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Evaluation of the Q-Step programme

Report focus
Report from an independent evaluation of the Q-Step programme, undertaken by Technopolis Group

Authors
Cristina Rosemberg
Rebecca Allinson
Dr Marika De Scalzi
Dr Adam Krčál
Dr Kristine Farla

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Final report

Cristina Rosemberg, Rebecca Allinson, Dr Marika De Scalzi, Dr Adam Krčál, Dr Billy Bryan, Dr Kristine Farla, Dr Charlie Dobson, Rita Cimatti, Dr Martin Wain, Zsuzsa Jávorka

technopolis group

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Foreword

Josh Hillman, Director of Education, Nuffield Foundation

The Nuffield Foundation established Q-Step in 2013 in partnership with the Economic and Social Research Council and the then Higher Education Funding Council for England. In doing so, our goal was to provide a strategic response to the shortage of social science graduates with skills in quantitative research methods. We funded 18 universities across the UK to deliver new courses, work placements and pathways to postgraduate study that would collectively promote a step change in quantitative social science education. The total initial investment in the programme was £19.5m.

Q-Step was designed to empower participating universities – through Q-Step Centres – to decide how best to use the funding to develop their quantitative teaching and courses in line with the programme's aims. In particular, we encouraged the Centres to learn from and adapt their approaches over time, aligned to their wider institutional strategies, and to harness new opportunities, ideas and creativity.

In 2017, we commissioned Technopolis to conduct an independent evaluation of Q-Step, the purpose of which was to: assess the outcomes for the Q-Step Centres, students and employers involved; explore the degree to which the programme had met its objectives; and provide insights and lessons for the design and implementation of future national initiatives. This report summarises the evaluation conducted between 2017 and 2021.

The findings are very positive. Participation in Q-Step modules is associated with better employment prospects for students compared to similar students on equivalent courses. For example, Q-Step students are more likely to earn over £25k and be in highly skilled employment 15 months after graduation. In addition, students expressed high levels of satisfaction with their Q-Step experience. The evaluation also found that Q-Step has increased quantitative teaching capacity and had a positive impact across participating institutions, particularly those with less established traditions of quantitative social science teaching. Notably, the programme has prompted a range of further investment and initiatives designed to boost quantitative methods across the participating universities, as well as in other universities and educational organisations.

The evaluation also identified a number of challenges associated with implementing a programme of Q-Step's scale and ambition. For example, embedding collaboration and the sharing of best practice across Centres requires considerable effort and coordination. There is also a need to ensure that Q-Step students are recruited from a diverse range of backgrounds in alignment with institutional priorities for access and widening participation, which was not one of the programme's initial objectives.

Reassuringly, the evaluation found that Q-Step Centres have demonstrated a long-term commitment to – and effective practices in – the sustained development of quantitative methods in the social sciences. They have also increased engagement with external stakeholders, particularly local employers, through their networks of work placement providers. Q-Step funding ended in September 2021, but participating universities are committed to sustaining the Centres for at least a further three years and the evaluation highlights that many have already embedded the good practice developed through the initiative within their business-as-usual activities. This bodes well for Q-Step Centres to play a useful role in local and regional skills strategies.

Based on the findings from the evaluation, Technopolis makes a series of recommendations to support continuous learning and adaptation across the network of Q-Step Centres, sharing of good practice within and across participating universities, and extension to other institutions interested in improving

quantitative skills. We hope that this evaluation will be of value to these institutions and other stakeholders in their consideration of the role they can play to support and develop the good practice and progress made by Q-Step.

In order to sustain and develop Q-Step's legacy, we have been working with SAGE Publishing, the ESRC and the Q-Step Centres to develop an online resource platform. Lecturers will have free access to materials to aid their teaching of quantitative methods at both undergraduate and graduate level. Resources are available across a range of topics, including data analytics, methodological approaches, modelling, and descriptive statistics. Our aim is for the online platform to support and grow the community of quantitative social science teachers. The Nuffield Foundation and ESRC are also using the key findings and recommendations to inform other activities; for example, the ESRC is working to ensure the pedagogical learnings from Q-Step are incorporated in its postgraduate training requirements.

We are grateful to all those who have supported Q-Step, including Centre coordinators and staff, the employers who provide placements, Nuffield Foundation colleagues (past and present) and the advisory group chaired by Professor Paul Boyle. We are particularly grateful to the ESRC who, as well as matching our financial support, have been very active partners throughout. The engagement, expertise and commitment of ESRC staff has been outstanding, in particular that of Frances Burstow and Joanna Lake.

But most of all we pay tribute to the students themselves. It is clear from this evaluation that through their hard work on Q-Step courses they are leaving university well equipped to apply their skills in their working lives and beyond.

Key terms

- **The Q-Step programme or Q-Step –** the overarching programme funded by the Nuffield Foundation, Economic and Social Research Council (ESRC) and Higher Education Funding Council for England (HEFCE)
- **Q-Step Centres** – the 18 Centres that are based in universities' social science departments and received grant funding through the Q-Step programme
- **Q-Step Network** – the network of the Q-Step Centres
- **The Q-Step degree programmes and courses** – the degree programmes and courses that were developed or enhanced by integrating quantitative methods with support of Q-Step
- **Q-Step modules (or programme modules)** – the individual modules that were developed or enhanced by integrating quantitative methods with support of Q-Step
- **Q-Step students** – students that are/were enrolled on a Q-Step programme or module
- **Non Q-Step students** – students that are/were not enrolled on a Q-Step programme or module, either within the host institutions of Q-Step Centres or in other universities. The latter were used as a control group for the econometric analysis

Executive Summary

Introduction

This report presents the results of the Q-Step programme evaluation. Q-Step is a £19.5 million programme launched in 2013/14 and funded by the Nuffield Foundation, Economic and Social Research Council (ESRC) and the Higher Education Funding Council for England (HEFCE).[1] Q-Step funded a total of 18 Higher Education Institutions (HEIs) (the Q-Step Centres) for five years (until 2018) and provided additional 'transitional' funding to 17 of them, for two years (2019–2021).

Q-Step was developed as a strategic response to the shortage of quantitatively skilled social science graduates in the UK and was designed to promote a step-change in quantitative social science training through the development of exemplar provision. It aimed to have a direct impact on:

- HEIs – the programme set out to generate sustainable institutional change in the HEIs hosting Q-Step Centres, supporting an increase in the critical mass of quantitatively skilled social scientists in UK universities (with associated benefits to academic research) throughout and beyond the initial five-year funding period
- Students taking the Q-Step programmes and/or modules – supporting students in their career trajectories by developing quantitative methods skills applied to the social sciences.
- Employers hosting Q-Step placement students and employing Q-Step alumni – meeting the needs of the wider labour market by equipping social science students with relevant skills to increase productivity and innovation in the workplace.

Equally importantly, the initiative was designed to "signal to a wide range of stakeholders that the stress on quantitative training and the role of empirical evidence in the social sciences requires a structural shift across the educational life course" (Programme Background paper, 2013).

The Q-Step programme was "experimental", and "evolutionary and permissive", allowing time and scope for Centres to decide how best to implement the programme and encouraging flexibility and creativity through the process.

The aim of the evaluation

The overall aim of the evaluation was to assess whether the Q-Step programme met its intended objectives and, given its experimental nature, whether evidence suggests it was successful as a proof of concept. Based on these findings, the evaluation provides recommendations to inform future development and similar future initiatives.

Evaluation approach

This evaluation is guided by a Theory of Change that captures the intended effects of the programme across the three beneficiary groups: the HEIs (Q-Step Centres), students and employers. It is based on desk research and intensive consultation with institutional and programme leaders at the Centres, lecturers, students and alumni. Evidence was collected at three points in time, in 2018, 2019 and 2020, to provide an evolutionary perspective of the programme. The evaluation also includes an econometric analysis to further explore the impact of the programme on students.

The following sections summarise our assessment of the Q-Step programme's implementation, impacts on the three specific intended groups, findings for sustainability and scalability, and, finally, our recommendations for the programme going forward.

[1] HEFCE closed on the 1st April 2018 and has been replaced with the OfS (Office for Students) and UKRI (UK Research and Innovation). HEFCE provided funding until 2018.

Evaluation findings

Overall assessment of the Q-Step programme

This evaluation of Q-Step **demonstrates the success of the programme** in promoting "a step-change in quantitative social science education and training in the UK". The Q-Step programme is helping to address the increasing application of quantitative methods in both research and professional settings as large data sets become more available and useful for a wide range of sectors (for private companies, public organisations and charities). This is evidenced in the literature and through interviews with lecturers and employers.

Q-Step provides a **successful proof of concept for increasing the number of quantitatively skilled social scientists**. A total of 1,101 students are estimated to have taken up a Q-Step degree programme in 2019/20, a fivefold increase in comparison with 2014/15. 11,171 students took up Q-Step modules in 2019/20, up from 8,813 in 2015/16 – a 27 per cent increase (based on data available from HESA).

To achieve a critical mass of quantitatively skilled social scientists, more universities would need to embed a Q-Step approach (2019/2020 HESA student statistics show around 164,000 undergraduate students enrolled in social sciences in total). This goes beyond what a single programme can achieve and would require system-wide change and potentially national policy levers.

The evaluation investigated the extent to which the different delivery models implemented across the range of Q-Step Centres could be classified or clustered into a set of models. The evidence collected shows **there is no single model for Q-Step Centres**. The approaches taken to implementation have been guided by the universities' own processes, culture, and decision-making procedures. The approaches have also been **adapted over time** with a general trend towards deeper integration of Q-Step within the schools and faculties. This includes increased discipline-specific modularity; a shift from first to second year recruitment; and a broadened student discipline base (from the social sciences).

The evaluation also identified success factors that support the implementation of the programme: strong internal coordination and continuity of staff, leadership support, investment to support staff, and alignment of the programme goals with institutional objectives.

Recruiting prospective students for full degree pathways has proved challenging. Most Centres find that combining both full degree pathways and modules is the most effective way to recruit students.

For the programme delivery, new pedagogical approaches have been adopted and adapted. Key features of the Q-Step teaching approach are the inclusion of practical sessions to implement concepts/approaches learned in the theory sessions and the use of real-world examples, as well as small class sizes. These are all identified as factors that support effective learning.

Work placements are a successful part of the Q-Step approach. There is a growing trend towards credit-bearing work placements being introduced within the programme (with success), and lecturers and students state that the work placements have allowed students the opportunity to apply quantitative methods in a real enviroment.

All Q-Step Centres also provide support through additional activities to further enhance the student experience and learning. These activities are varied but align with Q-Step core activities (the curricula, access to the programme, work placements etc.), and coordinators and lecturers underlined these additional "student-centred" activities as important for bringing the Q-Step student community together. These activities have been challenging to sustain during COVID-19.

Q-Step Centres' promotional activities have increased in intensity over time and have become more effective at targeting the intended audiences (including parents and prospective students). These are viewed by lecturers and students as important for the achievement of the objective of the Q-Step programme. There is also evidence of successful outreach activities, targeted at communities outside the Centre and host intitutions (e.g. secondary school students), which have further supported the development of quantitative skills (e.g. The University of Edinburgh's Q-Step Academy).

Cross-Centre activities have been important for the Q-Step Centres, but there have been more limited opportunities than expected. They provide a space for learning, motivation and networking and are valued by the Centres.

The main impacts of the programme on HEIs (and Q-Step Centres), students, employers, and sustainability and scalability are set out in the following paragraphs.

Impact on the institutions

Q-Step has had a positive impact in host institutions, and this has been stronger among those institutions with a limited prior tradition of introducing quantitative methods into the social science curricula.

The programme has helped institutions with Q-Step Centres to **upgrade their educational offer for social science students**, through introducing more diverse curricula and updating existing curricula on quantitative methods. There has been a measurable improvement in the teaching capacity in quantitative methods, and Q-Step has been mentioned in multiple Teaching Excellence Framework (TEF) submissions as an example of improvements in teaching standards.

The Q-Step programme has **inspired further investment in major initiatives dedicated to the research and teaching of quantitative methods** (at the host HEIs), and, in many cases, has played a pivotal role in the set-up or relaunch of such initiatives. Examples include the Institute of Coding at The University of Exeter, SPS Research Training Centre at The University of Edinburgh (relaunched 2019) and 3Di – the Data Discovery Institute (2021).

These initiatives are reported as adding value to their respective universities by attracting funding for research, promoting excellent and expert teaching, and providing prestige and opportunities for collaboration. These institutes have built capability to train cohorts of students and junior researchers who will continue to produce research based on the use of quantitative methods.

Q-Step has had an **impact on research**, to some extent, through increasing opportunities for students to undertake postgraduate work, which includes quantitative methods and increasing the capabilities of institutions to train researchers. Some Centres also report that Q-Step lecturers have been successful in attracting additional research grants.

Q-Step has contributed to a **change in culture** within host organisations. The introduction of lecturers with quantitative skills to departments (such as Sociology) with a limited tradition of quantitative methods helped to change cultures and create environments where both quantitative and qualitative methods are increasingly given equal or similar weight, and where there is a better understanding of how to combine them in the curricula. There are now only limited pockets of resistance to the use of quantitative methods within faculties and departments hosting the Q-Step Centres. Q-Step team members are gaining higher status within their departments and there are greater opportunities to take up leadership positions.

Q-Step has increased the institutions' **engagement with external stakeholders**, through building a network of work placement providers (employers). The HEIs report having recruited more local, and often prestigious, employers for the work placements. These managed relationships are potentially long-lasting and can contribute significantly to extending the range of stakeholders in the institution and ultimately enhance the employability of graduates.

Q-Step activities in some Centres are aligned with the **widening participation practices** within their host institutions, but only to a limited extent**.** The evaluation also found that Q-Step students tend to come from more well-off backgrounds (in comparison with students from other institutions enrolled on similar courses)**.** The alignment with widening participation practices was not a primary objective of the programme, but is an important aspect nonetheless, as any similar initiative should fully align with the need to promote equal opportunities to "access and succeed in higher education" (as mandated by the Office for Students).

Impact on the students

Q-Step students reported high levels of satisfaction with their programme experience. Students were most satisfied with the support from lecturers and departments, the use of real-life examples and data in courses, opportunities to work with statistical software, and the balance between theory and practice in courses/modules (between 79 per cent and 89 per cent of students reported being satisfied or very satisfied with these elements).

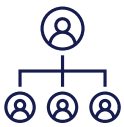
Students also indicated that Q-Step has made a positive difference to their "perception of numbers" (e.g. less negative) and has broadened their horizons on what they feel they can achieve; this has had an impact on their work-life ambitions.

According to the lecturers, Q-Step has provided students with new skills in data interpretation, critical thinking and reporting. These skills are less prevalent in non-Q-Step students. Lecturers also indicated that Q-Step students have better learning outcomes than non-Q-Step students. Students consistently achieved higher marks and gained more prizes.

Econometric analysis showed Q-Step had a (statistically) **significant and positive impact** on students' subsequent salary, qualifications and career prospects in terms of acquiring highly skilled employment (in comparison with non-Q-Step students, and after controlling by student background). Based on this analysis we estimate that the chance of having a graduate salary of more than £25k for Q-Step students is 1.92 times that of non-Q-Step students 15 months after graduation.

Many Q-Step alumni have taken up employment where quantitative skills are a requirement or a desirable asset. From their LinkedIn profiles, 42 per cent of Q-Step alumni are in employment with 27 per cent of those employed as consultants or analysts; 15 per cent have a research job (e.g. research officer or research data manager); 14 per cent data scientist or similar; 12 per cent are public sector civil servants or similar; 8 per cent are in sales, business, or marketing; 7 per cent are policy advisers or similar; 7 per cent are in finance or investment; and 3 per cent have founded a business or initiative.

Impacts on the employers



The Q-Step programme has a **positive impact on employers**.

The Q-Step work placements were **positive experiences for employers,** with the majority wishing to continue to provide this opportunity to Q-Step students.

The most widely reported impact by employers was an increase in their organisation's ability to perform new analysis or analyse data in more efficient ways. These gains have been higher among employers with fewer existing advanced quantitative skills in the organisation. These organisations reported bringing the students in as a way of gaining access to advanced quantitative skills to inform strategies or contribute to analytical reports. These gains often translated into material benefits and changes. The few employers who did not report such gains had different objectives, such as understanding the recruitment landscape.

Additional positive impacts reported included having access to a wider pool of talent, skills and techniques that were not usually available to them, as well as an increased opportunity for their own employees **to take supervisory roles and increase their own skills** within the company.

Employers indicated potential programme improvements. These included increasing the length of the placements (allowing students to familiarise themselves with the company before taking on specific tasks or projects), and more flexibility on the timing, in particular allowing for earlier engagement for preparation. Employers also noted a lack of knowledge of certain software programs which caused delays in students' ability to start on substantive work. There was recognition that the university cannot prepare students for all eventualities.

The sustainability and scalability of the Q-Step programme

Q-Step Centres **are committed to the sustainability and scalability of the programme**. This is because Q-Step is now embedded within the host universities and the external demand for graduate skills offered by Q-Step continues to grow.

In terms of sustainability, the Centres have all agreed to continue funding the staff roles for a further three years after the transitional funding period and staff have been offered permanent contracts in a number of Centres. 85 per cent of lecturers confirmed, via survey, that they would like to either sustain or scale up – or both – the Q-Step programme. Investments have been prioritised, even at universities facing difficult funding decisions due to the pandemic**.**

There are also ambitions to scale up in many of the host universities. This is focused on the expansion of the Q-Step offer to other disciplines.

There are several success factors of the Q-Step programme that should be taken into account in future decisions to sustain and scale the programme. These include internal coordination and continuity of staff, leadership support, investment in teaching staff (including training) and alignment of the programme with the wider institutional objectives.

Recommendations

Based on the evidence collected through the evaluation we provide the following recommendations:

Continuous learning and adaptation

- Q-Step Centres should continue to learn from and adapt their pedagogic approaches, sharing innovation with the wider social science research community
- Q-Step Centres should work closely with institutions' access and widening participation teams to help attract students with a diversity of backgrounds. Furthermore, the implementation of any similar initiative should fully align with the need to promote equal opportunities to "access and succeed in higher education" (as mandated by the Office for Students)
- Work placements are incredibly important for both students and employers and the following recommendations are made (which are relevant for any similar activity across HEIs)
  - Placements should be used as widely as possible by initiatives with a skills development remit. To achieve this goal, organisations supporting placement programmes (e.g. HEIs, research funders) are encouraged to develop sustainable models for delivering fully-funded placements
  - Where possible, work placements should be made credit-bearing in recognition of the skills and competences acquired
  - Universities should develop sustainable approaches to developing and managing relationships with placement providers. This will enable effective communication of expectations and information in order to make the placements as effective as possible

Expansion of the Q-Step offer (and similar initiatives)

- Both universities and funders should consider how the Q-Step model could support the development of quantitative skills in other subjects (within the social sciences and beyond), where there would be benefits. Universities could draw on the expertise of existing Q-Step Centres to embed quantitative methods training in other departments, train staff and expand other supporting activities
- When commissioning new investments with a skills development component, funders should consider the known success factors (e.g. leadership support, the use of practical sessions; the use of real-world data; and evidence of work placement coordination) during the assessment of proposals

Sharing good practice and lessons learnt

- The Nuffield Foundation and ESRC should ensure that the lessons learnt from Q-Step are shared within the social science HE community and HE communities more broadly to encourage and support the strengthening of quantitative methods training. This should include both the pedagogical and operational factors that contributed to the success of Q-Step. Sharing information on the current Q-Step Centre models will help universities design their own models of implementation, adjusted to their specific organisational processes, decision making structures and student body, as well as the current status of quantitative methods availability within their institutions
- The success of Q-Step should be presented as a showcase example that encourages other universities to invest in the development of quantitative methods within social science programmes and beyond. The evidence suggests investing in quantitative skills training, as has been done in Q-Step:
  - increases graduate employability
  - enriches the curricula
  - increases staff expertise
  - encourages the recruitment of additional high-quality lecturers
- Q-Step Centres should consider the continuation of cross-Centre activities that support mutual learning, peer support and cross-Centre collaboration (understanding that this may require external funding). Alumni and (former) Q-Step staff can play an important role in shaping these activities

- Q-Step Centres should also consider the joint delivery of activities that provide students with additional skills opportunities and cohort development
- ESRC could consider assessing whether there is a need to update the core training requirements at a postgraduate level to ensure that the pedagogical learning from Q-Step is embedded in training provision; and the curricula is attractive to, and sufficiently challenging for, students who have received substantial quantitative skills training as part of their undergraduate degree

1 Introduction

1.1 Introduction to the Q-Step evaluation

This is the final report of the evaluation of the Q-Step programme. The evaluation was commissioned by the Nuffield Foundation and carried out by Technopolis Group between July 2017 and November 2021.

The evaluation had three key objectives:

- To provide an **overview of the programme** and how it has developed over the funding period
- To offer quantitative **comparisons** of Q-Step student outcomes vs non-Q-Step student outcomes; and to compare the various Q-Step Programme delivery models against each other in order to identify possible **"institutional types"**. We have also expanded our analysis to include qualitative assessments of outcomes and impacts achieved or enabled by Q-Step
- To identify **successful, sustainable and scalable models of delivery** for the Q-Step Programme.

The study was conducted in three phases, leading to the following associated reports:

- Interim report (November 2018): This report focused on collecting information on the implementation of the programme across the Centres and early evidence of impact. It was based on site visits to the Q-Step Centres and a first analysis of the Destination of Leavers from Higher Education survey – collected by the Higher Education Statistics Agency (HESA) – to test the viability of conducting a quasi-experimental analysis for the programme (comparison of Q-Step graduate outcomes against a control group)
- Follow-up report (December 2019): This report provided information on changes made to implementation of Q-Step. It was mostly based on key statistics related to programmes, modules and number of students, as reported by the Q-Step Centres via data collected from the study team and the bids prepared from the Centres to apply for follow-up funding
- This Final report (March 2022): The final report provides a concluding assessment of the implementation of the programme and its impact – understanding that further impact is expected to materialise outside the life of the study, including the institutional impact and the impact of the Q-Step programme on students' careers

The first two reports were prepared for the programme funders and were not published. This report summarises the findings from the three phases of the evaluation, and includes evidence from earlier stages of the study, where relevant, to provide an overall assessment of the Q-Step programme.

This report provides a description of the methodology used for this evaluation followed by Chapter 2, a description of the Q-Step programme, and its Theory of Change. Chapter 3 provides an overview of the programme implementation. Chapter 4 presents the impacts of the programme at three levels: the institution; the student; and the employer and includes an exploration of some of cross-cutting issues and assumptions made in the Theory of Change. Chapter 5 presents an assessment of the sustainability and scalability of the Q-Step programme and Chapter 6 presents conclusions and recommendations.

1.2 Overview of the methodology

The study has been conducted using a mixed methods approach, i.e. a combination of qualitative and quantitative tools and methods, which are described in more detail in the sub-sections below.

In all evaluations, the choice of methodological tools impacts on the quality and validity of the data collected. For the Q-Step evaluation, we have taken a theory-based mixed method approach which is guided by a Theory of Change. This allows for the triangulation of multiple data sources which increases the strength of evidence of the findings which are reported. Individually the methods chosen would provide only a partial understanding of the outcomes and impacts of the programme.

Alongside more traditional qualitative social science techniques for evaluation, which support the provision of evidence relating to the questions of specific impacts on the institutions, staff and students, this evaluation also benefitted from in the use of a quasi-experimental approach based in HESA Graduate Outcome Survey data (see Section 1.2.3 below), which provided a source to investigate the specific impacts on students and employability, often hard to achieve without in-depth tracer (longitudinal) studies.

1.2.1 Primary data collection

We conducted an extensive programme of interviews and online surveys to inform this evaluation study. These exercises were closely coordinated with the Q-Step coordinators.

