place an emphasis on pedagogy and on-going pedagogic training, then curricula cannot change to adapt to the needs of learners. Within the quantitative methods community there is a strong and innovative debate around pedagogy but there is a sense that this group is preaching to the converted and that their innovation and urgency needs to be communicated to a wider audience within Sociology.

Students tend to be viewed as a generic category, rather than as individuals with their own learning styles, pace and experiences (Meyer and Land, 2006; Moore, 2007). This is true, irrespective of the subject matter; but perhaps becomes more important when the subject is particularly challenging for students. The “one size fits all” approach of university compulsory modules needs to be challenged by thinking through ways to support students who are at different stages of learning, for example, extra support for students who are struggling, streaming groups by knowledge or skill level, and peer mentoring.

**Challenging stereotypes**

Moore (2007) explored the issue of “intellectual resistance” within the classroom and that on unpopular quantitative methods modules such resistance can create shared social capital; making resistance to the module a shared identity, which disincentivises some students from learning. Moore (2007) notes that this results in staff that are unwilling to challenge this group resistance and instead switch to “coping” teaching strategies, which merely increase resistance. Students are sensitive to the attitudes of staff and if the majority of their teachers are pro-qualitative and social theory, then students will internalise their views (Williams et al., 2004). Furthermore Williams et al. (2004) found that the teaching of quantitative methods invariably began with lecturers openly expressing an inherent aversion for the subject. If students are not being exposed to quantitative methods active or enthused staff then they are less inclined to see its contemporary relevancy or worth.
Incentivising quantitative methods for students

One means to incentivise students to engage with quantitative methods, is to assess formally all quantitative methods work within curricula, or to adjust assessment weightings to avoid marginalising quantitative methods skills. Additionally, given the current economic environment, one means to incentivise quantitative methods is to publicise its important STEM skills that can certainly build a graduate’s employment profile (Murtonen et al., 2008; MacInnes, 2010). The Royal Statistical Society and the Economic and Social Research Council have recently produced materials that show some of the careers of individuals who are proficient in quantitative methods. The British Sociological Association has also highlighted quantitative methods skills as a key element of a Sociology degree. Quantitative methods should be a key element within Sociology degrees given the sector-wide shift towards greater emphasis on employability and career readiness.

Who teaches quantitative methods within university Sociology and what are their support needs?

A demographic shift

Sociology has an ageing profile; with 42% of staff aged, 50 or over (Mills et al., 2006; Economic and Social Research Council et al., 2010; British Sociological Association, 2013a). If the decline in quantitative methods in Sociology since the 1960s is taken into account, the consequences of this demographic shift can be seen; it means that the majority of quantitative methods active researchers in the UK are over 50 (Mills et al. 2006; MacInnes, 2010). The older researchers are not being replaced because doctoral students pursue qualitative approaches. This problem of a lack of throughput of quantitative methods active researchers and teachers is increasingly acknowledged (see for example, MacInnes, 2010, Nuffield Foundation, 2013). These trends mirror Vorderman’s circle of underachievement (Vorderman et al., 2011), as fewer Sociology teachers are exposed to quantitative methods, this leads to poorer teaching, which further compounds the problem, by producing graduates who are less inclined to pursue quantitative methods research and teaching. This dearth of active quantitative methods academics in the UK often means that staff with advanced quantitative methods skills may not be involved in teaching undergraduates if they are too busy working on externally funded quantitative methods projects.

Quantitative methods teachers

MacInnes (2010) notes that the teaching base for quantitative methods is small and “fragile” with around one to three quantitative methods active staff in any department, who may or may not do much teaching as many of these staff are older and therefore more senior. Some departments may have no quantitative methods active staff. As Williams et al. (2004) acknowledge, the teaching of quantitative methods often is something given to junior or new staff. Gibbs (2010) makes the point that quantitative methods is often universally loathed by staff and students alike within Sociology departments and students quickly become sensitised to prevailing staff attitudes. This can be problematic for new or junior staff as they are then tasked with teaching units that are unpopular with staff and students alike; hardly a recipe for developing good teachers. Williams et al. (2004) found that staff became discouraged when teaching quantitative methods due to the issue of student dissatisfaction; a point echoed by McVie et al. (2008) and MacInnes (2010). This can make staff less inclined to innovate or upskill. The lack of suitably qualified quantitative methods staff compounds this issue if more senior quantitative methods-active staff are taken out of teaching to pursue research (MacInnes, 2010). In such circumstances a junior quantitative methods member of staff often becomes the “quants” person who delivers all quantitative methods provision, potentially hindering the development of individual research profiles. MacInnes (2010), McVie et al. (2008) and Williams et al. (2004) all
acknowledge the importance of staff who are literate and active in quantitative methods in enthusing students regarding quantitative methods, and comment that increasingly, students are being taught quantitative methods by staff with only a rudimentary grasp of and training in quantitative methods. Ironically, MacInnes (2010) notes that quantitative methods teachers rarely have the skills that they expect their own students to develop. Additionally, the lack of staff confidence in quantitative methods may further reinforce student attitudes about quantitative methods (Williams et al., 2004). Yet in spite of this, the HEA STEM staff survey data shows that when looking at the factors taken into consideration when making decisions about who teaches the quantitative methods modules, 91% (30 out of 33) of respondents identified “expertise” and 61% (20 out of 33) identified “experience” (see Figure 5). Interestingly, 70% (23 out of 33) of respondents said that staff preference was a factor taken into consideration when allocating quantitative methods teaching. This contradicts the discourse that suggests tutors on quantitative methods modules are not there through preference or due to their experience. One explanation may be the survey’s low response and a possible skew caused by survey respondents who have a pre-existing interest in teaching quantitative methods. It is worth noting that 95% (18 out of 19) of the lecturers sampled described themselves as “very confident/confident” about their knowledge of quantitative methods.

Figure 5: HEA Staff Survey. When decisions are being made about allocating staff to teach quantitative methods components of modules what factors are taken into consideration? (33 respondents, note that more than one option could be selected)

There is a mismatch concerning the perception of training between heads of departments and those teaching quantitative methods in terms of training in teaching quantitative methods received/taken: 68% of lecturers (13 out of 19 who answered that question) stated they had no training whereas 45% (5 out of 11) of heads said that their staff did undertake training. 67% (6 out of 9 who answered this question) of heads of department said that postgraduate students tutoring on their quantitative methods modules have some form of training for this role; lecturers were not asked this question.
Resource intensive teaching

Quantitative methods content is typically delivered within Sociology programmes on large compulsory research methods modules. The HEA STEM staff survey data shows that most quantitative methods is taught in standalone research methods modules. For example, 74% (26 out of 35) of respondents stated that in year two of study there was a compulsory research methods module, which included quantitative methods, in comparison to 23% (8 out of 35) who stated that quantitative methods was embedded across other modules at year two. These modules are usually delivered via large group lectures, and small group labs. The issue of staff-student ratios was raised in Williams *et al.* (2004) where staff identified large classes as a barrier to learning, suggesting ratios of 15:1 or even 10:1 as more appropriate.

In addition to the “cost” of extra staff, quantitative methods teaching is resource intensive in that to be done effectively, it requires computer labs, which may be in short supply, and under great demand, on campus; up to date software (and staff trained in that software); and possibly extra class time. This can make quantitative methods vulnerable to being cut or reduced as heads of department face reduced budgets; additionally, within the context of departmental politics, the extra support needed for quantitative methods teaching may not have sufficient champions among staff who wish to see their own modules supported. MacInnes (2010) points out that “only one quarter of respondents feel that QM is a departmental priority.”. However, the HEA STEM staff survey data suggest that quantitative methods are valued within departments; 62% (8 out of 13) of heads and 59% (13 out of 22) of lecturers were in agreement with the statement asking if the teaching of quantitative methods is “valued by my department” (Figure 6).