Overall, we conducted 73 interviews and collected 451 responses via surveys, between October and November 2020.[2] The table below provides a more detailed overview of our data collection.[3]

Table 1 Primary data collection

Stakeholder	Focus and coverage
 Interviews with Q-Step coordinators	**Focus:** To gather views on the implementation and impact of the programme, as well as plans for sustaining or scaling up. **Scope and coverage:** We targeted and secured interviews with coordinators across all 18 Q-Step Centres including the coordinator at The University of Southampton which withdrew from the programme in 2019.
 Interviews with Q-Step placement coordinators	**Focus:** To gather information and views on the implementation of the work placements as well as plans for sustaining them. **Scope and coverage:** We set a target of 12 interviews – based on the fact that in some Centres there was no dedicated placement coordination. We secured **interviews with 15 placement coordinators.**
 Interviews with leadership	**Focus:** To gather views on the relevance and importance of the Q-Step programme within the institution and to discuss the future sustainability of Q-Step. **Scope and coverage:** We targeted 17 Senior leaders (including Deans, Vice-Chancellors and Heads of Department) across the 17 Centres following the recommendations of the Q-Step coordinators. We secured **interviews with 14** leaders (across 14 Centres)**.**
 Survey with lecturers	**Focus:** To gather views on the implementation of the programme, its impacts (especially on students), and its sustainability. **Scope and coverage:** We asked Q-Step coordinators to disseminate an online survey to members of their Q-Step teaching teams. We obtained a total of **68 responses** (across 15 Centres).

[2] Note that due to the COVID pandemic some of the activities had to be modified. Specifically, the team had planned to conduct site visits across all Centres in 2020 to carry out face-to-face interviews and focus groups. Due to the restrictions associated with the pandemic, and in coordination with the Nuffield Foundation, we opted for collecting the information via online interviews and surveys, covering all the stakeholders we had originally planned to contact. These dates (October and November 2020) correspond to the timing of the field work for the final phase of the evaluation. Where evidence from previous phases is used in this report, the date of the previous data collection period is specified.

[3] Note that The University of Southampton withdrew from the Q-Step programme in 2019, and in this case, we only conducted one interview with the Q-Step coordinator.

Stakeholder	Focus and coverage
 Survey with Q-Step and non-Q-Step students	**Focus:** To gather information on the student experience and perceptions of the Q-Step programme; to draw comparisons between Q-Step and non-Q-Step students whenever possible. **Scope and coverage:** An online student survey was distributed to Q-Step and non-Q-Step students studying at each institution. We relied on Q-Step coordinators to disseminate this survey via email to avoid us holding students' personal information. We obtained a total of **221 responses from Q-Step students** (across 14 Centres) and **51 from non-Q-Step students** (across 7 Centres).
 Survey with Q-Step and non-Q-Step alumni	**Focus:** To gather information on alumni experience and perceptions of the Q-Step programme; to gather information on their current activities; to draw comparisons between Q-Step and non-Q-Step alumni whenever possible. **Scope and coverage:** An online survey was distributed to Q-Step and non-Q-Step alumni. We relied on Q-Step coordinators to disseminate the survey through their network, and through the Alumni LinkedIn page. We obtained a total of **83 responses from Q-Step** (across 10 Centres) and 28 non-Q-Step alumni (across 2 of those 10 Centres). This survey was implemented to minimise the risk of not getting access to the Graduate Outcome survey data, which we needed for our econometric analysis (see below).
 Interviews with employers	**Focus:** To gather information on the Q-Step work placements and their impact on the host organisations. **Scope and coverage:** We targeted 34 employers who provided work placements for Q-Step students and secured interviews with 25 (i.e. one or two employers for each Q-Step Centre.). We relied on Q-Step coordinators and Q-Step work placement coordinators to provide contact details of employers. This may mean that selected employers have a positive bias towards their experience with Q-Step; however, we did obtain a variety of views (positive and negative) through this exercise.

1.2.2 Secondary data

There are three main sources of secondary data analysis:

- **HESA data (provided by Jisc) on the numbers of students enrolled** in Q-Step modules and programmes. Student numbers by Q-Step programme were identified using a key word search on select course titles (by HE provider). Student numbers by module were identified using a key word search on select module titles (by HE provider) or they were identified on the basis of a Q-Step identifier included in the HESA data record, when this approach yielded an improved (higher) student number (see Appendix A)
- **Q-Step alumni LinkedIn group,** which provides a mapping of the positions occupied by Q-Step alumni
- **Graduate Outcome Survey,** which captures the perspectives and status of graduates 15 months after they finish their studies. The survey is conducted with the aim of helping current and future students gain an insight into career destinations and development.[4] The survey is used to estimate the impact of Q-Step on student outcomes (see the econometric analysis, Appendix B)

1.2.3 Econometric analysis

The econometric analysis is based on information from the Graduate Outcome Survey. The Graduate Outcomes survey provides a few options for outcome variables, and we include multiple outcome

[4] https://www.graduateoutcomes.ac.uk/. Accessed July 2021

variables in the analysis. The following categories/indicators are aligned to the Q- Step Theory of Change:

1. **Q-Step students more able to use their undergraduate skills in their future activities** – Graduates' reflection on activity by subject area of degree: "I am utilising what I learnt during my study in my current activity" (strongly agree = 1, other = 0)
2. **Q-Step students with better employment prospects** – Did you need the qualification that you completed 15 months ago to get the job? (Positive = 1 if Yes: both the level and subject of qualification was a formal requirement, or if Yes: the subject of the qualification was a formal requirement, other = 0)
3. **Q-Step students with better salaries**
    i) Highly skilled employment (based on main activity as reported in the Graduate Outcome Survey as classified by HESA)
    ii) Median salary

The control group consisted of students who had taken similar courses to those taken by Q-Step graduates but graduated from different universities. We selected students who, based on their prior grades, had the opportunity to apply for and enrol at a Q-Step Centre if they wished by only including comparable universities in the selection. Q-Step universities fall into the top third of the ranking according to the mean UCAS tariff score of their entrants[5] and thus only comparator universities from this top third were included. Any university that expressed interest in Q-Step at the time this funding was announced was excluded from the sample.

[5] The ranking was produced by the Department for Education in 2013/14 (the same year Q-Step was introduced). https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/584161/SFR01_2017_Technical_note.pdf. The ranking was updated in later years but all universities that met the criteria in 2013/14 were considered for inclusion. Accessed July 2021

The Q-Step Programme was set up within this context and is a response to the perceived shortage in quantitative skills of social sciences graduates. The programme rationale acknowledges that the lack of quantitative skills could lead to lower levels of employability and competitiveness in the job market and could also have a knock-on effect on the UK's status as a world leader in research and on the UK's economy more generally (BA, 2012). The Nuffield Foundation, the Higher Education Funding Council for England and the Economic and Social Research Council joined together to develop the Q-Step Programme.

2.2 The Q-Step programme – an overview

Q-Step was a £19.5 million programme funded by the Nuffield Foundation, ESRC and HEFCE,[11] launched in 2013/14. Q-Step was developed as a strategic response to the shortage of quantitatively skilled social science graduates.

The background paper, written to support the case for the programme, expanded further on the rationale for the intervention and set out specific aspects which would be included.

The overall objective of the Q-Step programme was *"to promote a step-change in quantitative social science education and training in the UK."*[12] There was a clear purpose for Q-Step to generate "sustainable institutional change that will increase the critical mass of quantitatively skill social scientists in UK universities."[13] The funding was to be made available to "Centres" for training and other activities, be available across a range of social science disciplines and also aim to ensure that some of the students' progress to postgraduate work and thus benefit the research system, as well as the labour market.

Other important aspects included in the background paper were:

- the focus on the strategic nature of the programme, whereby universities should feel encouraged to commit to the changes in the long-term
- the signal to wider stakeholders on the importance of quantitative training and the role of empirical evidence in the social sciences, thus encouraging engagement from others in the life course from schools through to universities (and research) and on to employers

The Q-Step programme was also set up to be "experimental", and "evolutionary and permissive", allowing time and scope for Centres to decide how best to implement the programme, and encouraging them to keep a degree of flexibility and creativity throughout the implementation.

Following an open competitive process, the co-funding partners awarded grants to social science departments in fifteen universities to establish Q-Step Centres to work toward the above objective. In addition to the 15 Q-Step Centres, a Q-Step Affiliate status was developed to recognise and support other universities planning to develop and increase their existing quantitative skills training in their own social science undergraduate programmes.[14] The Centres and Affiliates are listed in Table 2. The Centres and Affiliates were expected to develop and deliver specialist undergraduate programmes, including new courses, work placements and pathways to postgraduate study.

[11] HEFCE closed on the 1st April 2018 and has been replaced with the OfS (Office for Students) and UKRI (UK Research and Innovation). HEFCE provided funding until 2018.

[12] Official programme website at: https://www.nuffieldfoundation.org/students-teachers/q-step. Accessed July 2021

[13] Programme background paper made available to the evaluators

[14] Grundy, Steve. "The Past, Present and Future of Q-Step – A Programme Creating a Step-Change in Quantitative Social Science Skills." Numeracy13, Iss. 1 (2020): Article 2. DOI: https://doi.org/10.5038/1936-4660.13.1.2

These additions were expected to include appropriate attention to methodology and evidence at every stage of the degree programmes. There was also the expectation that these additions would provide more frequent and deeper exposure to quantitative methods and introduce a wider range of techniques embedded within the theories, research design and other aspects of relevance for each field.

In March 2018, the Nuffield Foundation Trustees, in agreement with the ESRC, decided to use some of the funding that was initially allocated to the programme, but not spent, to support an additional two years of Q-Step programme activity. This "transitional funding" aimed to maintain the momentum of the network and further advance the activities undertaken via the programme. The additional funding also provided Q-Step Centres with the opportunity to consider and implement additional steps to deepen their sustainability. All Q-Step Centres successfully applied for "transitional funding", as did two of the three Affiliates. This funding covered the academic years 2019/20 and 2020/21. At this stage all host institutions became Centres.

Table 2 Q-Step Centres

Cardiff University	The University of Kent
City, University of London	The University of Leeds
Manchester Metropolitan University	The University of Manchester
Queen's University Belfast	The University of Oxford
The University of Bristol	The University of Sheffield
The University of Edinburgh	The University of Southampton (*)(**)
The University of Essex (**)	The University of Warwick
The University of Exeter	University College London
The University of Glasgow	University of Nottingham (**)

(*) The University of Southampton withdrew from the programme in 2019. While the Centre does not exist as such, curricular activities (modules) have been sustained (**) Centres previously known as Affiliates.

2.3 The Q-Step programme Theory of Change

At the outset of the evaluation, the evaluation team developed a Theory of Change (ToC) for the Q-Step programme which identified the inputs and activities funded by the programme through the Centres as well as the expected outcomes and impacts.

In line with the scope and objectives of the programme, the ToC identified "impact pathways" for three types of stakeholders: Q-Step Centres (HEIs), students and employers:

- The funded Q-Step Centres – the programme set out to generate sustainable institutional change that supports an increase in the critical mass of quantitatively skilled social scientists in UK universities. It also aimed to ensure that funded institutions are encouraged to consider the issues at a strategic level, and to commit themselves to supporting the changes in the longer term, after the initial five-year funding
- Students taking the Q-Step programmes and/or modules – supporting students in their career trajectories by developing their quantitative methods skills applied to the social sciences
- Employers of Q-Step placement holders and alumni – the programme's ultimate purpose is to benefit academic research (in universities) and to meet the needs of the wider labour market by equipping social science students with skills that are relevant to employers

The ToC also identifies the implicit assumptions that lie behind the expectations of moving from activities to outputs, and from outputs to outcomes/impacts.

The ToC is presented in the table below (Table 3). The ToC has evolved during the evaluation, in line with the emerging findings. Specifically, the updated version includes additional outcomes/impacts. The first is the ambition to endow students with skills for the future (i.e. create adaptive learners and promote

success in whatever context the future brings).[15] The second additional expected outcome/impact is related to widening participation. Although this was not set out in the original objectives of the programme, this issue was widely discussed in interviews conducted as part of the evaluation. It is therefore incorporated into the ToC for completeness, and the evaluation collected evidence on this theme. Furthermore, some additional assumptions which underpin the programme logic were added.

Table 3 Theory of Change (ToC)

Stakeholders	Input	Activities	Outputs	Outcome/Impact
HEIs / Institutional 	Q-Step Funding Additional resources from HEIs Experience with previous funding schemes	Set-up and operation of the Centre (including governance, recruitment strategy, curricula development and marketing)	• Teaching staff more aware of pedagogical approaches to teaching quantitative methods • Degree programmes and modules • Linked graduate and postgraduate programmes • Extra-curricular events • Outreach events	• HEIs with curricula that equip graduates with a wider variety of research methods • HEIs with curricula that lead to graduates with higher levels of employability • Staff with improved "quantitative skills" teaching capacity • HEIs with an improved pipeline of postgraduates/PhD candidates • HEIs more successful in TEF submission • Positive contribution to the institutional widening participation agenda • Enhanced discourse about the balance between teaching and research
Assumptions	➢ Strong buy-in from the university/school-level leadership ➢ Continuous support from Nuffield Foundation		➢ Governance is set up and strategies are put in place ➢ Ability to adapt ➢ Modules do not operate in isolation from rest of curricula ➢ Strong leadership from Q-Step coordinator (continuity) ➢ Ability and sufficient opportunity to recruit and retain staff ➢ The necessary infrastructure (such as IT labs and software) is in place	
Students 	Additional resources from HEIs Q-Step Funding	Q-Step students enrolled in degree programmes and modules Outreach events and marketing	• Q-Step students improving in confidence using quantitative methods • Q-Step students improving in ability in using quantitative methods • Q-Step students more likely to undertake postgraduate courses to apply their quantitative skills	• Q-Step students with better quantitative research skills • Q-Step students with better skills for the future (i.e. create adaptive learners and promote success in whatever context the future brings) • Q-Step students with better employment prospects • Q-Step students with better salaries

[15] These are sets of skills that are generally referred to as being required for success in the 21st century workplace. These are, broadly, critical thinking and problem solving, communications and collaboration, creativity and innovation, information literacy, ICT literacy, teamwork, presentation and some others. https://www.skillsdevelopmentscotland.co.uk/media/44684/skills-40_a-skills-model.pdf. Accessed July 2021

Stakeholders	Input	Activities	Outputs	Outcome/Impact
			• Q-Step students enrolled in work placements • Q-Step students select dissertations focusing on quantitative topics • Increased awareness among Q-Step students about study and working opportunities using quantitative methods • Q-Step students improving their skills for the future	
Assumptions			➢ Taking part in the programme or modules has provided skills that are sufficient to make a difference in terms of employability and salaries	
Employers 	Q-Step Funding Additional resources from HEIs Q-Step Funding	Students graduating from Q-Step programmes and modules Q-Step Students enrolled in work placements Outreach events and marketing	• Access to students with relevant skills • A workforce with better skills • Fewer resources allocated to training	• Higher productivity • New ideas brought to the employer
Assumptions	➢ Employers have the ability to take on Q-Step students on placements ➢ Employer engagement leads to improved employability		➢ Taking part in the programme or modules has equipped students with skills that are relevant to employers	

The ToC has guided this evaluation and is used throughout the report to help the reader navigate the sections where the impacts at the HEI/institutional, students and employer levels are presented.

3 Q-Step programme implementation

3.1 Introduction and key findings

In this section, we present an analysis of the implementation of the programme across the Q-Step Centres. A number of aspects of programme implementation link directly to the impacts of the programme at HEI/institution, student and employer level and will be addressed in the subsequent sections.

Key findings:

- In line with the objectives of Q-Step, almost all Q-Step Centres have launched new quantitative methods modules. 236 modules and 81 Q-Step Programmes are up and running. On average, between four and five degree programmes are on offer per institution. Additionally, five of the Q-Step Centres offer postgraduate courses.
- A total of 1,101 students are estimated to have taken up a Q-Step degree programme in 2019/20: this represents a fivefold increase in comparison with 2014/15. 11,171 students took up Q-Step modules in 2019/20, up from 8,813 in 2015/16 (based on available HESA data).
- The average number of students who have taken a Q-Step module at universities where QM is a basic requirement is 961, more than three times higher than the average student number at universities where QM is not a basic requirement, which is 280.
- Q-Step provides a successful proof of concept for producing quantitatively skilled social scientists. For critical mass to be achieved, more universities would need to embed a Q-Step approach in their programmes (2019/2020 HESA student statistics show around 164,000 undergraduate students enrolled in social sciences in total).
- There is a degree of variation in terms of implementation, of the programmes and modules – guided by the different organisational structures and decision making processes of the individual institutions.
- The evaluation also identified success factors which support the implementation of the programme. These are the need for internal coordination and continuity of staff, leadership support, investment and support in staff and alignment of the programme goals with institutional objectives.
- The overall implementation approaches have been adapted over time with examples of: deeper integration into the school and faculties; increased discipline-specific modularity; a shift from first to second year recruitment; and a broadened student discipline base (from the social sciences).
- Recruiting prospective students for full degree pathways has proved challenging. Most Centres find that a dual approach that combines both full degree pathways and modules is the most effective way to recruit students.
- New pedagogical approaches have been adopted and adapted for the delivered of Q-Step modules. Key features of the Q-Step approach are the inclusion of practical sessions to implement concepts/approaches learnt in the theory sessions, the use of real-world examples and small class sizes.
- Work placements, although resource intensive, are a successful part of the Q-Step offer. There is a growing trend towards credit-bearing work placements with evidence of the general development of employability skills alongside the practical application of quantitative methods.
- Additional activities which further enhance the student experience are also on offer. The activities come in a variety of forms and are aligned with the range of Q-Step core activities (the curricula, access to the programme, work placements etc.). Those which are student-centred are important for bringing the student community together. These activities have been challenging to sustain during COVID-19.
- Outreach and promotional activities are of pivotal importance to achieve the objective of the Q-Step programme. They have increased in intensity over the years and become more effective at targeting the intended audiences.

- Cross-Centre activities are important for the Q-Step Centres, but there have been more limited opportunities than expected. They provide a space for learning, motivation and networking and are valued by the centres.

Q-Step is implemented in a number of different ways across the Q-Step centres. However, there are five dimensions of the models of implementation which are discussed in the following sections:

- The **coordination patterns** across the network
- The approach to **introducing modules** for the teaching of quantitative methods. This includes a discussion on the **"dual approach"**, whereby Centres implement specialist degrees (e.g. "Criminology with Quantitative Methods") and modules that could possibly lead to specialist degrees
- The **pedagogical approaches** adopted and adjusted for the delivery of those programmes and modules
- The **work placements** and **activities to further enhance and support the student experience**, including summer schools, bootcamps, (data) help desks, among others
- The series of **promotion and outreach activities**

These dimensions are presented in the sub-sections below, along with a description of **cross-Centre activities** that have also taken place as part of the programme implementation.

3.2 Coordination patterns across the network

There is no "one specific coordination approach" which stands out across the Q-Step network. Coordination patterns vary considerably across the Network, and for good reasons. In half of the Q-Step Centres, the programme has been implemented through involving one department or school, either Sociology or Social Sciences, while other more complex set ups involve up to five or seven departments. In more than three quarters of the Centres, Q-Step is led by one department, while in three of them, more than one department jointly leads. In approximately one third of the Centres, a Q-Step steering committee/board/group has been set up in order to advise on the implementation and coordination.

The Q-Step Centre profiles which have been produced as an annex to this evaluation report provide more detail on these individual approaches (and the context in which they operate) and can serve as important information for any future plans for individual HEIs looking to implement equivalent activities. Overall, the approach is guided by the individual institutional set up.

3.3 Programme modules and numbers of students

3.3.1 Overview

Almost all Q-Step Centres have launched new quantitative methods modules. 236 modules have been set up to align with the Q-Step agenda, and 81 Q-Step programmes are up and running**.** On average, between four and five degree programmes are on offer per institution. Additionally, five of the Q-Step Centres offer postgraduate courses (see Table 4). The 236 modules include new modules as well as modules that have been adapted or enhanced to align with the Q-Step agenda.

Table 4 Number of Q-Step programmes and modules, by funded centre

	Number of programmes – September 2019	Postgraduate offer (as part of Q-Step Centre)	Number of modules – September 2019
Cardiff University	1	No	6
City, University of London	5	No	9
Manchester Metropolitan University	4	Yes – 1	15
Queen's University Belfast	1	No	6

	Number of programmes – September 2019	Postgraduate offer (as part of Q-Step Centre)	Number of modules – September 2019
The University of Bristol	14	Yes – 6	17
The University of Edinburgh	6	Yes – 1	24
The University of Essex	2	No	22
The University of Exeter	5	Yes – 1	23
The University of Glasgow	6	No	7
The University of Kent	6	No	18
The University of Leeds	6	No	17
The University of Manchester	6	No	16
The University of Oxford	3	No	4
The University of Sheffield	2	No	20
The University of Southampton	0	No	5
The University of Warwick	5	Yes – 3	16
University College London	4	No	6
University of Nottingham	5	No	5
Total	81		236
Mean	4.5		13.1
Median	5.0		15.5

Source: HESA data and Technopolis (2020) – based on a 2019 survey with Q-Step Centres.

There are four routes via which students access the programmes and/or modules. Students can:

- Enrol on a Q-Step degree programme at the beginning of their studies (Q-Step pathway)
- Undertake Q-Step modules in the first year and then make a decision on whether or not to carry on with a Q-Step pathway (with the first-year modules being mandatory for all students enrolled in a degree in a department that implements Q-Step)
- Elect to undertake Q-Step modules and receive a qualifier (+QM) at the end of their studies or transfer to a QM degree programme in year two or year three
- Elect to undertake Q-Step modules as part of their degree without having to be part of a Q-Step pathway at any point in time

The majority of the funded Centres aim at providing exposure to a beginner/intermediate level of quantitative skills for most students enrolled in the departments that implement Q-Step. In addition, they aim to upskill a smaller group of students with more specialist quantitative skills.

In a sense, all students enrolled in the departments that implement Q-Step could be qualified as Q-Step, but they will have different levels of exposure. Additionally, students who are taking a degree in a department that is not (directly) implementing Q-Step can also have access to Q-Step modules (i.e. modules that are newly created or revised with the support of Q-Step funding), which in turn is promoting positive spillover effects at the institutional level.

In nine of the 18 Q-Step Centres, QM exposure is a requirement for all enrolled Social Science students. The other nine Q-Step Centres do not require all students to take one or more basic QM modules.

We estimate that a total of 1,101 students have taken up a Q-Step degree programme (e.g. "Criminology with quantitative methods"). This represents a fivefold increase in comparison with

2014/15. **In addition, 11,171 students took up Q-Step modules in 2019/20, up from 8,813 in 2015/16, based on available HESA data.**[16]

This also represents circa 30 per cent of the total number of students who enrol in (comparable) social sciences courses across the 18 Q-Step Centres in 2019/20 according to HESA Student statistics[17] (12,272 out of 40,425).

Put in context, the total numbers of students with high exposure to Q-Step (i.e. Q-Step programme students) are relatively low in comparison with the total number of undergraduate students enrolled in social sciences in 2019/20 (circa 164,000 according to HESA Student statistics).[18]

This is not surprising since the programme only covers 18 HE providers (and only some of the HE social science departments/schools of these HE providers). The programme has also not targeted all social science subjects (for example it excludes economics, business, and in most cases, social psychology). However, these numbers provide a sense of scale and show that the programme was not widespread enough across the higher education sector to overcome the shortage of quantitatively-skilled social science graduates in the UK. However, as a proof of concept, the results of the evaluation provide evidence of the impact of the programme on the university offer, on students and on employers alongside recommendations for scaling up the effects or facilitating further positive spill over going forward.

The average number of students who have taken a Q-Step module at universities where QM is a core requirement is 961, more than three times higher than the average student number at universities where QM is not a core requirement, which is 280.

Further explanation and data are provided in Appendix A.