![Figure 6: HEA STEM Staff Survey. Please select the extent to which you agree or disagree with the statement “The teaching of quantitative methods is valued by my department”. (13 heads of department and 22 lecturers responded)](image)

Again, these data may reflect the low response and a possible skew caused by survey respondents who have an expertise in teaching quantitative methods.
Teacher attitudes and perceptions

The important thing to note from Moore (2007), in relation to the teaching of quantitative methods, is that as a subject area within Sociology, it encapsulates no dominant pattern nor does it represent any sort of dominance on both the part of students and teachers alike. Therefore, students’ almost “natural” reaction to intellectually “resist” this foreign and unfamiliar subject area is unsurprising given its lack of support and representation in Sociology as a whole.

It is quite clear from a range of studies (MacInnes, 2010, Williams et al., 2004, McVie et al., 2008) that Sociology teachers believe that their students “do not like numbers” and that they have weak mathematical skills. They attribute these weak skills to poor teaching in schools though Williams et al. (2008) makes the point that school Mathematics cannot solely shoulder the blame for student dissatisfaction with quantitative methods. Moore (2007) discusses the idea of “cognitive resistance”, which is “the shared assumption … that most students are either unprepared or unwilling to learn what is presented in the traditional college classroom.” This assumption is often shared by many teaching staff, when it comes to students’ struggles with quantitative methods.

Opinions from both heads and lecturers in the HEA STEM staff survey reveals (Figure 7) that the main reasons staff think students struggle with quantitative methods relate to “Mathematics and/or Statistics anxiety” and “lack of confidence”. The next most popular opinions then point to “lack of student motivation” and “failure to see relevance of quantitative methods for Sociology”.

![Figure 7: HEA STEM Staff Survey. For students who struggle with quantitative methods, which factors typically inhibit their development in this area? (35 respondents, note that more than one option could be selected)](image)

The HEA STEM staff survey data showed that although staff recognised reasons that students struggle, institutional measures to support struggling students are voluntary and rely on the student to be proactive.
Delivery and innovation

Research methods modules typically have large cohorts and so this can constrain the mode of delivery; usually these modules are delivered via large lecture and smaller tutorial/lab sessions. This can be a further barrier for staff and student confidence with quantitative methods, as highlighted by Williams et al. (2004) and Stenberg et al. (2010). For example, Williams (2007) points out that ‘maths ability was considered less important than access to tutors or small classes’, in other words students wanted extra staff support and if they received the right kind of support it could counteract any Mathematics deficiencies. Although one might argue that classroom technology may increasingly be useful in allowing large groups to interact. For example, many academics in a diversity of fields are using “clickers” and “textwall” to allow students to interact and to be tested in terms of their understanding (Mollihorn and Hoekstra, 2010). Innovation, in terms of delivery and curriculum, requires staff confidence and a commitment (institutional and departmental) to facilitate such practices; none of these are straightforward.

Supporting quantitative methods staff

It is quite clear that the staff involved in delivering quantitative methods teaching, have a range of specific support needs.

First, institutions need to support quantitative methods and give it a Strategic, Important and Vulnerable (SIV) subject status, which may give quantitative methods protected status, easing pressure off quantitative methods within crowded Sociology programmes. Institutions could also make greater investment in teaching infrastructure, such as better-equipped labs, interactive teaching spaces, and staff training. Most institutions run CPD-type training but there is a lack of incentive for staff to do such training, and there could be greater support for staff to attend externally funded quantitative methods training.

Secondly, heads of department could resource quantitative methods more generously by offering greater time and staff resources, so the pace of learning might be slowed down and more tutors involved in delivering such modules (MacInnes, 2010; Williams et al., 2004 and 2008). The preparation of quantitative methods teaching resources, such as datasets takes time (MacInnes, 2010; Gorard, 2003) and quantitative methods staff should be given recognition for such development work in their workloads. Heads of department need to think through the allocation of teaching duties to quantitative methods active staff, but also to ensure that quantitative methods is taught by quantitative methods skilled staff, whether they are active researchers or not. The results of the HEA STEM staff survey contradict the wider literature on the extent to which the staff teaching quantitative methods are specialists and willing. For example, 91% (30 out of 33 respondents) identified level of staff expertise as the key factor in allocating staff to teach quantitative methods.