3.3.2 Main changes over time

From an evolutionary perspective, we can identify the following main changes in the implementation of the programme over time:

- A move towards a **deeper degree of embeddedness** of the quantitative methods (QM) element in the curricula, and a greater degree of integration of Q-Step in Schools, both aimed at making Q-Step modules an integral part of the institutional offer, to ensure sustainability. Based on interviews with Q-Step coordinators, lectures and representatives of host universities we conclude that Q-Step is embedded within 15 Centres
- A **shift away from single modules** which are using material from several disciplines, and where the same content is delivered across a number of different Schools and Departments, to more discipline specific modules which have been created specifically for one School or Department with tailored content. This shift is also connected to an increased embeddeness within disciplines. This was mentioned by at least four Centres (City, University London, Queen's University Belfast, The University of Manchester, University of Nottingham)
- An **slight increase in modularity**, organising all activities related to the work placement into a module and all activities related to students' supervised research for their final dissertation, into a dissertation module (although this is only present in two Centres, The University of Exeter and The University of Bristol)
- An **emerging trend to shift away from 1st year recruitment** in some Centres (The University of Kent, The University of Glasgow and Queen's University Belfast) towards internal recruitment of second and third year students, or providing QM modules for existing degree programmes

[16] Q-Step modules can only be identified in HESA data from 2015/16 onwards.

[17] Based on number of HE students enrolled in all Social Studies across the 18 Centres, first degree, full-time.

[18] Based on number of HE students enrolled in all Social Studies across the UK, first degree, full-time.

- **Widening the offer** to a broader range of students enrolled in Humanities, Journalism, etc. with at least one Centre already doing so (The University of Bristol) and virtually all Centres expressing interest in expanding the offer (e.g. Q-Step modules) to other disciplines

On the four points, it is important to note that from the outset, many Centres opted for a dual approach, delivering quantitative skills training in the form of full degree pathways or in the form of one or more modules, which are either compulsory or optional. Q-Step students taking Q-Step modules can switch to a full degree pathway at the beginning of the second and, in some cases, the third year.

Coordinators unanimously agree that recruiting prospective students for full degree pathways has proved challenging since:

- The quantitative component of a degree programme is difficult to promote to prospective students choosing Social and Political Sciences, because quantitative training is often not the reason why they initially chose this subject. Those students may not feel equipped or inclined to take on programmes with a heavy quantitative component
- There is competition with other degree programmes that are attractive to students who are interested in pursuing quantitative methods (economics, social psychology, etc.)

Some centres have mitigated these challenges by only offering Q-Step from the second year, as in the case of The University of Glasgow, and from the third year in the recent case of The University of Kent, which switched the delivery of Q-Step modules from being available throughout the three-year course to offering it exclusively in year 3. This means they can recruit exclusively from their existing cohort of students and not from a prospective student population. These decisions were based on the fact that third year students were deemed better able to connect what they learn about quantitative methods with the subject matter they are studying. Attrition is much less frequent and, as a result, it is a more efficient and sustainable way of running the Q-Step programme.

These are not isolated cases: at The University of Nottingham and at Queen's University Belfast students cannot enrol in a Q-Step degree programme through UCAS. Queen's University Belfast decided to dispense entirely with direct entry via enrolment through UCAS to its BSc – *Sociology with Quantitative Methods* course, instead delivering Q-Step modules in non-Q-Step degree programmes. This approach, which was viewed as more sustainable and less pressurised by the coordinator, gave birth to "minor degree pathways" whereby students major in a discipline and graduate with a minor in research methods. Q-Step is thus no longer responsible for recruiting prospective students for degree programmes; instead students can choose it as an add-on in the form of a "*with Quantitative Methods (QM)"* badge.

The "minor degree pathway" with the Q-Step component was the first to be established at Queen's University Belfast and was described in the interview as "ground-breaking", with Queen's now having several other such minor degree pathways in the pipeline. This was possible because Queen's University Belfast's statutes state that students whose courses accrue sufficient credits in mathematical disciplines can graduate with a degree citing maths.

The delivery of Q-Step at both Manchester Metropolitan University and City, University of London can be viewed as examples of how the pace at which students are exposed to quantitative training matters for their continuation through to "dissertation with QM". City, University of London and Manchester Metropolitan University have adopted a light-touch approach to encourage retention in the first year, with the former choosing to have a group project module, and the latter featuring a statistics module worth only 15 credits. The aim of this approach is to retain students, to build confidence and persuade them that they have the competence and intellect to be able to use statistics. The second year at Manchester Metropolitan University is designed to increase exposure as students become more confident in QM, and students can choose to take two modules of 30 credits each to be awarded their degree 'with QM' (a choice they can make in year one); the third year features advanced statistics. This gradual student-centred approach seems to be effective because a large percentage of students are retained and choose to go into the third year.

The coordinator of The University of Manchester Q-Step Centre reported that out of ten Social Science students starting the Social Research Methods and Statistics Master's Degree (an advanced

postgraduate programme at the University of Manchester which is not part of the Q-Step programme), half came from the "full degree pathway", and the other half came from the "modules pathway". This indicates that the latter is as effective at engaging students in the study of quantitative methods, as shown by the successful recruitment of students for quantitative postgraduate degrees.

In effect, the "modules pathway" facilitates a smooth transition towards QM for those who might otherwise not have considered it, and ensures that Q-Step delivery is not limited to niche undergraduate programmes. It is for this reason that the "modules pathway" is effective at realising the goals of the Q-Step programme by bringing QM to a larger and diverse pool of students. Students who take even just one module increase their opportunities to become (re)acquainted with numeracy skills and data, encouraging some of them to opt for postgraduate training with QM. Our econometric analysis (see Section 4.2.2.2) shows that students taking part in Q-Step modules show better results in terms of career prospects.

3.3.3 Identified key success factors for programme implementation

During the evaluation, a number of key success factors were identified which are important for the effective implementation of Q-Step. These are covered in detail in the section on the sustainability and scalability of the programme (Section 1), but are also referenced here as they directly support the effective implementation of the programme.

- Internal coordination and continuity of staff – Q-Step coordinators are shown to play an important role in the implementation of the programme and achievement of results
- Leadership support – Across the Q-Step Network, Q-Step teams have benefited from support from the leadership at their universities. There needs to be someone at the decision-making level who drives the quantitative skills/data analytics agenda
- Investment in and support for staff – The retention of Q-Step staff is a major success of the programme. The Q-Step Centres' home universities are overall committed to funding the Q-Step teaching posts, as well as to keeping the courses and modules running because of the student and employer demand
- Alignment with institutional objectives – Q-Step is well aligned with the institutional objectives of the host universities. In many cases Q-Step has been mainstreamed into the university offer and linked to other related initiatives at the university

3.4 Pedagogical approaches

Within the pedagogical approaches used, we have identified at least four types of key attributes to implement and deliver Q-Step teaching, as summarised in Table 5.[19]

Table 5 Main pedagogical attributes of Q-Step

Attribute	Detail
Theory/practice balance	Q-Step teaching has been implemented with a combination of theoretical sessions (lectures) and practical labs and classes. Lectures have typically been either paired with immediately subsequent practical labs/seminars or the labs/seminars happen several days after the lecture.
Teaching materials used	Teaching quantitative research methods has been delivered using real-world cases and real-world data (e.g. crime statistics, election data, census and demographic data) in order to allow students to see the linkages between the numerical data (and the methods of working with them) and the world around them. This then helps to better ground their work in relatable contexts. Q-Step lecturers have used data from either their own research, public datasets (e.g. the European Social Survey data) or data that students themselves have collected, typically those in the later years.

[19] There exist, of course, variations across all Q-Step Centres in terms of the pedagogy applied to the Q-Step courses/modules.

Attribute	Detail
Specialist software used	The Q-Step Centres have used a wide range of statistical software in their teaching and classes. Understanding and being able to use statistical software is a very important skill that students can later offer to their future employers. There is no harmonised approach across the Centres to using a particular statistical software. Universities work with SPSS, Stata, R, Python, POPgroup and Excel. Some students are also taught how to code qualitative data (most commonly in NVivo) and then process the data using quantitative methods.
Class size	In terms of class size, these have tended to be small with between five and 12 students involved in each class, on average. This has allowed students to have a regular dialogue with, and support from, academics. The smaller class sizes have also allowed for more manageable group work sessions that contributed both to a stronger cohort bond and the development of teamworking skills, as cited by students in the focus groups.

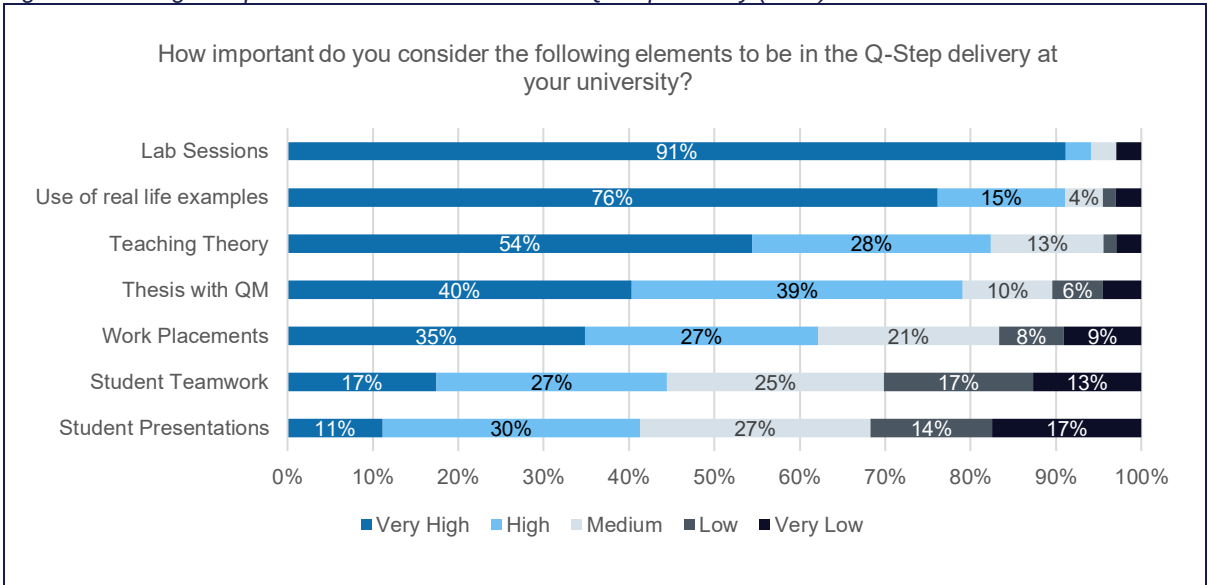
Source: Technopolis (2020)

A common feature, and key difference between Q-Step programme (and modules) and other existing courses is that it provides "practical" time (via, for instance, lab sessions) so students can implement what they learn in their theory classes.

At approximately a quarter of the Q-Step Centres, students are introduced slowly to quantitative methods during their first year, the main purpose of which is to allow them to make the transition from their previous (non-quantitative) studies and avoid higher rates of drop-out.

Looking at the results of the survey with Q-Step lecturers, it is very clear that they consider the practical aspects of teaching to be the most important. Approximately 94 per cent of the respondents believed that the importance of lab sessions was either very high or high. Similarly, the importance of the use of real-life examples was considered to be very high or high by 91 per cent of the respondents (Figure 1). This was followed by teaching theory (82 per cent).

Figure 1 Rating of importance of various elements of Q-Step delivery (2020)



Source: Technopolis Survey Analysis – Respondent base: 68

Several respondents also added text comments to the survey about teaching methods:

- **Student-teacher ratio.** This has allowed students to receive the support they needed
- **Sense of community amongst Q-Step student year cohort**. This has encouraged the build-up of a longer-term student network
- Other comments focused on the positive contribution of independent work in assignments, in assessed work and on the opportunity for students to transfer from a non-quantitative-methods-based BA programme to a quantitative BSc programme

Through their responses to open-ended questions and their feedback in the online survey, lecturers expressed passion for the subject they teach and a strong desire to implement research-led teaching and share the most effective pedagogic materials in order to continuously improve the teaching of research methods. One lecturer wrote:

> *"Working with the Q-Step Centre provides me with an enormous sense of pride. I have developed a strong pedagogic approach that is continuously developing and has helped me share knowledge and experiences with other practitioners and that has helped improve their teaching. I believe the work I do with Q-Step sets up students for life and am so glad to be a part of it."*

As transpired from the interviews with coordinators, a number of lecturers have published articles about innovative pedagogic approaches, some tested during Q-Step courses, in peer-reviewed journals, making important contributions to the pedagogic discourse concerning quantitative methods. One lecturer wrote:

> *"It has been a pleasure to be involved, as it has allowed me to teach the creme-de-la-creme students who have kept me on my toes, and I often feel I learned from them, and from the teaching process, as much as they learned from me."*

To complement the findings from the survey with lecturers, we also surveyed Q-Step students, and asked them a similar question on the pedagogical approaches in their Q-Step courses and modules. Students much appreciated the use of real-world data (89 per cent of the respondents were either very satisfied or satisfied). Similarly, students appreciated the opportunities to work with statistical software (83 per cent) and the balance between theory and practice (80 per cent). More results on students' feedback are presented in section 4.2. The findings above have also been confirmed by the interviews with the Q-Step coordinators and the representatives of the university leadership, who provide additional insight. Overall, they see the programme as broader than simply teaching quantitative methods embedded in social science disciplines. As they pointed out, Q-Step is about making sure that students are data literate and are ready to engage with real-world data. This also includes their ability to manage the data, collect it, manipulate it (e.g. clean it) and acquire a professional attitude towards working with the data (e.g. understand the right course of action when an error has been encountered).

3.5 Work placements

A key characteristic of Q-Step is the inclusion of **work placements** (which was encouraged as part of the funding conditions and taken up by most Centres)**.** Work placements have been offered to Q-Step students in a variety of formats. Interviewees described the two aims of the work placements as follows:

- to provide students with an opportunity to practise data analysis in a real-life environment
- to professionalise the skills students learnt in their degrees and modules

These objectives are clearly aimed at increasing student employability and are relevant to the current job market. In the last two years, some Q-Step Centres have transformed the placement from extra-curricular into a curricular activity, typically by introducing a credit-bearing module that, from the student perspective, consists of undertaking the work placement and, prior to that, attending training sessions aimed at equipping the students with soft skills (e.g. presentation skills, teamwork). In this new form, students do not get paid, but they are reimbursed for any additional costs incurred (in the past this was set up differently).

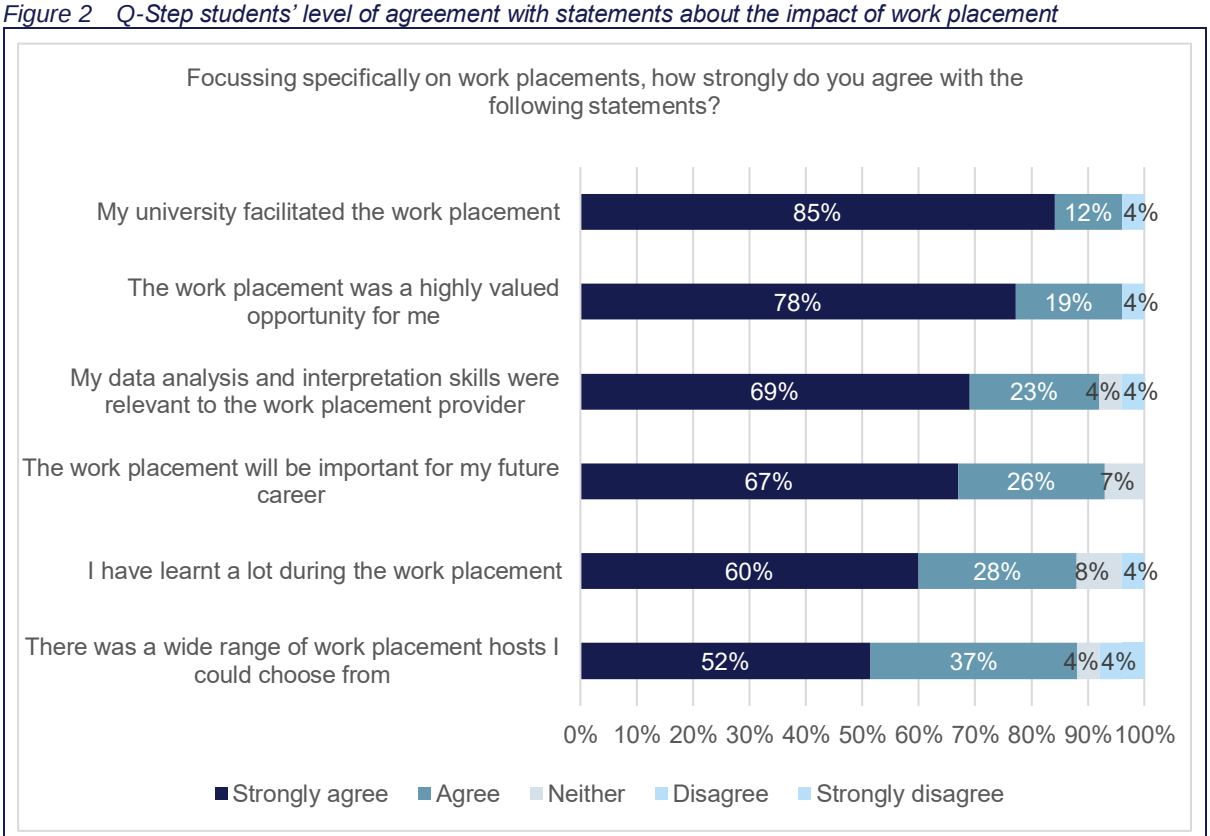
Fifteen Q-Step Centres have rolled out a Q-Step work placement scheme and thirteen of these have appointed a Q-Step work placement coordinator dedicated to organising and curating this aspect of the programme. Interviews with Centre coordinators and placement coordinators highlighted how the

organisation of these work placement schemes required considerable resources. **The work placements are highly rated by students, alumni, employers, lecturers, and Q-Step coordinators**.

In the student survey, Q-Step students who said that they participated in a Q-Step placement (29 out of 211)[20] were asked to agree or disagree with six statements about how they perceived the impact of the work placement on their learning outcomes and career prospects, and also whether the university facilitated the placement. There was consensus among respondents that the work placement had a positive impact on their learning outcomes. They also thought that this would have a positive impact on their future career opportunities (although, naturally, this is something that may only materialise in time). They also strongly agreed that the university facilitated the work placements and that the learning acquired at university (courses forging data analysis and interpretation skills) gave them relevant skills to bring to the placement provider. As shown in Figure 2, between 89 per cent and 97 per cent of respondents agreed on the six statements presented to them.

Weighted mean ratings for each of the six statements about the impact of Q-Step work placements on students had a score corresponding to "strongly agree".

Figure 2 Q-Step students' level of agreement with statements about the impact of work placement



Source: Technopolis Survey – Respondent Base: 27

Q-Step coordinators mentioned in the interviews that one of the most attractive features of the Q-Step placement programme is the fact that students were paid. This allowed students, who would typically seek paid work during the summer (or work throughout the academic year in a part-time job), to take

[20] Note that the survey includes students who are still in year 1 and 2, so not eligible yet for a work placement (at least in the majority of Centres) and Q-Step module students for whom this activity was not available (again, at least in the majority of cases). These figures need to be taken with caution given the small sample size.

on a Q-Step work placement. To date, apart from some exceptions, the work placements have been partially or fully supported by the external funding; this is no longer the case from the start of the academic year 2021/2022, and communication to this effect has been published, for example on University College London's website.[21]

There is variability with respect to the format of work placements, although two main formats seem to be the most popular:

- Full time model: 4–8 weeks over the summer between the second and third year of undergraduate studies
- Part time model: one day per week during the Autumn and Spring Term of the second year of undergraduate studies (cadence and duration of the placement may vary)

The number of students doing work placements has generally increased (up until March 2020). This trajectory was curtailed by COVID-19, with many placements moving online and a large minority either being cancelled or not organised in the first place.

All coordinators agreed that they have seen a difference in confidence and competence between those students who had done a work placement and those who did not. The impact of work placements on student acquisition of work-ready skills, and thus on their career prospects is discussed in the Section 4.2.2 below, while the impact on employers is presented in Section 4.2.3.

3.6 Activities to further enhance the students' experience and learning

Q-Step Centres have also put in place activities to further enhance students' experience and learning, which tend to be optional and may or may not be credit-bearing.

They are also often aimed at a broader university population (including Q-Step and non-Q-Step students and academic and non-academic members of staff). As highlighted, they have a number of purposes including raising awareness and interest in quantitative methods, addressing and meeting specific needs for QM advice (academic advice) and also for support with employability (associated with work placements or wider events on the employer landscape). Results from the qualitative analysis converge in identifying the most common forms of activities offered by Centres:

- **Summer Schools** are a frequent offer of Q-Step Centres. The purpose of Summer Schools is to offer a taster to prospective Q-Step students, to support with additional intensive training for the existing Q-Step cohort and to provide training for students who cannot enrol in Q-Step courses
- **Bootcamp training and other training sessions** aimed at students who are about to carry out a work placement (to help students to prepare for the tasks ahead) or aimed at providing professional development for students before leaving university. Students rated these sessions invaluable for forging employability skills
- **Master Classes organised and run by the Q-Step teaching team**; in some cases these are co-designed with students or co-run with guest speakers. One Centre designed Master Classes offering methodological topics alongside topics of social or political interest and registered an increase in uptake from a variety of departments. As of the summer of 2020, some Centres have developed online Master Classes
- **Helpdesk and Drop-in Clinics** offering support with statistical advice open to all university students and academic and non-academic members of staff; Clinics can be run or co-run by students; in interviews and through the online survey, students mentioned how beneficial it was to take part in this activity for their confidence and to improve their communication skills

[21] Note about work placements to being guaranteed in 2021/22 appearing on University College London Q-Step Centre website on 19/02/2021 at: https://www.ucl.ac.uk/q-step/. Accessed July 2021

Other activities include poster presentation events, an award ceremony for best quantitative dissertation, away weekends and guest speaker lectures.

Coordinators and lecturers underlined how making these student-centred activities is important in bringing the Q-Step student community together. Mentoring, buddy or peer schemes were rated by both lecturers and students as useful both to the more experienced students – e.g. second year Q-Step students and to those at the receiving end – e.g. first year students. University College London Q-Step Centre established a **Q-Step Student Society** running a Student Buddy Scheme, where first year Q-Step students are matched with a second- or third-year student who provides mentor support.[22] The Q-Step Student Society also aims to build links between University College London Q-Step students and people and organisations working in data science.

A less conventional example of student-centred (extra-curricular) activity is **Data Day,** an event organised by the Q-Step team at Manchester Metropolitan University, with the "Data Leaders of the North",[23] a community of "data enthusiasts" established in 2018. At Data Day, representatives of organisations working with data gather to talk to students about their work and how they became Data Analysts. For example, Mediacom,[24] one of the biggest media companies in the world, took part and exemplified how they explain in simple terms the statistical aspects of a task to their clients, and then students had to attempt to break down the task into simple blocks. Students appreciated the real-world sessions, tackling real problems to solve through data analysis and interpretation.

Extra-curricular activities have been flagged by the majority of Q-Step coordinators as being challenging to sustain in the future due to two main external factors:

- The COVID-19 pandemic has meant that many of these events were cancelled in the last 12 months; it is difficult to tell if and when they will be resumed
- Extra-curricular activities have been principally funded by Q-Step funding and therefore the end of this funding may also mean that these events can no longer be funded

3.7 Promotion and outreach

In this sub-section we provide an analysis of the outreach and promotional activities carried out by Q-Step Centres.

The broad aims of the **promotional and awareness activities** organised by the Q-Step Centres have been awareness about quantitative methods and to encourage engagement with the topic, with students and with external audiences. Interviewees unanimously stated that the promotional and awareness activities were of pivotal importance to achieve the objective of the Q-Step programme.

Promotional and awareness activities have increased in number over the years and have become more effective with their target audiences. Compared with the findings of the 2018 analysis, when only about half of the Q-Step coordinators mentioned these types of activity in interviews, in the 2020 qualitative analysis, outreach emerged as a substantial element of the Q-Step planned activities for the majority of Q-Step Centres. Naturally, the extent of the outputs varies, with some Centres deploying substantial resources for this activity, whilst others carry out activities on an occasional basis.

In terms of internal activities, a number of coordinators said that they shifted the target of their Q-Step promotion from prospective students to first year students who are enrolled in comparable non-Q-Step courses to encourage them to convert to Q-Step. One example of internal promotion of the Q-Step

[22] The University College London Q-Step Student Society at: https://www.ucl.ac.uk/q-step/student-society. Accessed July 2021

[23] The Data Leaders of the North at: https://open.spotify.com/show/1d9f8CvYEwbJMbzfgYPDKf. Accessed July 2021

[24] Mediacom Worldwide at: https://www.mediacom.com/en/. Accessed July 2021

programme consists of organising short promotional speeches at the end of non-Q-Step lectures to invite students to join the programme.