Similarly, the staff survey respondents reported high levels of confidence in teaching quantitative methods (95%, 18 out of 19 respondents). This disparity between the HEA STEM staff survey and other research (such as MacInnes, 2010; Williams et al., 2004 and 2008) may be in part due to the low response rate and a possible skew towards staff that have an expertise and enthusiasm for teaching quantitative methods. Much of the quantitative methods debate is focused on creating more quantitative methods active researchers but given the dearth of these individuals, the upskilling of staff to become quantitative methods proficient teachers should be promoted, and these staff may then gain the confidence to do quantitative methods research.
Finally, staff need training; if the majority of quantitative methods teaching is being delivered by non-quantitative methods specialists then this is partly an upskilling exercise, where staff are encouraged to develop greater quantitative methods skills. This last point has been acknowledged by the Economic and Social Research Council (Economic and Social Research Council, 2011) through its recent Researcher Development Initiative, where ten projects are currently involved in a range of upskilling, training and peer support issues. Similarly, the recently launched Q-Step centres (Nuffield Foundation, 2013) seek to train and develop greater numbers of quantitative methods literate students and by extension academics. Staff involved in delivering quantitative methods teaching often use a discourse of “getting students through” quantitative methods rather than a focus on producing quantitative methods competent students (Williams et al. 2004); this is an artefact of the various issues outlined previously. This also in part demonstrates the feelings of quantitative methods staff themselves who often feel beleaguered and marginalised (McVie et al., 2008, Lynch et al., 2007, MacInnes, 2010). In the HEA STEM staff survey 59% of lecturers (13 out of 22) felt that quantitative methods was “valued” in their departments and 95% (18 out of 19 lecturers) felt “confident” in their teaching of quantitative methods. It might be expected that how departments value quantitative methods may influence staff confidence in their practice.

Staff enthusiasm in teaching comes from confidence in their abilities as teachers. It is clear that within these Economic and Social Research Council funded Researcher Development Initiative projects there needs to be a championing of peer support work, such as peer coaching (Falkingham et al., 2009b; Dale et al., 2008). Peer coaching has been very effective within education fields in supporting staff that are either new to teaching or involved in “difficult” educational settings; this may be a model that could be fruitfully utilised within quantitative methods teaching support.

It should be noted that the social sciences have been very proactive in building a network of quantitative methods teachers who are increasingly mutually supportive and innovative. This has been greatly aided by the Economic and Social Research Council’s (2013) Quantitative Methods Initiative, which was established to support quantitative methods in the social sciences. The creation of the strategic advisor role for quantitative methods teaching in undergraduate programmes, has given a champion who has facilitated the creation of the quantitative methods teachers network, which shares good practice online and via workshops. However, there is the issue of whether this group is to an extent “preaching to the converted”; what efforts are being made to communicate with the rest of the social sciences on quantitative methods generally and pedagogical innovation specifically?

---

4 See for example the ESRC/HEA funded QM Initiative website and the QM Teachers Mailing List (QM Teachers Mailing List, 2013).
5 Conclusion

The HEA STEM staff and student surveys had disappointingly low responses, so the extent to which the responses can be taken, as representative of the whole sector must be questioned. Similarly, the extent to which generalisations can be made concerning the state of quantitative methods, within UK Sociology, is also debatable. However, both surveys revealed similarities to previously published work on the state of quantitative methods within UK Sociology, as well as staff and student attitudes towards quantitative methods.