Promotional activities targeting external audiences undertaken in the last two years include:

- **University Open Days** targeting prospective students and their families. This type of promotion involves a Q-Step stand, flyers and student testimonials
- **Web-based communication**: the Q-Step offer is usually promoted on the university's website, although it could give more prominence to videos of Q-Step students' experience and alumni case studies
- **Social media**: Q-Step is actively present on Facebook, Twitter, LinkedIn
- **Production of Q-Step short movies** available on YouTube or Centres' website
- **Promotional events** targeting existing and prospective work placement providers where students can present their research either via talks or poster presentations; some coordinators said that they would like to make these events with employers more frequent
- **Work with secondary school students and lecturers** to increase awareness of quantitative methods so that students can take quantitative training into consideration when making decisions regarding their "A-level" subjects and their subsequent course of study at university. This type of outreach work involves, *inter alia,* visits to schools, open door activities with universities, taster sessions organised by the Q-Step team, and interviews with schoolteachers

Although promotion is a responsibility of the Centres, a large group of coordinators felt that more could have been done to promote the programme by the external funders at a national level. In particular, Centres that have struggled to attract students for Q-Step courses make this argument. Additionally, promotional activities run by Q-Step Centres may be difficult to sustain from the academic year 2021/22, when the external Q-Step funding ends.

Some Centres have also engaged in **outreach activities**. One outstanding example comes from The University of Edinburgh Q-Step Centre which in 2019 set up the **Q-Step academy**,[25] a partnership between the Edinburgh Q-Step Centre and schools in The University of Edinburgh and the city region. The partnership provides free training and resources on statistical literacy for both staff and pupils in secondary schools in the Edinburgh city region, to raise the profile of social statistics, and to widen participation in higher education. This is particularly important given that many students abandon numeracy at the age of 16 and remain unaware of the possibility of combining a substantive discipline with quantitative training.

Given that the Q-Step team at The University of Edinburgh plans to continue this outreach work, an impact report[26] has been published to track and measure their efforts and achievements in this respect. A representative of leadership at The University of Edinburgh said that they view the work undertaken through the Q-Step Academy as giving back to society and adding value to the external funding received to support the Q-Step programme.

As with activities to further enhance the student experience and learning, outreach activities are being compromised by the COVID pandemic. For example, The University of Essex Q-Step Centre cancelled its plans to be part of "STEM-tacular" (formerly called "Big Bang"),[27] an outreach programme exposing 14-year-old students to science subjects at universities. It also cancelled plans to promote Q-Step at the Continued Professional Development Week held at The University Essex for local teachers, (where

[25] The Q-Step Academy at: https://q-step-academy.ed.ac.uk/. Accessed July 2021

[26] The Q-Step Academy Impact report at: https://q-step-academy.ed.ac.uk/wp-content/uploads/2020/06/Q-Step-Impact-2020.pdf. Accessed July 2021

[27] The STEM-tacular event at: https://www.essex.ac.uk/schools-and-colleges/events/stemtacular. Accessed July 2021

teachers were to be offered demonstrations of practical activities used in teaching statistics).[28] These plans are set to resume in 2021.

3.8 Cross-Centre activities

This sub-section provides an overview of cross-Centre activities. Cross-Centre activities refer to those activities and events that are either organised by the external funders (which involve all Q-Step-Centres) or are organised autonomously by Q-Step Centres and involve a smaller number of Centres. Those which are organised autonomously are typically based on geographical proximity or on personal relationships between coordinators.

These activities were positively rated, however, there seem to be only limited pockets of collaboration across the Q-Step Centres.

Findings from the interviews with Q-Step coordinators and from teacher survey responses carried out in 2020 reveal that when those cross-Centre activities took place, they were generally rated as important for three main reasons:

- They are a **learning opportunity**: they provide an occasion to showcase, share, and exchange innovative pedagogical practices and materials related to quantitative methods (e.g. real-life examples that are successful in explaining theoretical models)
- They are **motivational**: members of staff involved in the Q-Step programme across different Centres gather and become aware of the importance and status of the programme, and the pool of expertise and resources employed in it. This has worked well to raise motivation in the Q-Step teams
- They are a **networking opportunity**: lecturers in quantitative methods can discuss aspects of their specialist knowledge in statistical software and quantitative methods with colleagues from other centres; coordinators and lecturers can share their experiences in managing and coordinating Q-Step and how to overcome barriers and difficulties they may have in common

Centres did not manage to organise much in terms of cross-Centre activities and, as a result, did not share and get to know of each other's activities as much as was planned and expected at the start of the programme. According to findings from interviews and surveys, this was due to a range of factors:

- Insufficient central coordination for more frequent nationwide events
- Lack of Q-Step team's time resources to reach out to other Centres

Interviews conducted with Q-Step coordinators and representatives of university leadership reveal that a small minority of Centres succeeded in undertaking cross-Centre activities. For example, in 2019 The University of Exeter and The University of Bristol, being part of the advanced quantitative training pathways for PhD, managed to organise a Q-Step Festival[29] to celebrate six years of Q-Step with guest speakers and representatives of the wider Q-Step community (Q-Step teams from The University of Kent and Cardiff University were also invited). This cross-Centre activity was specifically focused on the postgraduate QM path, with the organisers reporting that an equivalent activity at undergraduate level would have been much more challenging to organise. There are also ongoing successful collaborations between the Q-Step Centres at Cardiff University and at Manchester Metropolitan University as they share a common pedagogical approach, and between the Centres at The University of Edinburgh and The University of Glasgow. Another example is the Royal Statistical Society panel

[28] CPD week programme to include teaching Sociology with Statistics at: https://www.essex.ac.uk/events/2020/04/01/cpd-week-using-maths-and-statistics-in-social-science. Accessed July 2021

[29] The University of Exeter's Q-estival 2019 at: https://www.exeter.ac.uk/news/events/details/index.php?event=9535. Accessed July 2021

organised by The University of Manchester, that brought together three Centres to discuss pedagogy at undergraduate level.

Collaboration and networking between the Centres are perceived as particularly valuable during the transitional funding phase[30] (from the 2019/20 to the 2020/21 academic years) given that most Centres are preparing their long-term plans to sustain Q-Step beyond the summer of 2021. However, this timeframe has partly overlapped with the COVID-19 pandemic period which has meant an increased workload for many members of staff, and many Higher Education Institutions having to function sub-optimally with the impossibility to meet physically. This situation has resulted in the inability to prioritise cross-Centre activities during the past twelve months.

In 2020 the Nuffield Foundation and the ESRC confirmed the intention to collect and curate as much of the teaching and learning materials as possible, created at Q-Step Centre level, and develop an open platform to ensure their free availability, which is still under development. Coordinators indicated that this will be a welcome tool.

[30] Grundy, S. 2020, The Past, Present and Future of Q-Step – A Programme Creating a Step-Change in quantitative Social Science Skills, Numeracy 13, Iss. 1 (2020): Article 2. DOI: https://doi.org/10.5038/ 1936-4660.13.1.2

4 The impacts of the Q-Step programme

4.1 Impact at the institutional level

In this section, we present and discuss the impact Q-Step has had on the Higher Education Institutions that hosted the programme, in line with the expected results as identified in the Theory of Change (an extract of which we present below). We focus here on the outcomes and impacts.

Key findings:

- Q-Step has helped institutions upgrade their educational offer for social science students, through introducing more diverse curricula and updating existing curricula on quantitative methods.
  - Q-Step has improved the teaching capacity in quantitative methods, and the impact of Q-Step on improving teaching standards is evidenced by mentions of Q-Step in multiple TEF submissions. As such, Q-Step helped to build a critical mass of excellence in teaching, through recruitment and upskilling.
  - Q-Step has contributed to a change in culture within the host organisations, providing a more inclusive and balanced space in which teaching, and research can be conducted using a diverse set of methodologies.
- The Q-Step programme has inspired institutions to further invest in major initiatives dedicated to the research and teaching of quantitative methods.
- Q-Step has impacted on research through increasing opportunities for undertaking postgraduate work which includes QM, increasing capabilities to train researchers and attracting additional funding.
- Q-Step has increased engagement with external stakeholders, in particular with work placement providers.
- Q-Step activities are being linked to institution's widening participation practices, although positive results are yet to be seen.

Table 6 ToC – HEI/Institutional

Stakeholders	Input	Activities	Outputs	Outcome/Impact
HEIs / Institutional 	Q-Step Funding Additional resources from HEIs Experience with previous funding schemes	Set-up and operation of the Centre (including governance, recruitment strategy, curricula development and marketing)	• Teaching staff more aware of pedagogical approaches to teaching quantitative methods • Degree programmes and modules • Linked graduate and postgraduate programmes • Extra-curricular events • Outreach events	• HEIs with curricula that equip graduates with a wider variety of research methods • HEIs with curricula that lead to graduates with higher levels of employability • Staff with improved "quantitative skills" teaching capacity • HEIs with an improved pipeline of postgraduates/PhD candidates • HEIs more successful in TEF submission • Positive contribution to the institutional widening participation agenda • Enhanced discourse about the balance between teaching and research
Assumptions	➢ Strong buy-in from the university/school-level leadership ➢ Continuous support from Nuffield Foundation		➢ Governance is set up and strategies are put in place ➢ Ability to adapt ➢ Modules do not operate in isolation from rest of curricula	

Stakeholders	Input	Activities	Outputs	Outcome/Impact
			➢ Strong leadership from Q-Step coordinator (continuity) ➢ Ability and sufficient opportunity to recruit and retain staff ➢ The necessary infrastructure (such as IT labs and software) is in place	

4.1.1 Impact on the institutional educational offer

There is qualitative and quantitative evidence indicating that the impacts listed in the Theory of Change were achieved by the majority of the Q-Step Centres. Q-Step has improved the teaching capacity in quantitative methods of virtually all the universities by introducing new curricula and training graduate students in a wider range of research methods. The education offer was also enriched with extra-curricular activities aimed at developing work-ready skills to boost student employability.

4.1.1.1 Increased quality of teaching and teaching standards

The majority of interviewees (representatives of institutional leadership, coordinators and lecturers) said that, **as a consequence of Q-Step, the universities hosting the programme were able to recruit better quality lecturers**. The University of Sheffield Q-Step Centre is one of the many examples where a university has recruited lecturers with strong quantitative expertise who could deliver advanced statistics courses and in addition were able to apply the most innovative pedagogy when introducing quantitative methods. **The impact of Q-Step on improving teaching standards is also evidenced by mentions of Q-Step in multiple TEF submissions**.[31] Another example comes from Cardiff University, where the school hosting Q-Step was said to have made a number of quantitative appointments (in addition to the Q-Step team), which would have been unusual before Q-Step.[32]

The impact of Q-Step is more evident in universities that did not have a tradition of teaching quantitative methods, but even in universities such as The University of Manchester and The University of Edinburgh with a prior tradition in implementing quantitative methods in social science curricula, **Q-Step helped to build a critical mass of excellence in teaching, excellence which was only previously seen in smaller pockets across the institutions.**[33]

Q-Step helped institutions upgrade their educational offer through introducing more diverse curricula and updating existing curricula by inserting highly specialised modules on the latest statistical software together with work placement modules (see Appendix A for a list of modules). Paid Q-Step work placements are perceived as employability boosters and have contributed to making the educational offer more relevant and appealing in institutions such as City, University of London and The University of Manchester; work placements also make a difference in widening participation in universities such as The University of Glasgow, which has a strong uptake of places from local students who are the first in their families to go to university.

4.1.1.2 Contribution to a change in culture

Q-Step has contributed to a change in culture. Interviews with coordinators and lecturers, conducted by Technopolis in May and June 2018, revealed a general and prevailing culture of resistance to QM within the (Q-Step Centres) host faculties and departments, which engendered a sense of academic isolation in those who wanted to pursue QM. In the data collection, subsequently undertaken nearly 30 months later, only a very small minority mentioned this situation; most interviewees described how the

[31] Grundy, S. 2020, The Past, Present and Future of Q-Step – A Programme Creating a Step-Change in quantitative Social Science Skills, Numeracy 13, Iss. 1 (2020): Article 2. DOI: https://doi.org/10.5038/ 1936-4660.13.1.2

[32] Technopolis interviews with members of staff

[33] Technopolis Interviews with members of HEI staff in leadership positions

2 Background and description of the Q-Step programme

2.1 Rationale for the Q-Step programme

The past decade has seen the advent and growing profile across science and society of big data and data analytics. These developments present an array of new possibilities across the social sciences, but also depart considerably from the conventional and well-established quantitative social science research techniques. While the UK is by no means an international laggard in traditional quantitative social science methods, there is concern about the extent to which the social science base – from undergraduate training up to the most senior academic level – has been able to fully absorb and exploit the possibilities of contemporary data analytics. Back in 2005 a HEFCE report noted that the "Shortcomings in the provision of quantitative skills development: Quantitative social science is a particular concern of the Economic and Social Research Council [ESRC], as supply is seen as insufficient, particularly as this subject underpins other disciplines".

The skills pipeline for data analytics and advanced quantitative methods more broadly remains a concern at a national level in many subject and occupational domains. This in fact begins even at skills provision at undergraduate level and extends not only to strengthening the capacity of social science researchers in UK universities but also to increasing demands for data literacy across the UK economy (and, therefore, the UK job market).

The recent report from the Centre for Data Ethics and Innovation[6] noted that shortages of data and digital skills could be a notable barrier in forging ethical Artificial Intelligence practices. Equally, whilst there are improvements in the graduate supply, it remains critical to develop skills (in a rapidly changing landscape) and prepare graduates for careers where their responsibilities may change but where their data understanding, and direction are still central. The recent ESRC report on research leadership[7] identified that even the ability to work with data managers will be an important skillset. Additionally, the policy paper from the UK Government "Quantifying the UK Data Skills Gap" finds significant demand for data skills within UK companies with almost half actively recruiting for roles requiring hard data skills and many struggling to recruit for these roles.[8] Even though the career advantages for graduates who are able to demonstrate knowledge of social data science/quantitative methods in social sciences were already described in the literature over a decade ago,[9] the data skills gap remains a challenge for employers.

Furthermore, the increasingly cross-disciplinary nature of research offers many opportunities for data-literate graduates: quantitative evidence often sits at the intersection between disciplines that are developing linked research programmes. Researchers may have to work in teams where data skills draw them together and these skills may be in short supply (as the Academy of Medical Sciences observed).[10]

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[6] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/894170/CDEI_AI_Barometer.pdf. Accessed July 2021

[7] https://esrc.ukri.org/files/research/fit-for-the-future-research-leadership-matters/. Accessed July 2021

[8] https://www.gov.uk/government/publications/quantifying-the-uk-data-skills-gap/quantifying-the-uk-data-skills-gap-full-report. Accessed July 2021

[9] MacInnes, J. (2009) *Proposals to support and improve the teaching of quantitative research methods at undergraduate level in the UK*, strategic advisory for the ESRC, available online at: https://esrc.ukri.org/files/research/qmi/final-report-strategic-advisor-for-quantitative-methods-proposals-to-support-and-improve-the-teaching-of-quantitative-research-methods-at-undergraduate-level-in-the-uk/. Accessed July 2021

10 British Academy report Count Us In: Quantitative skills for a new generation. Accessed July 2021

environment had changed to become a space in which teaching and research could be conducted using a diverse set of methodologies (quantitative and qualitative). Lecturers, members of staff in leadership positions, and coordinators have said that the introduction of lecturers with quantitative skills to departments (such as Sociology) with little tradition of quantitative methods helped change the culture and helped create an environment where both quantitative and qualitative methods are increasingly given similar (or equal) weight.

Even in the case of The University of Southampton, which was a Q-Step Affiliate but dropped out of the programme in 2019, the experience of Q-Step had an impact. The University of Southampton case shows a scenario where there was an existing adequate provision of quantitative training hence the implementation of Q-Step did not make a big difference. In this case, the consultation reveals that Q-Step led to a major change within the school with respect to how research methods are taught. This is a process driven by different departments, but it is also a response to Q-Step experience, through which lessons were learnt and a clearer awareness emerged about what was needed and what was already in place. This exercise on looking at the teaching of research methods will be completed in 2022.

At a more personal level, many members of Q-Step teams have reported that their involvement in Q-Step has resulted in them gaining a higher status within the department or creating opportunities to take up leadership positions, which could further support this cultural change in the future.

The Theory of Change also identifies that Q-Step could lead to an "enhanced discourse about the balance between teaching and research" (for lecturers); however, we have not found evidence in this regard.

4.1.2 Impact on wider initiatives

The **Q-Step programme has inspired institutions to make further investments in major initiatives dedicated to the research and teaching of quantitative methods.** The following institutes and centres have been founded or re-launched, with some modelled after the Cathie Marsh Institute for Social Research (CMI) at The University of Manchester:[34]

- Sheffield Methods Institute[35] (est.2014)
- Institute of Coding at Exeter University[36] (est. 2018)
- SPS Research Training Centre at The University of Edinburgh[37] (relaunched 2019)
- 3Di – the Data Discovery Institute (2021)

Members of the Q-Step team who were located in the same university and were already working together became a driver to pool resources, transfer innovative teaching and learning, and generate research propositions to attract external collaborations. Although many different contributions converged in the set-up of these initiatives, interviewees and survey respondents reported that **Q-Step acted as a catalyst,** harnessing the collective expertise in research methods and **building momentum by directing focus and energies.** As pointed out by a Pro-Vice-Chancellor at a university *"they have used Q-Step to prove the point: that there is a demand among students, that graduates are successful at securing jobs and that there is growing demand for those skills among employers. It's a positive story".*

These above-mentioned institutes and centres have a close and dynamic relationship with Q-Step team members, and many are affiliated to them. An example is the current Director of the Social and Political

[34] Technopolis interviews with representatives of institutional leadership and coordinators

[35] The Sheffield Methods Institute at: https://www.sheffield.ac.uk/smi. Accessed July 2021

[36] The Institute of Coding at Exeter: http://sites.exeter.ac.uk/instituteofcoding/. Accessed July 2021

[37] The SPS Research Training Centre at Edinburgh at: https://research-training-centre.sps.ed.ac.uk/. Accessed July 2021

Science Research Training Centre at Edinburgh University, who was involved in Q-Step first at The University of Manchester, and then at The University of Edinburgh.

These institutes have added value for their respective universities by attracting funding for research, promoting excellent and expert teaching (by continuing to sustain the QM offer at undergraduate and postgraduate level), and providing prestige and opportunities for collaborations. These institutes have built capability to train cohorts of students and junior researchers who will continue to produce research based on quantitative methods. These are examples of how the external funding received for the Q-Step programme was maximised and how the objectives of the Q-Step programme – one of which was to raise the profile of UK-based research in social sciences by equipping researchers with quantitative skills so that they could continue to produce high quality and diverse research in social sciences – were achieved.

The University of Edinburgh has also worked in collaboration with the Scottish Qualifications Authority to develop a new Advanced Higher in mathematics (the Scottish equivalent to A-Levels). The contribution of the Q-Step team was to include elements of the Social Sciences in the development of the Higher.

Q-Step also inspired activities which were smaller-scale but nevertheless may have a major impact and long-term beneficial effects. Many of the Q-Step programme lecturers are researchers who specialise in "research methods" pedagogy and publish research on their innovative pedagogical approaches, complementing the university's pre-existing body of knowledge. The fact that Q-Step was embedded within schools and departments created a renewed focus for the institutional leadership and academic members of staff to continuously address the balance between quantitative and qualitative approaches**.** Because Q-Step is a nationwide programme with a network of 17 key Higher Education Institutions throughout the UK, advocacy for the quantitative approach has been given a fillip that it would not have had without Q-Step.

Q-Step has also led to wider activities to further enhanced the student experience that have, in turn, contributed to enrich institutional teaching and research life and added value to the institutional research outputs. For example, some of the initiatives listed above, such as the summer schools, quantitative helpdesk (troubleshooting statistical issues, helping with dissertation research), maths café, and drop-in clinics (which offer a service not only to all students but also to institutional members of staff) have enabled and supported research outputs based on quantitative methods. One of these activities, co-run by Q-Step staff and students, started to be centrally funded having achieved recognition as a service which was meeting an institutional need.

There seems to have also been an effect on the ability to secure research funding. In one case, a Centre pointed out that they have seen a real step-change in **grant capture** (of around 5 per cent) – many of those grants having a strong data element. This not only means more financial resources for the university, but it also filters down into the curricula as students benefit from access to the research their lecturers conduct. This has also provided, in some cases, an opportunity for students to undertake small research projects within those grants.

4.1.3 Impact on institutional stakeholder engagement, promotion and outreach

The Q-Step programme has a strong element of experiential learning, with many Centres building a network of work placement providers who could host the Q-Step students for their internships. In many cases, this resulted in bringing local and often prestigious employers into contact with the universities, creating collaborations which are potentially long-lasting and can contribute in a major way to extend the range of stakeholders in the host institutions (i.e. beyond the Q-Step centres).

In terms of promotional activities, some Q-Step Centres, such as The University of Manchester Q-Step, were particularly active in raising the university profile through targeted and effective promotional activities, both offline and online, including the publication of a book which features case studies of Q-Step students, and the production of a series of videos of Q-Step students and alumni. Outreach work, with communities outside the institutions, carried out by the Q-Step teams also reflects positively on the

institution, raising its profile. Worthy of note in this respect is the work carried out by the Q-Step Academy at The University of Edinburgh (see section 4.1.2). [38]

4.1.4 Impact on the widening participation agenda

As mentioned above, the Q-Step Centres considered their institutions' widening participation strategies in the recruitment of students. This was not an original primary intention of the programme, however it was raised in interviews with the Centres since widening participation is an important consideration for all universities, linked to the requirement set out by the OfS.[39] This also aligns with the broader interests of the Nuffield Foundation and is central to the objectives of the Nuffield Research Placements, another of its programmes.

Q-Step supporting activities are relevant for all aspects of widening participation (access, continuation, attainment and progression). Access is supported through activities such as the summer schools, continuation and attainment is supported through activities such as the help desk for student dissertations and progression is supported through the work placements and other support for employability.

We find that in practice Q-Step Centres have aligned to their institutions' widening participation agenda to some extent. Six Centres pointed out (in 2018) that Q-Step allows disadvantaged students to improve their quantitative skills and participate in work placements, which they would have not been able to do otherwise. In one institution Q-Step is integrated into the institution-wide social responsibility agenda (The University of Manchester), which includes, besides widening participation, a focus on graduate employability, life environment etc. In the 2020 interviews, The University of Edinburgh also provided information on their Q-Step Academy (described above). This body has been established for outreach and supports widening participation reaching into disadvantaged areas.

However, data obtained from the HESA Graduate Outcome Survey shows that Q-Step students actually come from more privileged backgrounds, in comparison with social science students (from other universities). For example, the variable "Parental education" shows that a larger percentage of Q-Step students have parents who have HE qualifications in comparison with the control group (64–68 per cent vs 52 per cent). The data also shows that that a larger percentage of Q-Step students attended a private school in comparison with the control group (16–18 per cent vs 8 per cent). 27–31 per cent of Q-Step students attained a first-class degree, higher than the percentage of graduates from the control group (23 per cent). Some differences are also found when looking at the participation neighbourhood marker, gender, disability, and ethnicity.[40]

More positively, it is worth noting that ~60 per cent of Q-Step programmes and modules students are female. Again, this was not originally an intention of the programme but means that Q-Step has successfully supported the uptake of STEM skills by women.

4.1.5 Differences across Q-Step Centres

When evaluating the impact of the activities of the Q-Step Centres on their respective institutions, distinctions need to be made based on the typology of higher education institutions hosting the programme.

In institutions that already had a tradition of data-oriented research and teaching, and whose goals were aligned with those of the Q-Step programme, Q-Step went a long way, with the funding received bringing in further investments. This is the case of The University of Manchester, The University of

[38] The Q-Step Academy at: https://q-step-academy.ed.ac.uk/. Accessed July 2021

[39] https://www.officeforstudents.org.uk/advice-and-guidance/promoting-equal-opportunities/our-approach-to-access-and-participation/

[40] This data has been used as part of the econometric analysis presented in 4.2.3

Edinburgh, The University of Exeter and The University of Sheffield which will, consequently, sustain the implementation of the Q-Step programme and continue to endorse quantitative training.

This was not the case, however, with The University of Southampton and, to some extent, with The University of Essex. These were universities which, at the beginning of the programme, attained Affiliate status, which meant that they received a smaller amount of funding compared with the universities which attained the status of "Centre" (as explained in Section 2.2). Because both The University of Southampton and The University of Essex had a strong tradition of quantitative research and teaching prior to Q-Step, the funding received did not result in substantial differences at institutional level nor with respect to achieving the goals of the programme.

In institutions without a prior tradition of quantitative methods and that were new to data-literacy training, Q-Step had a strong impact in terms of enrichment of curricula, increase in staff expertise, widening of the educational offer for students, and enhancement of graduate student employability. This is the case with Manchester Metropolitan University, City, University of London and The University of Glasgow.

4.2 Impact at the student level

This section presents the results in terms of impact on students, again guided by the Theory of Change as presented below.

Key findings:

- Students reported high levels of satisfaction with all aspects of the Q-Step programme.
- Q-Step contributed to the acquisition of data interpretation skills, critical thinking and reporting skills among students.
- The majority of lecturers can identify differences in learning outcomes between Q-Step students and non-Q-Step students as a consequence of the Q-Step courses. Students displayed higher competence and a higher level of confidence in performing data analysis and interpretation and were more confident working independently in comparison with non-Q-Step students.
- Q-Step students consistently achieved higher marks and were awarded more student prizes than non-Q-Step students.
- Our econometric analysis shows that the Q-Step programme has a significant and positive impact on the salary, qualifications required for the job and the students' career prospects in terms of acquiring highly skilled employment.

Table 7 ToC – Students

Stakeholders	Input	Activities	Outputs	Outcome/Impact
Students	Additional resources from HEIs Q-Step Funding	Q-Step students enrolled in degree programmes and modules Outreach events and marketing	• Q-Step students improving their confidence using quantitative methods • Q-Step students improving their ability in using quantitative methods • Q-Step students more likely to undertake postgraduate course to apply their quantitative skills • Q-Step students enrolled in work placements • Q-Step students select dissertations focusing on quantitative topics • Increased awareness among Q-Step students about study and working	• Q-Step students with better quantitative research skills • Q-Step students with better skills for the future (i.e. create adaptive learners and promote success in whatever context the future brings) • Q-Step students with better employment prospects • Q-Step students with better salaries

Stakeholders	Input	Activities	Outputs	Outcome/Impact
[redacted]			opportunities using quantitative methods • Q-Step students improving their skills for the future	
Assumptions			➢ Taking part in the programme or modules has provided skills that are sufficient to make a difference in terms of employability and salaries.	

4.2.1 Satisfaction with the programme

We first present an analysis of the degree of satisfaction of Q-Step students with various aspects of the programme.

Online surveys with Q-Step students and alumni (which took place between October and November 2020) showed a very high level of satisfaction with the programme. Respondents were asked to rate their satisfaction with specific elements of Q-Step. The majority of respondents were mostly satisfied with the first 5 elements listed in Figure 3 below. They rated as particularly high the:

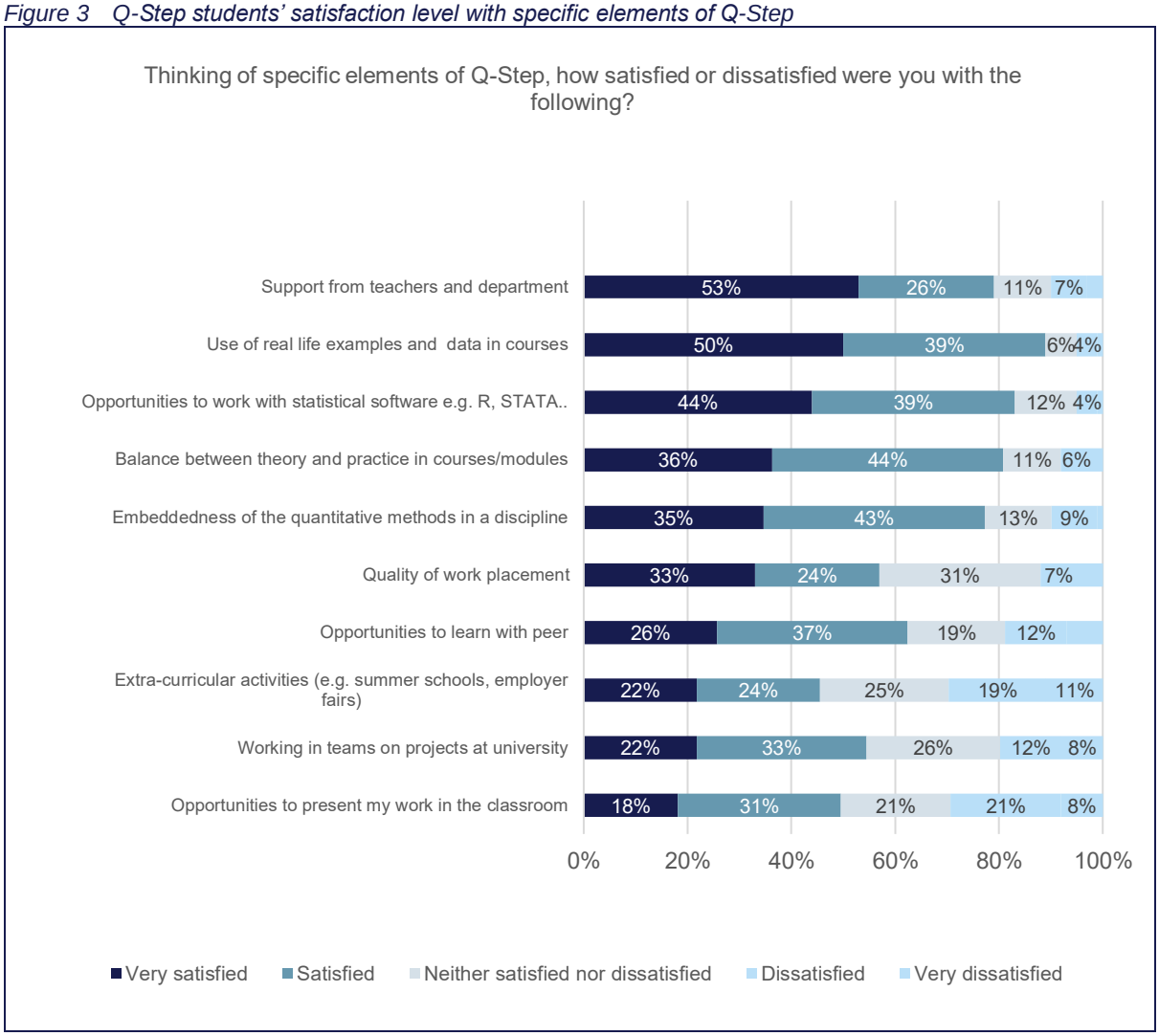
- "Use of real-life examples and real data in QM courses" (89 per cent)
- Support received from members of staff and the opportunity to work with statistical software (80 per cent)

Students were also satisfied with the balance between theory and practice offered in courses and modules. A relatively large percentage were dissatisfied or neutral with "working in teams on projects" (46 per cent) and "opportunities to present work in the classroom" (50 per cent). Note that the dissatisfaction expressed with these elements of Q-Step may be influenced by the past year (and current) COVID-19 crisis, which resulted in fewer opportunities to be in the classroom to present work and to work in teams on university premises.

Respondents were also asked to specify other elements with which they were either satisfied or dissatisfied. There was a total of 25 comments, and many referred to their dissatisfaction with online learning as mode of delivery (which was implemented due to the COVID-19 pandemic and goes beyond what the programme could have done under the current circumstances), and the missed opportunity of a work placement, noting the importance of those placements for students.

Further insights were obtained from this (albeit) small number of responses. Eleven of the 25 qualitative comments revolved around the quality of teaching but with a split in opinions: half of them were extremely positive and appreciative of Q-Step teaching staff and modules and the other half expressed the wish to learn a variety of software packages that are more relevant to businesses. A small number of respondents were dissatisfied with the current distribution of modules across the years of the programme.

Figure 3 Q-Step students' satisfaction level with specific elements of Q-Step



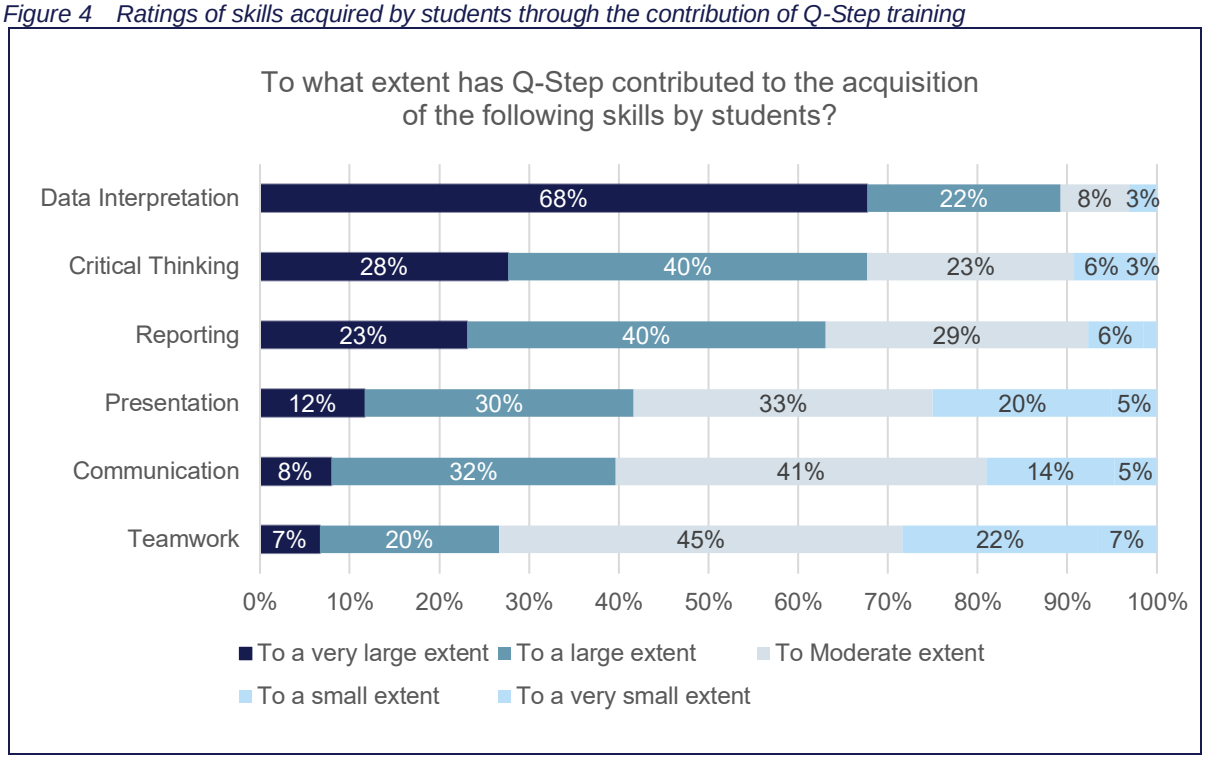
Source: Technopolis Survey – Respondent Base: 171

4.2.2 Main outputs

4.2.2.1 The lecturers' perspective

For the great majority of **Q-Step lecturers** who responded to our survey, Q-Step contributed to the acquisition of data interpretation skills, among students, to a very large or large extent (90 per cent of respondents); Q-Step also contributed to the acquisition of critical thinking and reporting skills for 68 per cent and 63 per cent of respondents, respectively.

Figure 4 Ratings of skills acquired by students through the contribution of Q-Step training



Source: Technopolis Survey Analysis – Respondent base: 65

Lecturers also commented that Q-Step contributed to the **acquisition of programming skills for statistical software** (e.g. R & Python), mathematical understanding and data management. Q-Step also helped students to acquire research design skills and to critically read research articles.

Lectures were also asked, via survey, whether they could identify any difference in learning outcomes in Q-Step students/graduates compared with non-Q-Step students/graduates, based on their wider teaching experience. All surveyed lecturers left comments in response to this open-ended question. **The majority of lecturers (65 per cent) said they could identify differences in learning outcomes between Q-Step students and non-Q-Step students because the Q-Step courses**, **as described by lecturers, are "much more practical than non-Q-Step courses"** and so Q-Step students learn how to solve real-world, applied problems on a regular basis. According to the lecturers, the outcome is that Q-Step students "leave with skills" they do not simply "leave with knowledge".

The different learning outcomes include **higher competence and a higher level of confidence in performing data analysis and interpretation**. The enhanced level of confidence extended to handling all aspects of doing research, including understanding and critiquing research published by others. One teacher said that quantitative research was essentially a "closed book" for all other non-Q-Step students, defining the difference in learning outcomes in stark terms. Examples mentioned by the majority of lecturers included: Q-Step students were better able and more confident in the use of empirical evidence to support their research hypotheses, rather than simply informed opinion; were able to question the causal identity of correlations; and could parse complex problems with a higher level of confidence than non-Q-Step students.

Q-Step students are much more confident working independently than non-Q-Step students, needing much less hand-holding on such tasks as finding appropriate literature or problem-solving when things go unexpectedly. The level of quantitative learning outcomes achieved by Q-Step students was often compared to that achieved by postgraduate students of a discipline with quantitative methods; one teacher said that it surpassed MRes students' level, and this is not the case for non-Q-Step students.

A learning outcome that many lecturers mentioned is that **Q-Step students achieve consistently higher marks and are awarded more student prizes than non-Q-Step students**. Some lecturers also noticed that Q-Step students **do better in their dissertation**; this was partly explained by the fact

that the first two years of the programme involve gradually scaling up independent work, so the dissertation is less of a shock for Q-Step students. This results in Q-Step students identifying better research ideas and data to test them and understand research design more clearly.

A minority of lecturers, however, thought that Q-Step was not easily comparable to other components of teaching that undergraduate students receive. One reported that although in the initial years there was a high level of comparative achievement, with a larger cohort a greater variation in attainment has appeared.

4.2.2.2 The students' perspective

Q-Step students were asked to agree or disagree with a set of six statements about the impact of Q-Step on confidence and competence in data analysis, interpretation and use of statistical software and on their career prospects. There was a strong consensus with all the statements about the positive impact of Q-Step on students' quantitative training, as shown in Figure 7:

- 86 per cent of respondents felt more competent in data analysis and interpretation than students enrolled in similar programmes but without the quantitative methods elements
- 88 per cent of students agreed that the Q-Step programme will open up more job opportunities for them, though just below half the respondents (46 per cent) stated that Q-Step has helped them to decide what kind of job they want to do

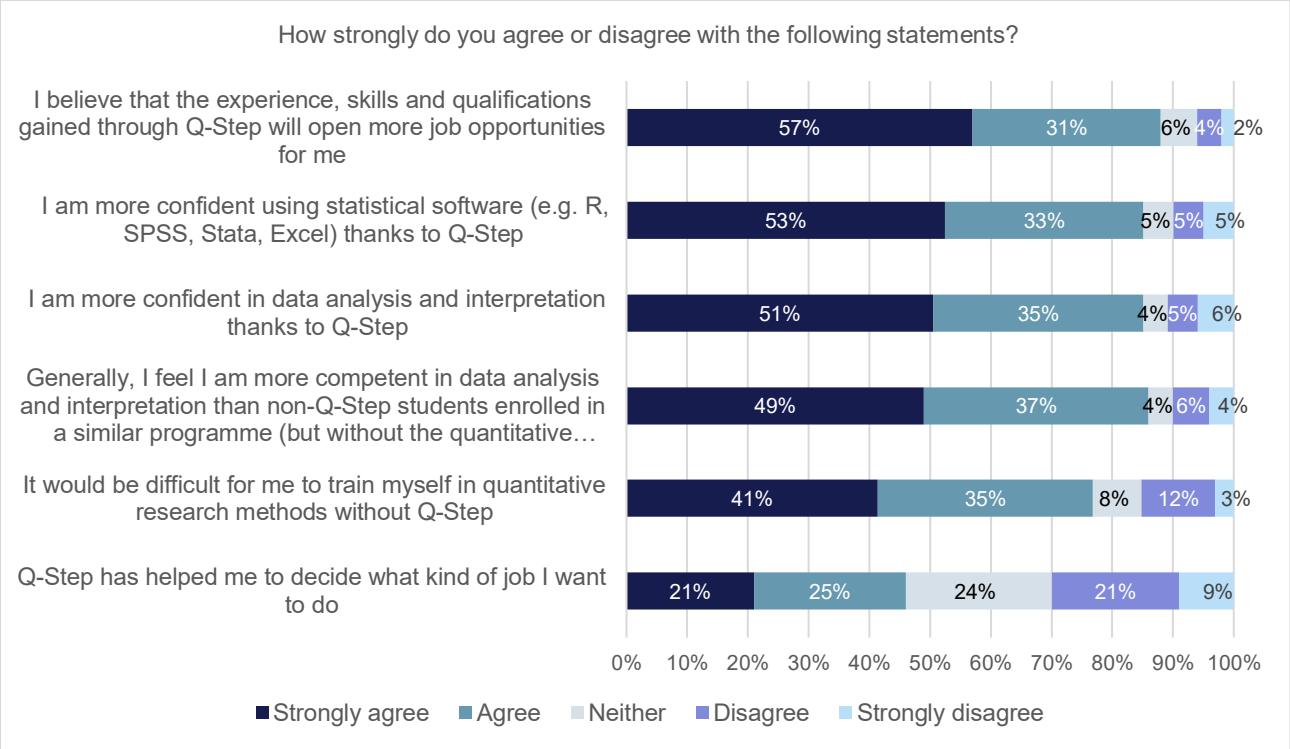
When asked if they had any other remarks on their quantitative training, 10 students left comments that revolved around the following points:

- Q-Step has opened up opportunities for undertaking research at postgraduate level (e.g. PhD)
- Q-Step has broadened students' horizons on what they feel they can do, as a result of their gained confidence with data handling
- Q-Step has made a positive difference in students' "perception of numbers" (e.g. less negative and "scary")
- A small minority mentioned that they did not feel as if they received quantitative training

One student said:

> *"It has been the single best and most stimulating aspect of my undergraduate degree, opening a new way of approaching and solving problems."*

Figure 5 Q-Step students' level of agreement with statements about the impact of Q-Step



Source: Technopolis Survey Analysis – Respondent Base: 155

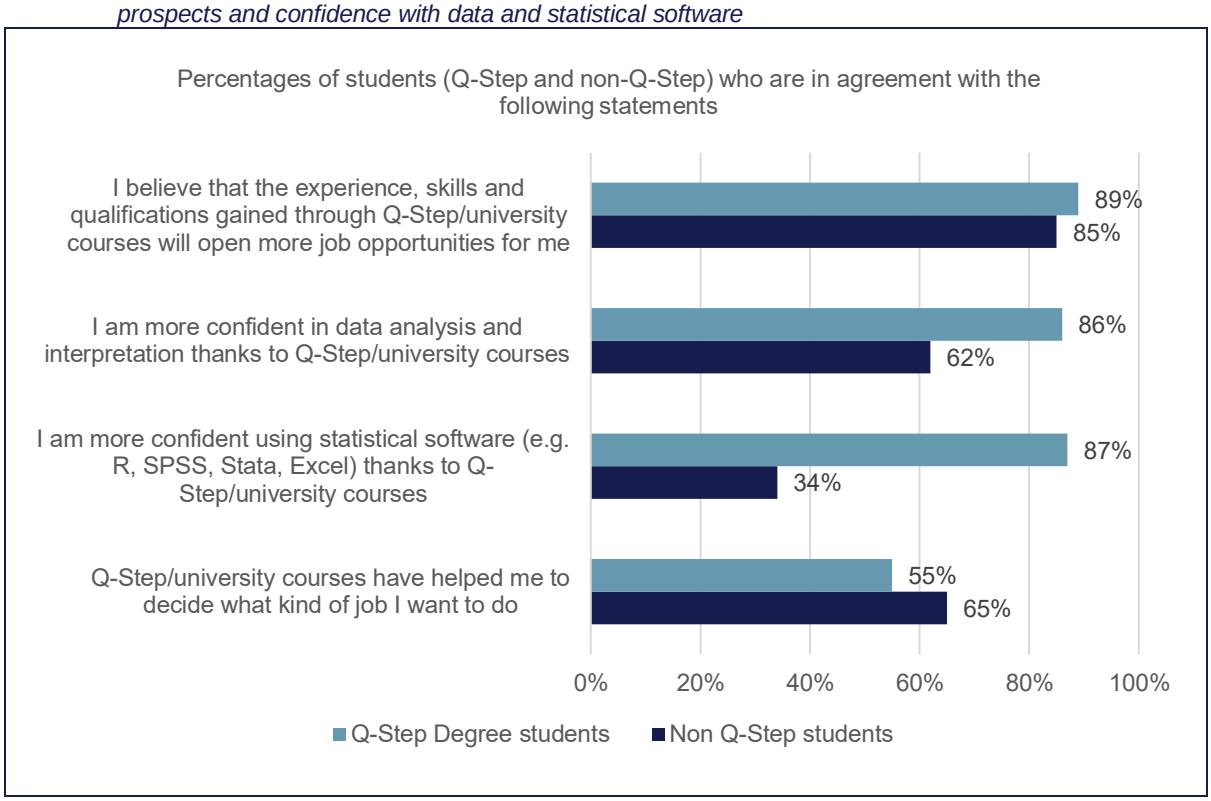
When looking only at students who were enrolled on a Q-Step degree, we found a very similar scenario, with a high level of agreement regarding the impact of quantitative training, (n=104). An interesting difference was that more students agreed that Q-Step helped them to decide what kind of job they want to do (55 per cent against 46 per cent when Q-Step students in programmes and modules are included).[41]

We also looked at the responses given by non-Q-Step students, that is students enrolled in similar social sciences programmes to Q-Step students, but without the quantitative methods element. The respondent base of non-Q-Step students is 51, so it is not possible to compare the data to draw causal interpretations.[42] In Figure 6, we observe the responses of non-Q-Step students and Q-Step degree course students. Both groups of students agreed that the experience, skills and qualifications gained through their university courses will open more job opportunities for them, although the Q-Step degree students' consensus was slightly stronger (89 per cent against 85 per cent of non-Q-Step students). Q-Step degree students showed more awareness than non-Q-Step students of their gained confidence in handling data and using statistical software. Notably, more non-Q-Step students than Q-Step degree students agreed that their university courses helped to decide what kind of job they wanted to do.

[41] See section 3.3 for an explanation of the difference between programmes and modules

[42] As explained in the methodology section, the survey was distributed by the Q-Step Centres (since sharing student and alumni/personal details was not possible) which limited the study team's ability to bolster the number of responses. Additionally, response rates among alumni were expected to be low given the fact that they no longer belong to the institution (and hence have less incentive to take part in activities organised by the institutions) as well as the unprecedented circumstances unfolding during the fieldwork due to the COVID-19 crisis.

Figure 6 Q-Step and non-Q-Step students' levels of agreements with the impact of their courses on their job prospects and confidence with data and statistical software



Source: Technopolis Survey Analysis – Respondent Base: 206

4.2.3 Impact on employment

4.2.3.1 The lecturers' perspective

Lecturers indicated in their survey responses that Q-Step students appear more career oriented and have higher expectations about their career prospects in comparison with non-Q-Step students.

According to the lecturers, Q-Step students are more "market-ready" and have the opportunity to acquire skills that make them more **employable.**

4.2.3.2 Results from the Graduate Outcomes Survey and LinkedIn data

The analysis provides some evidence suggesting that Q-Step module students have better employment prospects and have better salaries than other social science graduates in non-Q-Step HEIs. Based on the data available, we find no evidence that Q-Step students make more use of the skills they acquired during their undergraduate training (in comparison with the control group).