The HEA STEM staff survey found that quantitative methods is predominantly taught at year two of undergraduate programmes; is usually found within standalone research methods modules, which may share curriculum space with qualitative methods. Although most of the HEA STEM staff survey respondents said they taught the majority of key quantitative concepts that one would expect on an undergraduate programme; the more complex the concept, the less likely it was to be practised or assessed. The lack of embedding and the lack of assessing in quantitative methods are problematic in terms of allowing students valuable time to build confidence in their quantitative skills. Additionally, the lack of formal assessments in quantitative methods reinforces students’ views that the subject is less important and offers them no opportunity to be rewarded for such skills. The HEA STEM student survey revealed that of those students who struggled with quantitative methods 44% (27 out of 62) of students did not think they had sufficient practice at quantitative methods and 53% (33 out of 62) lacked confidence with their skills; proficiency in quantitative methods demands practice and time.

The HEA STEM staff survey revealed that none of the 27 universities in the sample used diagnostic testing of students’ Mathematics/Statistics skills on entry, nor did any stream students by ability within quantitative classes. The most common forms of support offered to students, according to the HEA STEM staff survey, were voluntary drop-in sessions and online resources. The extent, to which such voluntary support strategies might work is to be questioned, given that respondents to the HEA STEM staff survey identified “ maths anxiety” and low confidence as the two key reasons why students struggle with quantitative methods. There is also a period in which Mathematics is not studied that students face between completion of GCSE Mathematics, which was identified as the common entry requirement for Sociology degree programmes, and starting their degrees. This can be at least two years and it should be noted that the HEA STEM staff survey found that the most common year to place quantitative methods is in year two of a degree programme, further extending the “ maths gap”. The extent to which GCSE provides a good grounding in Mathematics is widely debated and there clearly needs to be a change in how students are taught applied numeracy skills that will give them confidence and proficiency with Mathematics, prior to university entry.

The HEA STEM student survey found that the majority of students expected some quantitative methods in their degree programmes; which may reflect the fact that most Sociology undergraduates have studied the subject at A-level. There remains a disconnect between A-level and university level Sociology; with little dialogue between the two sectors; the British Sociological Association’s Teaching Sociology group is one of the few formal fora that exists. The A-level syllabus currently covers research methods via a conceptual approach, with no opportunity for students to conduct their own research. Quantitative concepts are covered but due to the weighting of marks; quantitative material carries less weight. The Tackling Transition event with A-level teachers found that staff expected students to advance their quantitative skills at university rather than at A-level; that staff felt low confidence themselves in quantitative methods; and that
there was a lack of time or infrastructure (e.g. computing labs, software) to do more quantitative work. The recent review of A-level Sociology may see greater emphasis on quantitative methods, given the strong lobbying from the British Sociological Association and Economic and Social Research Council on this issue. There remains a need for more research on quantitative methods within A-level particularly in relation to staff confidence, training and support.

Quantitative methods within Sociology has long been identified as “vulnerable”: the number of quantitative sociologists is small, ageing and not currently being replaced in sufficient numbers; the amount of quantitative outputs such as journal articles is small; the curriculum space devoted to quantitative methods remains small; the number of graduates pursuing postgraduate study in quantitative methods remains low. However; the “problem” of quantitative methods has been well documented and increasingly there is a shift towards “solutions”: greater visibility of quantitative methods in British Sociological Association publicity; the Economic and Social Research Council’s quantitative methods initiatives; and more recently the Economic and Social Research Council-Higher Education Funding Council for England-Nuffield Q-Step Centres programme (Nuffield Foundation, 2013). These are positive shifts to encourage quantitative research, teaching and training. Additionally the current review of the Sociology benchmark may more formally require degree programmes to teach and assess a range of specific quantitative skills. However, the transition between secondary and university level quantitative methods needs greater attention and research; as does the supporting of students’ numeracy skills, particularly on entry to university.
6 References


MacInnes, J. (2012) Scoping a national degree level qualification in quantitative skills in social science. (circulated via QM Teachers network group email).


Acknowledgements

The Higher Education Academy would like to thank the following for their contributions to the development of the overall project.