The analysis of the Graduate Outcomes Survey (GOS) is based on data from the 2017/18 graduating cohort, which was the first Q-Step cohort invited to complete the GOS. This analysis involved comparing the characteristics/profile and performance of Q-Step programme students and, separately, Q-Step module students with non-Q-Step students. An econometric analysis is used to measure the impact of Q-Step; this analysis uses treatment groups (i.e. data on Q-Step graduates) and a control group (i.e. data on graduates from universities that do not offer Q-Step). We report on the following outcome variables:

- Highly skilled employment (based on main activity)
- Median salary
- Did you need the qualification that you completed 15 months ago to get the job?

These variables were selected because they are aligned to the Q-Step Theory of Change.[43]

GOS data is provided/analysed for:

- 140 Q-Step programme students from across 14 HEIs – students who have taken a Q-Step programme (i.e. several modules)
- 1,552 Q-Step module students from across 15 HEIs – students who have taken at least one QM module
- 3,184 non-Q-Step students from across 21 HEIs – students who are taking social sciences courses at universities that do not offer Q-Step (see Appendix B for details on the construction of this counterfactual/control group)

The 1,552 module students included 719 students from The University of Kent. The data is dominated by students from The University of Kent because at this university QM is a core requirement for all social science students, of which the university has a large number. Because these students dominate in the sample, statistics are also presented excluding The University of Kent.

To explore the data, we first provide counts for each variable and proportions (see tables below and Appendix B). This descriptive analysis is a first necessary step to the analysis that precedes the impact analysis.

The data shows that there are differences between Q-Step and non-Q-Step students for several outcome variables used to profile the graduates in terms of background. For example, the variable "Parental education" shows that a larger percentage of Q-Step students have parents that have HE qualifications in comparison with the control group (64–68 per cent vs 52 per cent). The data also shows that that a larger percentage of Q-Step students have attended a private school in comparison with the control group (16–18 per cent vs 8 per cent). 27–31 per cent of Q-Step students attained a first-class degree, higher than the percentage of graduates from the control group (23 per cent). Some differences are also found when looking at the participation neighbourhood marker, gender, disability, and ethnicity.

In terms of outcome variables, we find no evidence that Q-Step students think that they are using what they learnt during their studies in their current work to a greater extent than the control group (just over 50 per cent of students agree that they are using what they learnt, see Table 9).

A substantial proportion of Q-Step students are "working" (62 per cent programme and 65 per cent module students). The percentage of students working is slightly lower than that of the control group (69 per cent, see Table 8). Only 26 per cent of the programme students are in their first job since graduating (control group – 37 per cent). 71 programme students provide data on salary and 45 per cent report earning more than £25k. Also, 46 per cent of module students report earning more than £25k; this is 16 percentage points higher than the control group (30 per cent, see Table 10). Finally, a higher proportion of Q-Step students are working in high-skilled jobs (again, in comparison with the control group, see Table 12).

Of student/alumni who are affiliated to Q-Step and have a LinkedIn profile, 42 per cent are in employment, the vast majority in professional employment. A profiling of job titles shows that many alumni have taken up employment where quantitative skills are a requirement or a desirable asset. 27 per cent of those in employment are consultants or analysts; 15 per cent have a research job (e.g. research officer or research data manager); 14 per cent data scientist or similar; 12 per cent are public sector civil servants or similar; 8 per cent are in sales, business, or marketing; 7 per cent are policy advisers or similar; 7 per cent are in finance or investment; and 3 per cent have founded a business or initiative. An overview of specific job examples is provided in Table 29 in the Appendix B. GOS data

[43] Descriptive statistics also look at the variable Workskills [To what extent do you agree or disagree with this statement: I am using what I learnt during my studies in my current work] – This data item records the extent to which the graduate has utilised the skills they have learnt in their studies in their form of employment (Positive = 1 (strongly agree) other = 0)

shows that 72 per cent of module students and 73 per cent of programme students have taken on "highly skilled" jobs, higher than the percentage in the counterfactual (59 per cent).

Based on the total sample of alumni on LinkedIn who are in employment, 40 per cent are male. When looking at the percentage of those employed in sales/business/marketing and finance/investment we find that 60–77 per cent are male. Females tend to have a stronger representation in data science and research jobs, with 65–78 per cent of those jobs being taken up by female candidates.

GOS data shows a contrast in salary outcomes between males and females, with the majority of males earning more than £25k while only 42 per cent of females earn more than £25k. The cross tabulation by salary and gender also shows that a larger proportion of both male and female graduates earn more than £25k in the Q-Step module group relative to the control group. The percentage difference in male vs female earning more than £25k is only slightly higher than in the control group.

Cross-tabulations for each of the outcome variables by grouping and by gender, parental education and/or by school marker are presented in Appendix B. Amongst other, the data also shows that whilst a larger proportion of Q-Step graduates have ended up in jobs with a higher salary (higher than £25k), this difference in outcome is greater for the sub-sample of graduates with parents who benefited from higher education. The difference in salary outcomes between graduates who went to private school and those who went to a state-funded school or college is about the same across the intervention and the counterfactual groups.

Table 8 Main activity, percentage of observations

	Q-Step programme group (including Kent)	Q-Step module group (including Kent)	Q-Step module group (excluding Kent)	Counterfactual
Studying	22%	16%	16%	17%
Working	62%	65%	65%	69%
Self employed	4%	5%	4%	3%
Unemployed	6%	8%	8%	6%
Other activity	6%	7%	7%	5%
	140	1,552	833	3,184

Table 9 Work skills [To what extent do you agree or disagree with this statement: I am using what I learnt during my studies in my current work], percentage of observations

	Q-Step programme group (including Kent)	Q-Step module group (including Kent)	Q-Step module group (excluding Kent)	Counterfactual
Disagree	27%	32%	33%	31%
Neither agree nor disagree	20%	16%	15%	15%
Agree	53%	52%	52%	54%
	74	743	410	1,646

Table 10 Salary bands, percentage of observations

	Q-Step programme group (including Kent)	Q-Step module group (including Kent)	Q-Step module group (excluding Kent)	Counterfactual
£25k or less	55%	54%	53%	70%
More than £25k	45%	46%	47%	30%

	71	719	390	1,533

Table 11 Qualification required for the job, percentage of observations

	Q-Step programme group (including Kent)	Q-Step module group (including Kent)	Q-Step module group (excluding Kent)	Counterfactual
No: the qualification was not required	28%	26%	25%	35%
	92	1,077	571	2,323

Table 12 Highly skilled [based on main activity], percentage of observations

	Q-Step programme group (including Kent)	Q-Step module group (including Kent)	Q-Step module group (excluding Kent)	Counterfactual
High-skilled	73%	72%	75%	59%
	99	1,130	608	2,411

The next step in the analysis tests the impact of Q-Step on outcomes on the basis of an econometric analysis.

Note that the econometric analysis uses an approach that helps overcome some of the differences in the background and performance of the "average" Q-Step graduate and the "average" graduate from a non-Q-Step HEI. The regression analysis controls for confounding factors (e.g. student background) and the analysis is based on a sub-sample of "treatment" and "control" graduates that are identified using propensity score matching (ensuring a better comparison).

The results show that the Q-Step programme has a significant and positive impact on the salary, qualifications required for the job and the students' career prospects in terms of acquiring highly skilled employment (see Table 13 and Appendix B. for a more detailed overview). The odds of benefiting from a graduate salary of more than £25k increase by 0.6 units for Q-Step students (keeping all other factors constant). Using an odds ratio, the results mean that the chance of having a graduate salary of more than £25k for Q-Step students is 1.92 times that of non-Q-Step students.

These results hold for the sample that includes only module students and for a sample that includes programme and module students (which given the sample sizes across those two groups is dominated by the latter). We did not find a statistically significant effect when measuring the impact among Q-Step programme students only. This does not mean that Q-Step programmes do not lead to any positive benefits, or that Q-Step modules have higher effects than Q-Step programmes, as other factors may be at play.

First, the overall sample size of programme students is small, and the results may not be robust to changes in sample. Re-running this exercise in the future, when the sample of programme students increase may yield different results.

Second, the results may be reflecting the fact that several programme students are entering further education (i.e. not entering the labour market) or entering research or other sectors where salaries tend to be lower.

Third, the background characteristics of Q-Step programme students could explain the difference in outcomes if the background characteristics of these students are playing a relatively more important role in their achievements. This is in part controlled by the model but there may be additional factors at play that we are unable to control for (e.g. higher motivation to excel in the job market relative to their peers). As such, it is possible that, on average, those ambitious and higher performing graduates have

self-selected into Q-Step programmes. At the same time the Q-Step programme will have offered those students the opportunity to explore more ambitious career paths.[44]

Table 13 Key results from the econometric analysis measuring impact of Q-Step on outcome variables

Logit models with Random Effects (RE) – extract only	**Salary over £25k**		**Qualification required for the job**		**Highly skilled**	
	Coef.	P>z	Coef.	P>z	Coef.	P>z
Programme student [i.e. dummy where programme students = 1, Counterfactual=0]	0.75	*0.11*	0.00	*0.99*	0.31	*0.33*
Module student [i.e. dummy where module students = 1, Counterfactual = 0]	0.66	*0.01 [significant]*	0.45	*0.00 [significant]*	0.50	*0.00 [significant]*
Q-Step student [i.e. dummy where programme & module students = 1, Counterfactual = 0]	0.60	*0.02 [significant]*	0.39	*0.00 [significant]*	0.47	*0.00 [significant]*

4.3 Impact at employer level

This section presents the results in terms of impact on employers, again guided by the Theory of Change as presented below.

Key findings:

- The Q-Step work placements are positive experiences for employers with the majority wishing to continue to provide this opportunity to Q-Step students.
- The Q-Step programme (with its work placements) has given employers access to a wider pool of talent, as well as to skills and techniques not usually available.
- More than half of employers interviewed report an increase in the organisation's ability to perform new analysis or analyse data in more efficient way. These gains have been higher among employers with less advanced existing quantitative skills in the organisation – either because they were a small organisation with limited resources or because their primary work was not in data analysis.
- Employers also reported that student bring new ideas into the organisation. This was, again, higher among employers with less advanced existing quantitative skills.
- Other positive spillover effects noted included: Providing their employees with supervisory opportunities (increasing their skills through supervising placements; and boosting morale and energy within the company).
- Many employers would like the placements to be longer than the six to eight weeks.

Table 14 ToC – Employers

Stakeholders	**Input**	**Activities**	**Outputs**	**Outcome/Impact**
Employers	Q-Step Funding	Students graduating from Q-Step programmes and modules	• Access to students with relevant skills	Higher productivity New ideas brought to the employer

[44] There was also an attempt to link-up all the different elements of the provision with impacts across the three main groups, using an approach inspired by Qualitative Comparative Analysis, however, no clear patterns were identified, and the categories prove difficult to test.

Stakeholders	Input	Activities	Outputs	Outcome/Impact
	Additional resources from HEIs Q-Step Funding	Q-Step Students enrolled in work placements Outreach events and marketing	• A workforce with better skills • Fewer resources allocated to training	
Assumptions	➢ Employers have ability to take on Q-Step students on placements ➢ Employer engagement leads to improved employability		➢ Taking part in the programme or modules has equipped students with skills that are relevant to employers	

4.3.1 Outputs

4.3.1.1 Overview

Twenty-five Q-Step placement host employers were interviewed in the last round of fieldwork for the evaluation (2020). This included a wide range of organisations ranging from small and large charities, government bodies, university departments, and private companies. **The view of the employers was overwhelmingly positive. The majority (19 of 25) of employers had a positive view of the experience and most (16) said they wanted to continue the placements.** This overall picture suggests that most of the employers are gaining positive benefits from their interactions with Q-Step students.

4.3.1.2 Access to a wider talent pool

Four employers described how the interaction with the university and the students involved in Q-Step introduced them to undergraduate students with a more diverse range of skills than they would have seen otherwise. This group valued the opportunity to learn about the kind of skills a diverse group of undergraduates could bring, and they sought to use the information gained from the placements in developing how they thought about recruitment in the future.

4.3.1.3 Savings on internal training

As captured in the Theory of Change, a potential result for employers, of accessing students with quantitative skills, could be the need for fewer resources allocated to training staff and/or new recruits. However, the impact on savings on internal training was only reported by two organisations suggesting it is not a major impact. It was also not mentioned by any organisation as a motivation for taking a student. A small number of organisations reported that it was more likely that extra costs of training were incurred by the placements rather than savings being made. These costs included students being given induction type training or training in specific skills needed for the tasks they were undertaking.

4.3.2 Outcomes/Impacts

4.3.2.1 Organisations' ability to use and apply quantitative methods

The most widely reported impact on employers was an increase in the ability to use and apply quantitative methods (n=17). Interviewees described how the placements allowed them to do work that they would not have had the time and/or the skills to carry out in the absence of the programme. However, within this group there was a divergence in terms of the intensity of the impact, with 7 reporting quite minor gains, and 10 describing a substantial impact.

The group of employers that reported substantial impacts tended to be those with less advanced existing quantitative skills in the organisation; either because they were a small organisation with limited resources or because their primary work was not in data analysis. These organisations reported bringing the students in as a way of gaining access to advanced quantitative skills to inform their strategies or provide inputs into their analytical reports.

One charity reported:

> *"They bring strict and disciplined analytical skills. As a charity we don't have that level of accuracy in the way we use data. They bring in advanced level analytical data skills … data analysis at the charity tends to be more inferential, basic level insight. The work they produce really helps us to identify the needs of the organisation and to influence strategy. For example, last year a student looked at domestic abuse and impacts on mental health and we took their work to the risk strategy teams who then looked at how to implement it into a strategy alongside using a range of other sources of research."*

Another charity reported:

> *"It's clear that this piece of work would not have been done without her, as we don't have the skills to do it as efficiently as her (if at all). But it's also about capacity. It was a huge productivity benefit."*

For the second group reporting smaller benefits, the issue was not a lack of skills. For them the issue was fitting in all the analysis they had to do within the capacity of their teams. The motivations of this group of employers were more varied and included getting a sense of the recruitment landscape amongst graduates, wanting to support the development of quantitative skills or a general sense of obligation to support students. For example, one interviewee from a Think Tank that has advanced quantitative capacity described only a minor increase in the organisations' ability to use and apply quantitative methods, and the student doing work that the interviewee could have done himself. His reason for getting involved in the programme was to get access to applicants with a more diverse set of skills. Also, the paid nature of placement meant that employers had different (higher) expectations of Q-Step interns, in comparison with unpaid interns.

4.3.2.2 Bringing new ideas into the organisation

A significant number of organisations highlighted that the bringing of new ideas (on to how analyse relevant data) into the organisation by the students (n=10) was one of the main benefits of the placements. The organisations reporting this impact also tended to be the same group of organisations described above which had reported less advanced pre-existing quantitative skills in the organisation. One charity said, *"we really encourage learning from the students, for example we have been getting students to teach us about R".*

The value of this benefit is less direct than the benefit of using and applying quantitative methods (reported above), but employers reported valuing bringing in new ideas even if they could not immediately use them. When asked if students brought new ideas in, one interviewee said, "*Yeah I think so, not that we get to really use them but good to get familiarisation with the options out there*".

4.3.2.3 Other impacts

Employers highlighted a number of additional impacts gained from the students being in their organisations beyond the three main categories described above. These included the following:

- **Motivation and morale:** a number of employers noted how the energy and enthusiasm of the students had a positive effect on the morale of the teams they were working with. One said, *"The students are brimming with enthusiasm, and it brings a real lift to the morale of the team … it had a really nice team feeling and it made it a really fun summer."*
- **Chance to develop management skills:** for five interviewees, the student placements were described as a valuable opportunity of getting experience in line management/supervision that they would not have done otherwise. Many of the placement organisers were in relatively junior positions

and the opportunity to supervise a student appears to have represented a good stepping stone into the role of managing an employee

4.3.2.4 Employers' views on how impact could be increased

A number of employers expressed a view on how the programme could be improved to make it more beneficial from their perspective. The most common viewpoint related to the **timing and length of the placements**. Many employers stated that they would like the placements to be longer than the six to eight weeks they were given by the universities. They reported that this period was not long enough to produce significant benefits as it took some time for the students to get up to speed with the particularities of the organisation and task and then the project would be almost over. A number of others requested more flexibility in the timing. For example one asked that the placement be split in two: starting with a short period for a student to write a survey questionnaire, followed by a break while the survey is sent out, before the student returns to conduct the analysis of the results. Another asked that the student should be allowed to start interacting a few months before the summer placement so they can start planning the work before they arrive. These are understandable requests, from a business perspective, but something that may be difficult to accommodate by universities as placements have to fit with term time course commitments, examination periods and holiday periods where only the summer break is long enough. Since Q-Step students are also taking courses alongside non-Q-Step students, there is little room for manoeuvre.

Another issue highlighted by employers was that students did not have the requisite skills in the **software programs** they were using. This meant there would be a delay before students could start the substantive work on their projects while they were trained. The most common complaint was that students were not confident enough in the manipulation of data on Microsoft Excel. A smaller number highlighted a lack of coding skills. However, there was some recognition by employers that every organisation has its own way of working, including software preferences, and that universities could not be expected to prepare students for all eventualities.

A small number of employers raised an interesting point of self-reflection: they felt that the responsibility for getting the most out of a placement rested mainly with the employers themselves. They felt that the onus was on them to develop a clear idea of the aims of the placement and a clear understanding of what students are able to deliver. One interviewee said: "*we're not sure we got enough out of the placement this year to justify taking it for another year, but the question is whether that's our fault, whether if we put more thought into it, we could get more out of it, it's a conversation we need to have before next year."* Another said, *"I think they're an asset as long as we can identify what we want from them and be clear about this, as we're a small team".* On the other hand, in addition to the onus being on employers to reflect on what they need from the placement, some interviewees asked that universities get better at informing them of what the students are able to do and what they have been taught. One interviewee suggested that more engagement earlier in the year, before the summer, would help with the sharing of perspectives and information in order to make the placements as effective as possible.

5 The sustainability and scalability of the Q-Step programme

This section provides an analysis of the sustainability and scalability of Q-Step.

As well as primary evidence from the evaluation data (lecturers' survey and the analysis of success factors), throughout the report we have collected further lessons and recommendations for the sustainability and scalability of the Q-Step effect (post funding and for other HEIs interested in introducing QM). These will be brought together in the section on conclusions and recommendations. This section focuses on sustainability and scalability in the existing 18 Q-Step Centres.

Key findings:

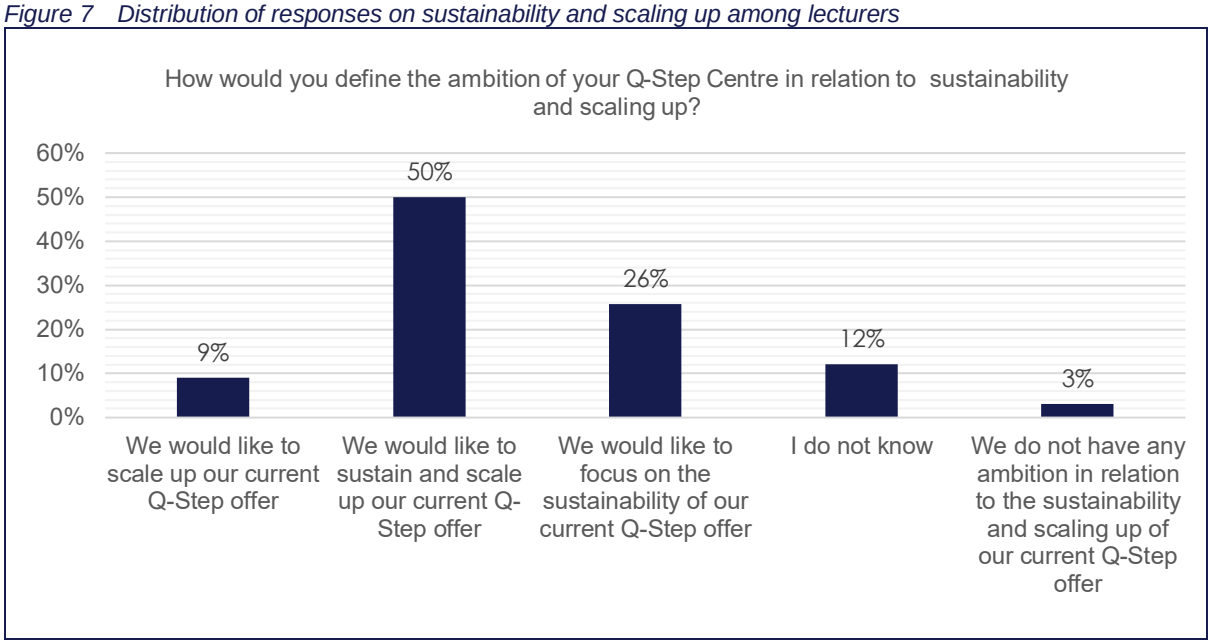
- There is a high level of commitment from university lecturers to the sustainability of Q-Step. The institutions have all agreed to continue funding the roles for a further 3 years' post transition funding. At a number of Centres, the staff have been offered permanent contracts.
- There is a high degree of optimism among the Q-Step coordinators and representatives of the university leadership that the programme will be sustained in the future. The investments have been prioritised even at universities which are facing funding decisions due to the pandemic.
- Q-Step is now embedded within the host universities, and the external demand for graduate skills offered by Q-Step continues to grow.
- Most centres are also considering scaling up the offer by expanding the implementation of Q-Step degrees and modules to other disciplines.
- Five critical factors emerge from the survey with lecturers, for both scaling up and sustainability
  - The team of Q-Step lecturers should be larger
  - There should be strong buy-in/endorsement at the decision-making level (i.e. from the faculty/school/department management)
  - Q-Step should be embedded in the curriculum of the faculty/school/department
  - There should be more students enrolling in Q-Step
  - Q-Step should be integrated in a wider range of academic disciplines
- Other important success factors of the Q-Step programme which have been identified through exploring the programme implementation, also affect scale up and sustainability. These are:
  - Internal coordination and continuity of staff
  - Leadership support
  - Investment and support in staff
  - Alignment with institutional objectives

5.1 Sustainability and scalability – lecturers' survey results

5.1.1 Commitment to sustainability and scalability

A total of 85 per cent of lecturers confirmed, via survey, that they would like to either sustain or scale up – or both – the Q-Step programme. More than half of the lecturers reported that their Q-Step Centre had an ambition to sustain and scale up the programme. Only two lecturers answered that there was no ambition in relation to sustainability and scaling up of this programme, as shown in Figure 7.

Figure 7 Distribution of responses on sustainability and scaling up among lecturers



Source: Technopolis Survey – Respondent Base: 66

Interviews also pointed to a high degree of optimism among the Q-Step coordinators and representatives of the university leadership that the programme will be sustained in the future. Interviewees largely agree that the main programme attributes (mostly the curriculum and the team of Q-Step lecturers) will be sustained even in the absence of additional funding; any continued funding would allow for even greater sustainability and scalability.

The main reason for this optimism was the fact that Q-Step is now embedded within the university, and the external demand for graduate skills offered by Q-Step continues to grow. The sustained, and growing, demand from the labour market means that universities will keep offering social data science courses and modules after the end of Q-Step. Many interviewees articulated clearly that their universities remain committed to keeping the offer of Q-Step courses and modules, as well as retaining Q-Step staff. It is notable that in the terms and conditions of the Q-Step grants, the institutions have all agreed to continue funding the roles for a further 3 years' post transition funding. At a number of Centres, the staff have been offered permanent contracts.

In terms of scaling up, Q-Step coordinators and university leadership representatives were more focused on the potential expansion of Q-Step to other disciplines, rather than on an increase in the number of students in existing programmes.

There are, of course, uncertainties related to the effects of the COVID-19 pandemic. Universities are facing uncertainty both in terms of their budgets and in terms of the teaching environment in which they will be able to operate after the pandemic. However, in the face of the pandemic, universities had to prioritise efforts, and the fact that many had decided to maintain or scale up Q-Step activity provides evidence of its strategic importance among these institutions.

5.1.2 Factors for sustainability and scaling up

Lecturers were asked to reflect, via survey, what would be the critical factors to attain sustainability and scalability. Five key factors emerge in both cases:

- The team of Q-Step lecturers should be larger
- There should be stronger buy-in/endorsement from the faculty/school management
- Q-Step should be more embedded in the curriculum of the faculty/school
- There should be more students enrolling in Q-Step
- Q-Step should be integrated into more academic disciplines

Table 15 Mean Level of agreement/disagreement with 13 factors for the sustainability/scalability of Q-Step

Factors (order by importance on sustainability)	Critical Factors for Sustainability (Top 5 marked in blue)	Critical Factors for Scaling up (Top 5 marked in blue)
The team of Q-Step lecturers should be larger	4.29	4.48
There should be stronger buy-in/endorsement from the Faculty/School management	4.23	4.31
Q-Step should be more embedded in the curriculum of the Faculty/School	4.10	4.30
There should be more students enrolling in Q-Step	4.03	4.03
Q-Step should be integrated in more academic disciplines than it is currently	3.93	4.07
Q-Step PhD course/module(s) should be opened at our university	3.92	4.00
Q-Step Master's course/module(s) should be opened at our university	3.83	4.14
There should be more central promotion of Q-Step from the Nuffield Foundation	3.73	3.59
There should be more support provided to students	3.65	3.79
More work placement options should be available to students	3.58	3.71
The offer of extra-curricular activities around Q-Step (such as summer schools) should be improved	3.52	3.72
There should be more external partners (such as employers) involved in the Q-Step delivery	3.34	3.34
More options for dissertations in quantitative methods should be available to students	3.26	3.66

* Weighted Mean Ratings: 1= strongly disagree, 5= strongly agree

5.2 Programme success factors which affect sustainability and scalability

The following sub-sections showcase some of the success factors of the programme, identified by the lecturers and university management which directly influence future sustainability and scalability of Q-Step:

- Internal coordination and continuity of staff
- Leadership support
- Investment and support in teaching staff
- Alignment with institutional objectives

These success factors are summarised in section 3.3.3 (in relation to programme implementation) and are explored in more detail below, as the findings help to inform the future of Q-Step or any other related initiative.

5.2.1 The importance of internal coordination and continuity of staff in supporting sustainability and scalability

Since 2017, the evaluation team has had a unique opportunity to become closely engaged with each of the Q-Step Centres. During this time, we have undertaken in-depth interviews with all Q-Step coordinators twice (in 2018 and in 2020), which has provided us with longer-term evidence on the evolution of the programme coordination within each university.

Coordinators are a major factor contributing to successful implementation of Q-Step. Q-Step coordinators are shown to play an important role in the implementation of the programme and achievement of results (one of the assumptions made in the Theory of Change). Therefore, coordination

is an important component in considering the implementation of the programme in other disciplines or faculties.

The Q-Step teams at each university have largely remained in place throughout the duration of the programme. The commitment of the Q-Step coordinators and their teams has lasted throughout the duration of the programme, and, in many cases, they are committed to further development of their Centres or sustaining the effects. Although there have been some changes to the Q-Step teams across the Network, these have hardly ever led to major disruptions to the Q-Step programme. The changes have often entailed promotions within Q-Step teams. Where a new coordinator has been appointed, this person was usually already a member of the team, e.g. as a deputy Q-Step coordinator. This means that in most cases, the individuals who were behind the idea of establishing a Q-Step Centre are still members of the Q-Step teams across the 17 Centres. They, therefore, hold invaluable experience in Q-Step programme implementation. When the Q-Step funding stops, it will be very important to make sure that this level of continuity (or planning for continuity) is sustained.

The administrative effort required to implement an initiative such has Q-Step is high and, in many cases, has been reported by coordinators as being more than the available resources. There are many roles which fall to the coordinators of Q-Step. Since the beginning of the programme, they have acted as the driving force behind the process of the establishment and gradual development of their Centre, including the recruitment of lecturers and students. They have been responsible for the daily operations of the Centre and day-to-day contact within the university internally (e.g. with Heads of Departments) and externally (with the Nuffield Foundation and other Q-Step Centres). This also includes continuous promotion and advocacy of Q-Step to their colleagues, to students and their parents, and to employers. In addition, they have generally maintained some teaching and research duties. Additionally, in some cases, coordinators have also had the responsibility of coordinating the Q-Step work placements (which are further described in Section 3.5).

All these different activities have required a good deal of administrative and coordination support, and coordinators have reported that the resources available – through Q-Step funding – felt in some instances to be insufficient (or tight). This is mostly the case for Centres that could not easily rely on existing infrastructure/resources available at school /faculty level to support specific activities (e.g. promotion, support for work placement). For the future of Q-Step activities and the sustainability, the HEIs need to ensure that time is still given for coordination and consideration given to the provision of extra administrative resource. For any future programme, supporting the development of Q-Step Centres (or similar), this evaluation provides useful evidence to support the need for additional coordination resource (either funded or provided in kind from the institutions.

5.2.2 The importance of leadership support in supporting sustainability and scalability

There is strong evidence to suggest that the endorsement of university leadership is an important condition for the successful implementation of Q-Step and is thus crucial for the sustainability of the programme.

Across the Q-Step Network, Q-Step teams have enjoyed the support of their university leadership. Most Q-Step coordinators agreed in interview that the stability and success of the programme depends upon there being someone at the decision-making level who drives the quantitative skills/data analytics agenda. The specific mechanisms vary according to the management structure, and perhaps also the size, of each university: for some, this happens at the school/faculty level; for others, the central university level directly supports Q-Step, for example by directly funding a part of the coordinator's time.

However, in many cases, the Q-Step Centres are not considered independent financial units, and so are financially dependent on their schools/faculties. While this affords Q-Step coordinators and their teams less freedom as to how to use the Q-Step funding, at the same time it means that the programme activities are aligned with the priorities of the schools/faculties. Regardless of the specific support mechanisms, Q-Step coordinators gave many examples of how their university Vice-Chancellors and Deputy Vice-Chancellors were aware of Q-Step, with some becoming active promoters of the Q-Step idea internally and externally.

Our interviews with representatives of university leadership confirmed the findings above: interviewees overwhelmingly maintained their original commitment to Q-Step. Furthermore, there have been

instances where the university leadership has become even more supportive of Q-Step over time, seeing the benefits for students and employers, and also in showcasing Q-Step in the university-wide recruitment process.

In 2018, Q-Step lecturers generally showed a high level of satisfaction with the amount of institutional support for the programme. The Q-Step lecturers consulted via survey indicated that the institutional support for Q-Step has not changed between 2018 and 2020 and remains overwhelmingly high. In the two instances where lecturers mentioned (in open text) a lack of buy-in, they also noted how this would affect the sustainability of the programme going forward.

Looking to the future, a smaller number of interviewees expressed an opinion that once the numbers of students have stabilised and the team of lecturers has reached the necessary stability, support from the leadership may be less critical, as Q-Step becomes a standard study programme fully embedded in the wider school/faculty offer. Although our interviewees felt that Q-Step is on course to achieve this, more still needs to be done. This is also an important lesson for any future programmes, or for other higher education institutions wishing to introduce Q-Step-like approaches into their programmes.

5.2.3 Investment and support for Q-Step teaching staff for sustainability and scalability

The retention of Q-Step staff is a major success of the programme and an important aspect of sustainability.

The Q-Step Centres' home universities are overall committed to funding the Q-Step teaching posts, as well as to keeping the courses and modules running because of the student and employer demand. Our consultation with the Q-Step coordinators and representatives of the university leadership confirmed this commitment. It has been a standard practice across the Q-Step Centres that the Q-Step lecturers' contracts have been made permanent. This, therefore, means that Q-Step lecturers are likely to remain in post after the end of the Q-Step funding period.

Reflecting on the seven years of Q-Step, it appears that, overall, the Centres have managed to retain their staff, with a few exceptions (mostly through colleagues who have retired). We found no evidence that Q-Step staff themselves would like to leave their Q-Step Centre after the funding period.

In the early days of the programme (and the evaluation) most Q-Step Centres recruited new staff, usually teaching fellows, to fill the roles needed. Overall, the Centres did not face major difficulties when recruiting because the offer was seen as attractive by those who applied. There were no major changes a year later (2019), with express commitment from Centres to retain the staff (as part of their submissions for transitional funding). Furthermore, five Centres proposed to recruit an additional teaching fellow.

The commitments made in the transition funding applications seem to be broadly in line with the results of our consultation conducted in the second half of 2020. Only a minority of the Q-Step Centres said that they had increased the number of lecturers in the two years prior to the consultation. Two other Centres mentioned that their university had to freeze recruitment during the COVID-19 pandemic. The numbers of Q-Step staff have remained the same at the rest of the Centres.

There is also evidence to show that Q-Step staff have been promoted and are now in managerial/coordination roles in the wider university, beyond the narrow Q-Step team. As they have become more senior, this has also meant that the Q-Step staff have taken on more duties and generally become busier. Furthermore, with the gradual increase in the numbers of students in Q-Step courses, the staff at those Q-Step Centres which did not recruit additional lecturers, are now busier as well, in line with their expectations. Two Q-Step Centres mentioned that they had registered a significant rise in the number of quantitative dissertations over a very short period of time, which means that there is now a shortage of supervisors.

5.2.4 Alignment with institutional objectives and other initiatives

The majority of Q-Step coordinators and university leadership stated that Q-Step is well aligned with their institutional objectives. This was confirmed by the evidence (coming from the interviews with placement coordinators, university management and employers) of Q-Step becoming mainstreamed within its host universities. The mainstreaming has been demonstrated in different ways

across the Q-Step Network. For example, at Cardiff University, the interviewees said it would be hard now for new colleagues to identify the original Q-Step colleagues because the Q-Step staff are now embedded and central to all programmes. This is linked to some of the aspects already introduced above such as leadership endorsement.

A number of Q-Step Centres already had a tradition of including quantitative methods, albeit more aligned to their research and postgraduate activities. The table below provides an overview of other identified initiatives (centres/institutes) operating at Q-Step Centres' home universities, which preceded the Q-Step programme.

Table 16 Other similar initiatives at the Q-Step Centres' home universities

Q-Step Centre	Title of the initiative	Description
The University of Edinburgh	**AQMEN (Data Science Training for Social Research, Business and Industry)**	Established in 2009, AQMEN is a provider of training, capacity building and knowledge exchange activities in the area of statistical methods and analysis, based in the School of Social and Political Science at The University of Edinburgh.
The University of Southampton	**NCRM (National Centre for Research Methods)**	Set up in 2004 by the ESRC, the NCRM at The University of Southampton aims at increasing the quality and range of methodological approaches used by UK social scientists through a programme of training and capacity building, and with driving forward methodological development and innovation through its own research programme.
The University of Essex	**ISER (Institute for Social and Economic Research)**	Originally established in 1989 at The University of Essex to house the British Household Panel Survey (BHPS), ISER has grown into a leading centre for the production and analysis of longitudinal studies. It encompasses the ESRC Research Centre on Micro-Social Change and the successor to the BHPS, Understanding Society. As well as providing unrivalled postgraduate study opportunities, ISER also houses an internationally-renowned Microsimulation Unit which develops and runs the tax and benefit model, EUROMOD.
The University of Manchester	**CMI (The Cathie Marsh Institute for Social Research)**	CMI provides a focal point at the university for the application of quantitative methods in interdisciplinary social science research in order to generate a world class research environment.
The University of Leeds	**LIDA (Leeds Institute Data Analytics)**	Established in 2014, with major investment from the UK Research Councils and The University of Leeds, LIDA brings together applied research groups and data scientists from all disciplines, opening up new opportunities to understand health and human behaviour and casting light on the action required to tackle a wide range of social and environmental problems.
The University of Edinburgh	**CDCS (The Edinburgh Centre for Data, Culture & Society)**	Founded in 2019, CDCS is an initiative of the College of Arts, Humanities and Social Sciences at The University of Edinburgh. Directed by Professor Melissa Terras, it provides a locus for data-driven and digitally-engaged research across the disciplines and forms the foundation of an open and inclusive community in which such research can grow and thrive.
The University of Bristol	**JGI (The Jean Golding Institute)**	Founded in 2016 and one of the five University Research Institutes, JGI is a central hub for data science and data-intensive research at The University of Bristol. The JGI connects a multidisciplinary community of experts across the University and beyond. It sponsors short courses during 'Data Week', usually June of each year, which are open to staff, students and the wider community

Source: Technopolis (2020). Based on desk research

As well as initiatives which preceded Q-Step, there are also examples of new programmes or initiatives to support training in "data" within the Q-Step Centres' home universities, where Q-Step has played a pivotal role in the establishment of these initiatives, such as at The University of Edinburgh.

6 Conclusions and recommendations

6.1 Conclusions

This evaluation of Q-Step demonstrates the success of the programme in promoting "a step-change in quantitative social science education and training in the UK".[45]

There is broad consensus on the high and continuing relevance of the Q-Step programme to the identified needs in academia and the labour market. There is a growing demand for the use of quantitative methods in both research and professional settings, as large data sets become more available and useful for a wide range of sectors (for private companies, public organisations and charities). The Q-Step programme has helped to address this demand.

6.1.1 Broad programme-level effects and impact on institutions

Q-Step provides a successful proof of concept for producing quantitatively skilled social scientists. It has helped institutions upgrade their educational offer for social science students by introducing more diverse curricula and updating existing curricula on quantitative methods. The evidence suggests that the programme has also helped to improve the teaching capacity in quantitative methods.

The impact of Q-Step has been stronger among those institutions with a limited prior tradition of introducing quantitative methods into the social science curricula.

Q-Step has had an impact on research, to some extent, by increasing opportunities for students to undertake postgraduate work involving quantitative methods and increasing the capabilities of institutions to train researchers. Some Centres also report that Q-Step lecturers have been successful in attracting additional research grants.

Q-Step has also contributed to a change in culture within host organisations, creating environments where both quantitative and qualitative methods are increasingly given equal or similar weight. Moreover, the Q-Step programme has inspired host universities to think further about the roll-out of the use of modules and programmes in other social science and humanities disciplines, and to further invest in major initiatives dedicated to the research and teaching of quantitative methods.

Half of the Q-Step Centres have made QM a basic requirement for social science students, and this has increased the total number of students that have had exposure to QM to 11,171 in 2019/20. Despite this level of uptake, more universities would need to embed a Q-Step approach in their programmes for critical mass of quantitatively skilled social scientists to be achieved (2019/2020 HESA student statistics show around 164,000 undergraduate students enrolled in social sciences in total). This goes beyond what a single programme can achieve and would require system-wide change and potentially national policy levers.

The Q-Step experience offers some important lessons that could be taken into account for future similar initiatives:

- The recruitment of students for the full degree pathways proved challenging, and the strategy of recruiting from first-and second-year students after they have taken initial quantitative modules may prove an effective way to attract more students into the Q-Step programme
- The new pedagogies (such as the use of practical elements, access to public data sets and small class sizes) have proved successful, as well as the implementation of activities to further enhance

[45] Official programme website at: https://www.nuffieldfoundation.org/students-teachers/q-step. Accessed July 2021

the student experience (especially those that are student-centred). The latter includes work placements, which, despite being resource intensive, have been endorsed by lectures, students and employers as an important part of the Q-Step offer

- Implementing an initiative such has Q-Step requires strong coordination and the administrative effort required is high. Adequate resourcing (i.e. at least 1.5-2 FTEs) is key to guarantee the success of the initiative
- Cross-Centre activities are important as they provide a space of learning, motivation, and networking.

Q-Step activities in some Centres are aligned with the **widening participation practices,** within their host institutions, but only to a limited extent**.** The evaluation also found that Q-Step students tend to come from more well-off backgrounds (in comparison with students from other institutions enrolled on similar courses)**.** This alignment was not a primary objective of the programme, but it is important aspect nonetheless as any similar initiative should fully align with the need to promote equal opportunities to "access and succeed in higher education" (as mandated by the Office for Students[46]).

6.1.2 Impacts on the students

Students report high levels of satisfaction with the various aspects of the Q-Step programme.

According to lecturers, Q-Step contributed to the acquisition of data interpretation skills, critical thinking and reporting skills among students. The majority of lecturers can identify differences in learning outcomes between Q-Step students and non-Q-Step students as a consequence of the Q-Step courses. Furthermore, students display higher competence and a higher level of confidence in performing data analysis and interpretation. They are also more confident working independently in comparison with non-Q-Step students, achieve consistently higher marks and are awarded more student prizes than non-Q-Step students.

Our econometric analysis suggests that Q-Step module students have better employment prospects and better salaries than the control group of other social science graduates in non-Q-Step HEIs. In fact, based on this analysis we estimate that Q-Step students are 1.92 times more likely to earn a graduate salary over £25k than the control group.

6.1.3 Impacts on the employers

The Q-Step work placements were **positive experiences for employers,** with the majority wishing to continue to provide this opportunity to Q-Step students.

Employers that took part in the work placements report an increase in the organisation's ability to perform new analysis or analyse data in more efficient way as well as increased **access to a wider pool of talent**, skills and techniques not usually available to them. Additional benefits for the companies included providing their own employees with **opportunities to take supervisory roles** and increase their own skills within the company.

Employers with less experience in quantitative methods and smaller organisations were more likely to report a positive impact from the placements.

[46] Office for Students. Regulatory notice: Access and participation plan Guidance. https://www.officeforstudents.org.uk/media/92d85140-2719-4af0-85c9-b28ee1038c5e/regulatory_notice_1_access_and_participation_plans.pdf Accessed January 2022

One of the areas of the Theory of Change relating to the impact on employers was “potential savings on internal training”. This was not a major effect of the programme and was evident in only a handful of placements.

Future similar activities by the Centres and host institutions, may wish to note that employers would like the placements to be longer than the six to eight weeks given.

6.1.4 Sustainability and scalability

There is a high level of **commitment to both the sustainability and scalability** of Q-Step in the host institutions. Q-Step is now embedded within the universities, and the external demand for graduate skills offered by Q-Step continues to grow. In many of the host universities, scaling up is focused on the expansion of the Q-Step offer to other disciplines.

The Q-Step experience shows that implementing this offer to new disciplines may require:

- A strong coordination role (as mentioned above)
- Strong endorsement/buy-in at the faculty/school/department level as well as from the university leadership, especially during the investment and set up phase of new programmes and modules

6.2 Recommendations

Based on the evidence collected through the evaluation we provide the following recommendations:

Continuous learning and adaptation

- Q-Step Centres should continue to learn from and adapt their pedagogic approaches, sharing innovation with the wider social science research community
- Q-Step Centres should work closely with institutions’ access and widening participation teams to help attract students with a diversity of backgrounds. Furthermore, the implementation of any similar initiative should fully align with the need to promote equal opportunities to “access and succeed in higher education” (as mandated by the Office for Students)
- Work placements are incredibly important for both students and employers and the following recommendations are made (which are relevant for any similar activity across HEIs)
  - Placements should be used as widely as possible by initiatives with a skills development remit. To achieve this goal, organisations that support placement programmes (e.g. HEIs, research funders) are encouraged to develop sustainable models for delivering fully-funded placements
  - Where possible, work placements should be made credit-bearing in recognition of the skills and competences acquired
  - Universities should develop sustainable approaches to developing and managing relationships with placement providers. This will enable effective communication of expectations and information in order to make the placements as effective as possible

Expansion of the Q-Step offer (and similar initiatives)

- Both universities and funders should consider how the Q-Step model could support the development of quantitative skills in other subjects (within the social sciences and beyond), where there would be benefits. Universities could draw on the expertise of existing Q-Step Centres to embed quantitative methods training in other departments, train staff and expand other supporting activities
- When commissioning new investments with a skills development component, funders should consider the known success factors (e.g. leadership support; the use of practical sessions; the use of real-world data; evidence of work placement coordination) during the assessment of proposals

Sharing good practice and lessons learnt

- The Nuffield Foundation and ESRC should ensure that the lessons learnt from Q-Step are shared within the social science HE community and HE communities more broadly to encourage and support the strengthening of quantitative methods training. This should include both the pedagogical

and operational factors that contributed to the success of Q-Step. Sharing information on the current Q-Step Centre models will help universities design their own models of implementation, adjusted to their specific organisational processes, decision making structures and student body as well as the current status of quantitative methods availability within their institutions

- The success of Q-Step should be presented as a showcase example that encourages other universities to invest in the development of quantitative methods within social science programmes and beyond. The evidence suggests investing in quantitative skills training, as has been done in Q-Step:
  - increases graduate employability
  - enriches the curricula
  - increases staff expertise
  - encourages the recruitment of additional high-quality lecturers
- Q-Step Centres should consider the continuation of cross-Centre activities that support mutual learning, peer support and cross-Centre collaboration (understanding that this may require external funding). Alumni and (former) Q-Step staff can play an important role in shaping these activities
- Q-Step Centres should also consider the joint delivery of activities that provide students with additional skills opportunities and cohort development
- ESRC could consider assessing whether there is a need to update the core training requirements at a postgraduate level to ensure that the pedagogical learning from Q-Step is embedded in training provision; and the curricula are attractive to and sufficiently challenging for students who have received substantial quantitative skills training as part of their undergraduate degree

Appendix A Q-Step modules and programmes

Q-Step programme and modules

This appendix presents an overview of Q-Step programme and modules that have been identified in HESA data (in 2020/2021). A key word search on the listed module titles provide input into Q-Step student numbers. In 2022 some Q-Step Centres have proposed adjustments to the overview of Q-Step programmes and modules and these adjustments are noted in purple in the tables below.