Project Steering Group

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher Education Academy</td>
<td>Dr Janet De Wilde (Chair)</td>
</tr>
<tr>
<td></td>
<td>Dr Mary McAlinden (Project Lead)</td>
</tr>
<tr>
<td></td>
<td>Dr John Craig</td>
</tr>
<tr>
<td></td>
<td>Dr Julie Hulme</td>
</tr>
<tr>
<td></td>
<td>Dr Anne Wheeler</td>
</tr>
<tr>
<td></td>
<td>Dr Paul Yates</td>
</tr>
<tr>
<td>Advisory Committee on Mathematics Education</td>
<td>Professor Andrew Noyes</td>
</tr>
<tr>
<td>British Academy</td>
<td>Joshua Burton</td>
</tr>
<tr>
<td></td>
<td>Anandini Yoganathan</td>
</tr>
<tr>
<td>Nuffield Foundation</td>
<td>Dr Vinay Kathotia</td>
</tr>
<tr>
<td>Royal Society of Chemistry</td>
<td>Dr Isolde Radford</td>
</tr>
<tr>
<td>Kingston University</td>
<td>Dr Penelope Bidgood</td>
</tr>
<tr>
<td>Sheffield Hallam University</td>
<td>Professor Neil Challis</td>
</tr>
<tr>
<td>Representation from Science Council</td>
<td>Gemma Garrett</td>
</tr>
<tr>
<td></td>
<td>Rachel Lambert-Forsyth</td>
</tr>
</tbody>
</table>

Project support for discipline work

<table>
<thead>
<tr>
<th>Coordinating editor</th>
<th>Consultant statistician</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr Elizabeth Berry</td>
<td>Dr Richard Gadsden</td>
</tr>
</tbody>
</table>

The support of the British Sociological Association and its Teaching Sociology study group are gratefully acknowledged for their assistance with the second discussion event. Thanks are also due to the British Academy for their generous funding to support the project events.

The Higher Education Academy would also like to recognise useful discussions in the early formative stages of the project with the following: Professor D Lawson, Dr M Moustras and Dr H Walkington.

Finally thanks are due to EdComs for administering the survey work.
About the authors

Julie Scott Jones is a Principal Lecturer in Sociology in the Department of Sociology at Manchester Metropolitan University. She is the Centre coordinator of Manchester Metropolitan University’s Q-Step Centre funded by the Nuffield Foundation, the Economic and Social Research Council (ESRC) and the Higher Education Funding Council for England (HEFCE). She is the principal investigator of the ESRC’s Quantitative Methods, Researcher Development Initiative grant: *No More Point Clicky, numbers stuff; building staff quantitative skills*. She currently teaches quantitative research methods to year one and two Sociology and Criminology undergraduates.

John Goldring is a Senior Lecturer in Sociology in the Department of Sociology at Manchester Metropolitan University. He is the Deputy Centre coordinator of the Nuffield/ESRC/HEFCE funded Manchester Metropolitan University’s Q-Step Centre and is a co-investigator of ESRC’s Quantitative Methods, Researcher Development Initiative grant: *No More Point Clicky, numbers stuff; building staff quantitative skills*. He currently teaches quantitative research methods to year one and two Sociology and Criminology undergraduates.
We offer services at a generic learning and teaching level as well as in 28 different disciplines. Through our partnership managers we work directly with HE providers to understand individual circumstances and priorities, and bring together resources to meet them. The HEA has knowledge, experience and expertise in higher education. Our service and product range is broader than any other competitor.

The views expressed in this publication are those of the authors and not necessarily those of the Higher Education Academy. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording or any storage and retrieval system without the written permission of the Editor. Such permission will normally be granted for educational purposes provided that due acknowledgement is given.

To request copies of this report in large print or in a different format, please contact the communications office at the Higher Education Academy: 01904 717500 or pressoffice@heacademy.ac.uk

The Higher Education Academy Company limited by guarantee registered in England and Wales no 04931031. Registered as a charity in England and Wales no. 1101607. Registered as a charity in Scotland no. SC043946. The Higher Education Academy and its logo are registered trademarks and should not be used without our permission.