Table 17 Programmes and modules identified in HESA data, by funded centre

	Programme titles	**Module titles**
Cardiff University	BSc Social Analytics	Knowing The Social World – Online And Offline Surveys Lies, Damned Lies And Statistics Real World Research (With Placement) Philosophy And Methodology Experiments In Knowing Analysing Social Change
City, University of London	Criminology And Sociology With Quantitative Methods Criminology With Quantitative Methods Media Studies And Sociology With Quantitative Methods Sociology With Psychology And Quantitative Methods Sociology With Quantitative Methods Media, Communications And Sociology With Quantitative Methods	Lies, Damned Lies And Statistics Producing Social Data Quantitative Analysis Of Social Research Data Quantitative Data Placement Visualising Society
Manchester Metropolitan University	BSc(Hons) Criminology And Sociology With Quantitative Methods BSc(Hons) Criminology With Quantitative Methods BSc(Hons) Sociology With Quantitative Methods	Applied Quantitative Dissertation Quantitative Data Analysis
Queen's University Belfast	BSc (S) Sociology With Quantitative Methods BSc Criminology with Quantitative Methods BSc Social Policy with Quantitative Methods	Researching The Social World [no longer offered] Visualising The Social World Digital Society Theory Counts Social Identity: Differences And Inequalities Modelling The Social World
The University of Bristol	Childhood Studies With Quantitative Research Methods (BSc) Childhood Studies With Quantitative Research Methods (MSci) Geography With Quantitative Research Methods (BSc) Geography With Quantitative Research Methods (MSci) Politics With Quantitative Research Methods (BSc) Politics With Quantitative Research Methods (MSci) Social Policy With Quantitative Research Methods (BSc)	Advanced Quantitative Methods For Social And Policy Research Advanced Quantitative Research Project Big Data & Society [discontinued] Conducting A Research Project Using Secondary Data Convincing Stories? Numbers As Evidence In The Social Sciences Dissertation (With Quantitative Research Methods) (Childhood Studies) Dissertation (With Quantitative Research Methods) (Geography) Dissertation (With Quantitative Research Methods) (Politics)

	Programme titles	Module titles
	Social Policy With Quantitative Research Methods (MSci) Sociology With Quantitative Research Methods (BSc) Sociology With Quantitative Research Methods (MSci) Sociology With Quantitative Research Methods With Study Abroad (BSc) Politics With Quantitative Research Methods With Study Abroad (BSc)	Dissertation (With Quantitative Research Methods) (Social Policy) Dissertation (With Quantitative Research Methods) (Sociology) Explanation, Causation And Longitudinal Analysis Principles Of Quantitative Social Science Segregation And Inequality In The UK (Measurement And Debate) Spatial Data Analysis, Spatial Regression Modelling And GIS In R [renamed as Mapping and Modelling Geographic Data in R]
The University of Edinburgh	Government, Policy And Society With Quantitative Methods MA (Hons) International Relations With Quantitative Methods (MA) (Full-Time) Politics With Quantitative Methods (MA) (Full-Time) Social Policy With Quantitative Methods (MA) (Full-Time) Sociology With Quantitative Methods (MA) (Full-Time)	Doing Social Research With Statistics Doing Survey Research Mathematics For Social Science Statistical Literacy Statistical Modelling
The University of Essex	Sociology With Applied Quantitative Research Methods Sociology With Applied Quantitative Research Methods (Including Placement Year) Sociology With Applied Quantitative Research Methods (Including Year Abroad)	Models And Measurement In Quantitative Sociology
The University of Exeter	BA Politics And International Relations [not Q-Step] BA Politics And International Relations With Employment Experience Abroad [not Q-Step] BA Politics And International Relations With Study Abroad [not Q-Step] BSc Criminology BSc Criminology With Study Abroad BSc Politics And International Relations BSc Politics And International Relations With Employment Experience Abroad BSc Politics And International Relations With Study Abroad BSc Sociology BSc Sociology With Study Abroad	Data Analysis In Social Science Data Analysis In Social Science II Data Analysis In Social Science III Data Analysis In The Workplace Experimental Research In The Social Sciences Introduction To Social Data Introduction To Social Network Analysis Quantitative Methods In Political Science
The University of Glasgow	MA (Soc Sci) Central and East European Studies with Quantitative Methods MA (Soc Sci) Economic & Social History with Quantitative Methods MA (Soc Sci) International Relations with Quantitative Methods MA (Soc Sci) Politics with Quantitative Methods / Politics With Quants, MA(Soc) MA (Soc Sci) Social & Public Policy with Quantitative Methods / Soc Pub Pol With Quants, MA(Soc) ; Soc&Pub Pol With Quants, MA(Soc)	QM1 Measuring your social world QM2 Analysing your social world QM3 Research Design & Method Selection QM4 Advanced Regression Measurement and Scaling Quantitative Methods [not included in 2022 reporting]

	Programme titles	Module titles
	MA (Soc Sci) Sociology with Quantitative Methods / Sociology With Quants, MA(Soc); Sociology With Quants, MA(Soc)	
The University of Kent	Social Policy With Quantitative Research Sociology With Quantitative Research Criminology With Quantitative Research Political Science With Quantitative Research Law With Quantitative Research	Quantitative Research And Data Analysis In Social And Psychological Sciences Quantitative Research Dissertation Quantitative Research Methods
The University of Leeds	Business Analytics Economics And Politics	Und Data In Soc Sciences Und Data In The Soc Sciences
The University of Manchester	BA (Hons) Politics & Quantitative Methods [not included in 2022 reporting] BA (Hons) Social Anthropology And Quantitative Methods [not included in 2022 reporting] BA (Hons) Social Sciences (Criminology & And Quantitative Methods) [not included in 2022 reporting] BA (Hons) Social Sciences (Criminology And Quantitative Methods) [not included in 2022 reporting] BA (Hons) Social Sciences (Philosophy And Quantitative Methods) [not included in 2022 reporting] BA (Hons) Social Sciences (Politics & Quantitative Methods) BA (Hons) Social Sciences (Politics And Quantitative Methods) [not included in 2022 reporting] BA (Hons) Social Sciences (Social Anthropology & Quantitative Methods) [not included in 2022 reporting] BA (Hons) Social Sciences (Sociology & Quantitative Methods) [not included in 2022 reporting] BA (Hons) Social Sciences (Sociology And Quantitative Methods) [not included in 2022 reporting] BA (Hons) Social Sciences (Criminology & Data Analytics) BA (Hons) Social Sciences (Philosophy And Data Analytics) BA (Hons) Social Sciences (Politics & Data Analytics) BA (Hons) Social Sciences (Social Anthropology & Data Analytics) BA (Hons) Social Sciences (Sociology & Data Analytics)	Advanced Social Network Analysis Crime Mapping: An Introduction To GIS And Spatial Analysis Essentials Of Survey Design And Analysis Introduction To Quantitative Methods (Post graduate course) Modelling Social Inequality Quantitative Methods In Language Sciences Research Design & Statistical Inference Measuring Inequalities (Unequal Societies) The Survey Method In Social Research Theory & Method In Demography Changing Social Attitudes Making Sense Of Politics How to Conduct Politics Research Understanding Political Choice In Britain Quantitative Methods In Language Sciences Phonetics & Phonology I Sounds Of Language Criminological Research Methods Drugs And Society Short Dissertation
The University of Oxford	-	-
The University of Sheffield	BA/Quantitative Social sciences BA Applied Social Science	Data Visualisation Introductory Quantitative Data Analysis For Social Scientists Introductory Research Project In Quantitative Social Sciences

	Programme titles	Module titles
		Survey Design and Data Collection Lies, Damned Lies and Statistics Placement Intermediate Research Project In Quantitative Social Science Multivariate Data Analysis In Social Science Doing Quantitative Research Doing Qualitative Research Research Dissemination In The Social Sciences Doing Mixed Methods Research Advanced Quantitative Methods For Social Research
The University of Southampton	BSc Quantitative Social Sciences [discontinued in 2018]	Introduction To Quantitative Methods Research Methods In the Social Sciences Applied Regression Methods
The University of Warwick	Politics, International Studies And Quantitative Methods Politics, International Studies And Quantitative Methods (With Intercalated Year) Sociology And Quantitative Methods Sociology And Quantitative Methods With Intercalated Year	Applying Quantitative Methods To Social Research Determinants Of Democracy: Analysing Emergence, Survival, And Fall Digital Data - Data Collection Experiments In The Social Sciences And Humanities Intermediate Social Analytics: Survey Analysis And Reporting Intermediate Social Analytics: Survey Design And Data Collection Introduction To Qualitative Methods Introduction To Quantitative Methods In The Social Sciences I Introduction To Quantitative Methods In The Social Sciences II Introduction To Social Analytics II
University College London	BA Geography With Quantitative Methods BSc Philosophy Politics And Economics With A Year Abroad BSc Philosophy, Politics And Economics BSc Philosophy, Politics And Economics With A Year Abroad BSc Population Health	Data Analysis Data Science And Big Data Analytics Introduction To Quantitative Research Methods Measuring Population Health Mining Social And Geographic Datasets
University of Nottingham	-	Intermediate Quantitative Methods For Social Science Quantitative Methods For Social Science 1 Quantitative Methods For Social Science 2

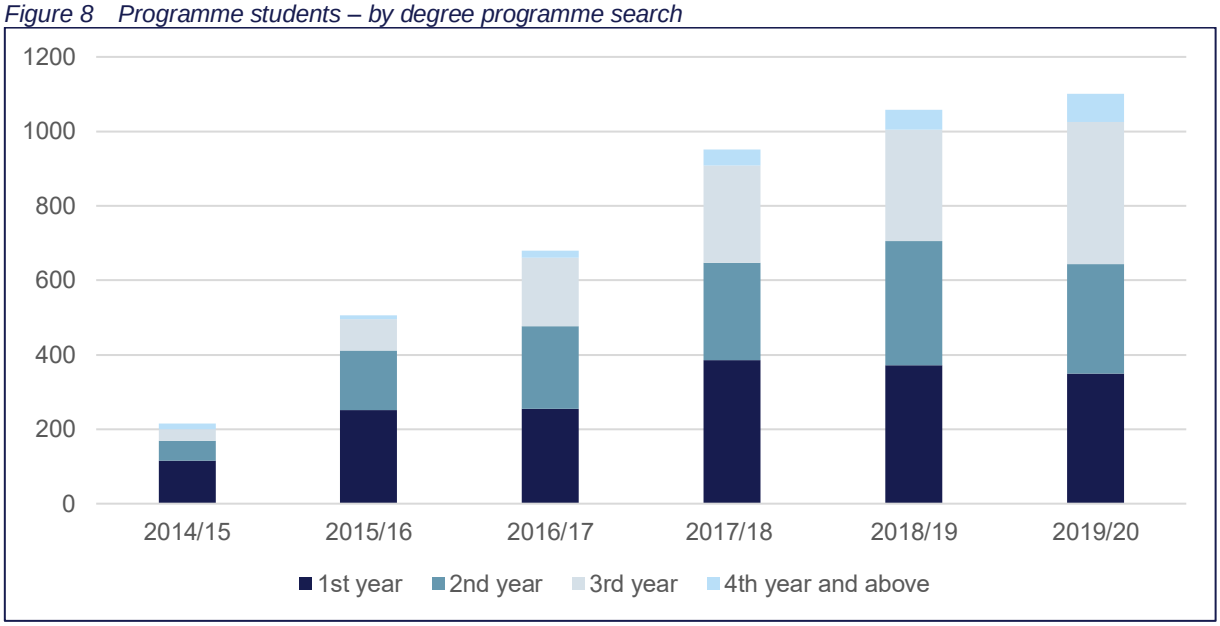
Source: HESA data

Q-Step student numbers

Based on a course title search on degrees, data was extracted on the number of first-degree students who were enrolled in a Q-Step programme.[47] The results show that total enrolment in **Q-Step degree programmes increased across the universities from 217 in 2014/15 to 1,101 in 2019/20.**[48] The student numbers by university are provided below.

We find that the number of module students has increased from 8,813 in 2015/16 to 11,171 in 2019/20. Module student numbers vary substantially across universities, e.g. from 23 at Queen's University Belfast, to 106 at The University of Bristol and to 5,064 at The University of Kent (2019/20). Student numbers at The University of Kent are identified using the Q-Step identifier, as per the HESA student record, and this partly explains the disparity relative to other universities.

Figure 8 Programme students – by degree programme search



Module students were identified in the HESA data record using a key word search on select module titles, identifying all students that took at least one of the selected QM modules.[49] Complementing this approach to identifying module students, the analysis draws on a Q-Step identifier that is part of the HESA data record. This identifier is included in the data record from 2015/16 onwards and is used by 10 universities to tag Q-Step students (without specifying if these are programme or module students). Manchester Metropolitan University, amongst others, reported against this indicator and at this university all students are required to take at least one Q-Step module, making the indicator for this university a

[47] Data includes Q-Step students in year 1 and above. The University of Southampton and The University of Oxford offer no Q-Step programme. No data for The University of Nottingham.

[48] The data shows some inconsistencies in the pattern of student numbers across years. For example, for the LSE in 2015/16 the number of first year programme students is 45, and in 2016/17 the number of second year students is 16. We would have expected that the number of second year students in 2015/16 would be 45 or higher, as the students' progress in their studies over time (and drop-outs are close to zero). The inconsistency is caused by a quirk in the course title data, as provided by HE provider. For some providers the course title does not remain consistent throughout, say, a standard three-year course. For example, Social science and QM studies may only be returned as a course title for one of the three years they study, while for the other two it may only be returned as Social studies.

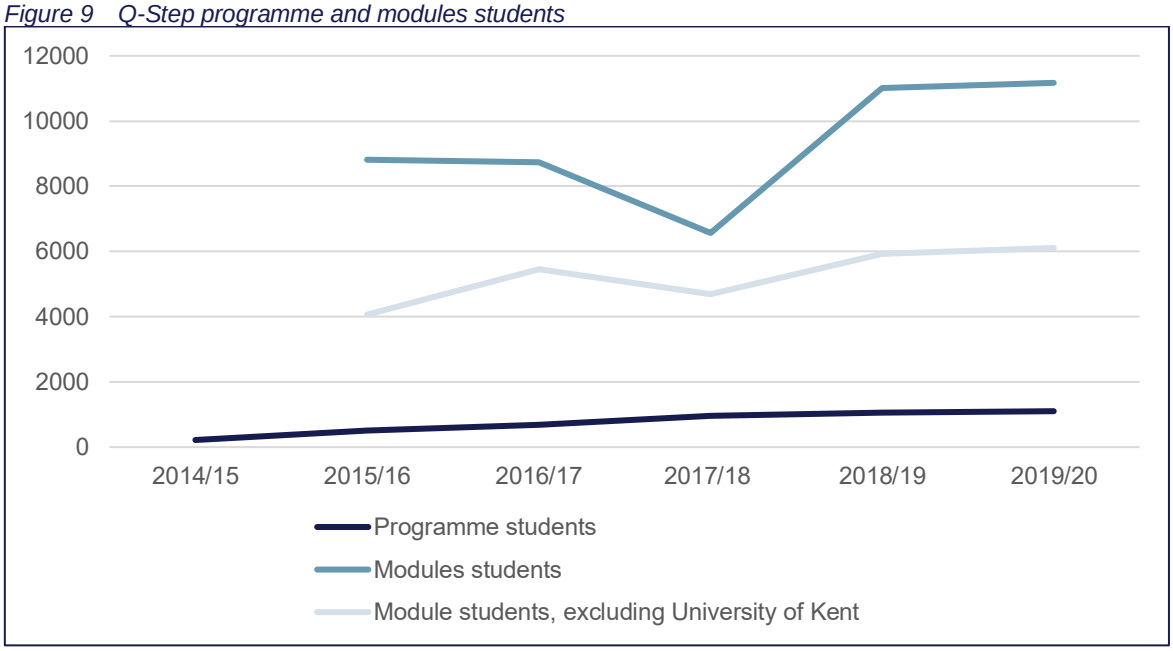
[49] No data for The University of Southampton, The University of Oxford and The University of Sheffield.

comprehensive tool to identify module students. By contrast, student numbers sourced by module word search data may underestimate the total number of module students enrolled in QM modules.

To present the best estimate of the number of modules in which students were enrolled the analysis uses both data extracted using the QM module search and the Q-Step identifier. For each HE provider the number of students that are tagged by the Q-Step identifier or by the module word search are counted, depending on what approach yields an improved (higher) student number.

An overview of Q-Step programme and modules student numbers is presented in Figure 9. The data shows an increase in the number of students taking at least one Q-Step module across the universities from 8,813 in 2015/16 to 11,171 in 2019/20.[50]

Figure 9 Q-Step programme and modules students



Number of modules taken

Data was also provided on the number of first-degree QM modules that students have taken (based on a module word search); this data shows that the majority of the students (60 –77 per cent) take only one of the modules as captured through the module word search. Moreover, only a very small minority (0–2 per cent) take three or more modules. The number of students taking two of the selected QM modules has increased somewhat over time. Figure 11 presents data for 2019/20 which illustrates that this change is driven by year 1 students taking more of the selected QM modules.

[50] When excluding The University of Kent the student numbers drop to 4,062 in 2015/16, and to 6,107 in 2019/20

Figure 10 Number of QM modules taken at Q-Step universities, 2014/15–2019/20

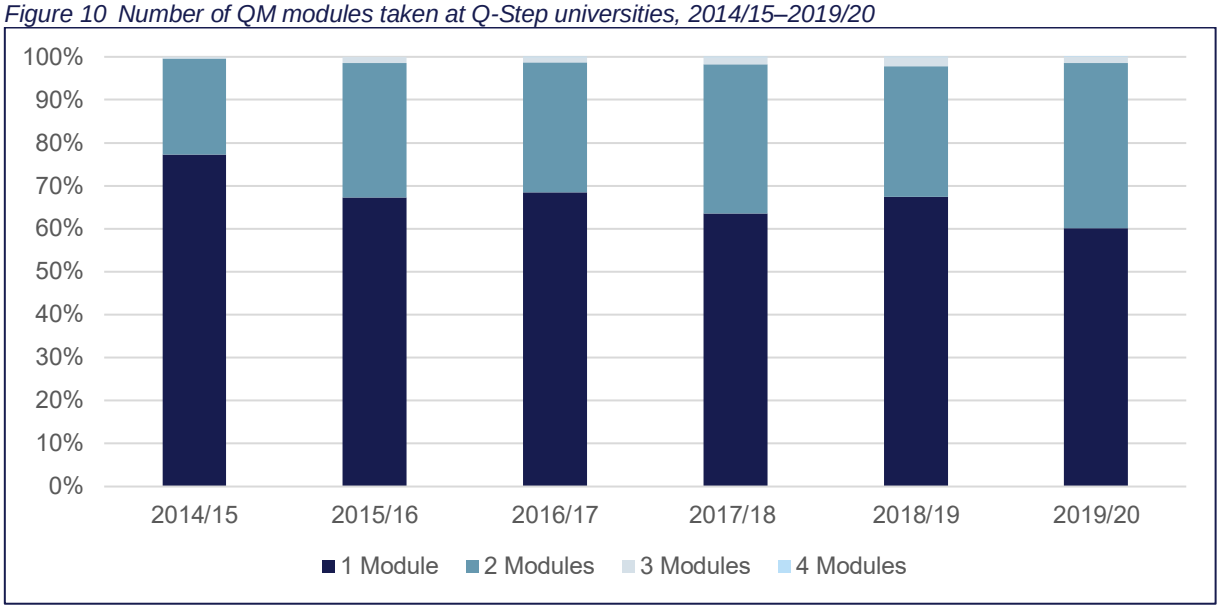
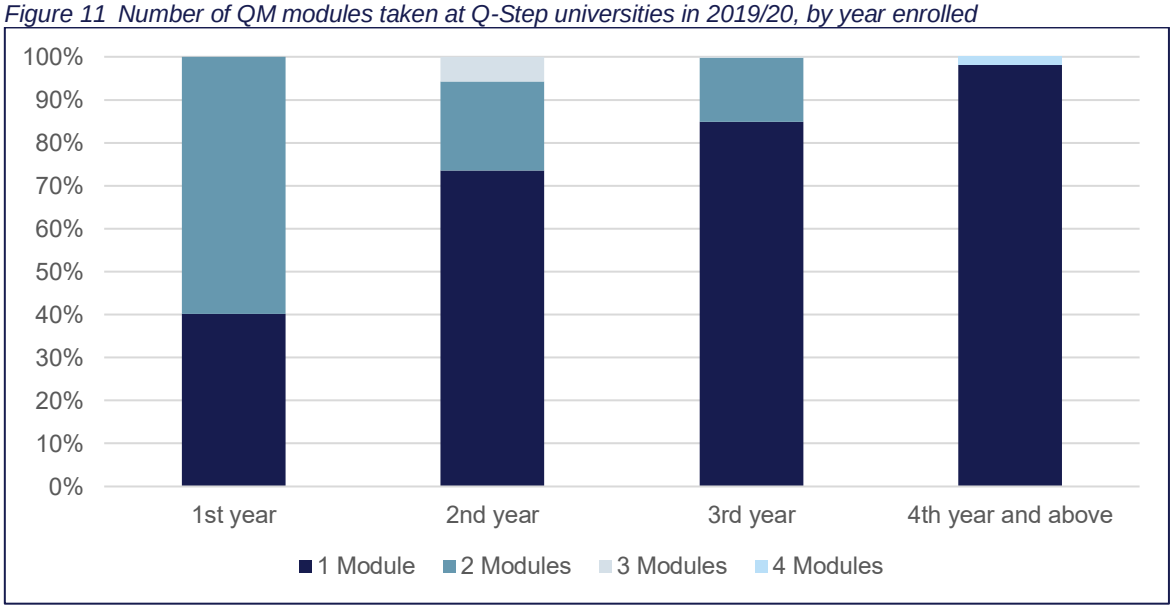


Figure 11 Number of QM modules taken at Q-Step universities in 2019/20, by year enrolled



The tables below provide an overview of the number of Q-Step programme students and Q-Step module students based on data from HESA/Jisc.

Table 18 Q-Step Programme students, total enrolled

	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
Cardiff University*	0	3	8	12	15	11
City, University of London	0	8	16	19	35	43
Manchester Metropolitan University	0	34	22	64	60	80
Queen's University Belfast*	0	7	4	10	8	6
The University of Bristol	31	65	62	56	58	58
The University of Edinburgh	11	22	48	60	63	76

The University of Essex	0	0	0	3	7	9
The University of Exeter*	82	194	280	342	356	376
The University of Glasgow*	0	9	18	27	30	37
The University of Kent*	0	0	2	3	4	3
The University of Leeds*	83	90	116	161	185	180
The University of Manchester	0	5	14	25	16	11
The University of Oxford	0	0	0	0	0	0
The University of Sheffield*	0	6	16	24	28	34
The University of Southampton	0	0	0	0	0	0
The University of Warwick	10	20	31	36	46	44
University College London	0	45	44	111	147	133
University of Nottingham	[blank]	[blank]	[blank]	[blank]	[blank]	[blank]
Total	**217**	**508**	**681**	**953**	**1,058**	**1,101**
Average	**12.1**	**28.2**	**37.8**	**52.9**	**58.8**	**61.2**
Median	**0.0**	**7.5**	**16.0**	**24.5**	**29.0**	**35.5**

Source: HESA data. The University of Southampton and The University of Oxford offer no Q-Step programme. No data for the University of Nottingham. *In comparison to the data provided for the 2020 reporting, the HESA data includes possible underestimations Cardiff University, Queen's University Belfast, The University of Glasgow and The University of Sheffield. Data for The University of Kent is also underestimated, based on data provided in 2022 student numbers were 48 in 2017/18, 59 in 2018/19 and 54 in 2019/20. The HESA data includes possible overestimations for The University of Leeds and The University of Exeter.

Table 19 Q-Step Modules students, total enrolled

	2015/16	2016/17	2017/18	2018/19	2019/20	QM is a basic requirement for all social science students	Identifier is used to identify module students
Cardiff University*	75	97	47	88	73	Yes	No
City, University of London	308	345	380	451	445	Yes	No
Manchester Metropolitan University	604	925	273	275	744	Yes	Yes
Queen's University Belfast	18	10	16	13	23	No***	No
The University of Southampton	[blank]	[blank]	[blank]	[blank]	[blank]	Yes	No
The University of Bristol	177	183	177	191	160	No	No
The University of Edinburgh	900	1,076	1,010	973	866	Yes	Yes
The University of Essex*	10	14	13	8	20	No	No
The University of Exeter *	237	213	229	244	270	No	No

	2015/16	2016/17	2017/18	2018/19	2019/20	QM is a basic requirement for all social science students	Identifier is used to identify module students
The University of Glasgow*	228	188	140	191	208	No	No
The University of Kent*	4,751	3,282	1,871	5,090	5,064	Yes	Yes
The University of Leeds*	29	693	492	1352	1352	No	Yes**
The University of Manchester	869	761	921	918	870	Yes	Yes
The University of Oxford*	471	523	506	498	491	Yes	Yes
The University of Sheffield*	26	74	83	140	140	No	Yes
The University of Warwick*	64	194	175	242	80	No	No
University College London*	46	104	155	232	267	No	No
University of Nottingham*	0	62	79	108	98	Yes	No
Module students	**8,813**	**8,744**	**6,567**	**11,014**	**11,171**		
Module students, excluding The University of Kent	**4,062**	**5,462**	**4,696**	**5,924**	**6,107**		
Average	**489.6**	**485.8**	**364.8**	**611.9**	**620.6**		
Median	**126.0**	**191.0**	**176.0**	**237.0**	**237.5**		

Source: HESA data. *In comparison with the data provided for the 2020 reporting, the HESA data includes possible underestimations for Cardiff University, The University of Essex, The University of Glasgow, University of Nottingham, The University of Oxford, The University of Sheffield, and The University of Warwick; and potential overestimations for University College London, The University of Exeter, The University of Kent, The University of Leeds, and The University of Sheffield. In the case of overestimations (i.e. for the University of Kent) the data may reflect all Social Science studies. **2019/20 missing, and 2018/19 values are interpolated [modules search yields limited results]. No HESA data was collected for The University of Southampton but internal reporting suggests that students numbers were 194 (2015/16), 300 (2016/17), 340 (2017/18), and 300 (2018/19). ***At Queen's University Belfast the Quantitative Research Skills module is a basic requirement for all social science students, but this is not a Q-Step module. The number of students (should) only reflect Q-Step module students.

Appendix B Econometric exercise

A. Methodology for the Graduate Outcomes Survey data extraction and cleaning

The data extraction by Jisc involved three stages:

- Stage 1 – Micro data extraction, linking students' modular data between years
- Stage 2 – Mapping of populations
  - Population 1 – Students on a Q-Step course based on a course title search on their final year of study
  - Population 2 – Students marked with a Q-Step initiative or studied a Q-Step module in their final year of study
  - Population 3 – Control group drawn from students that graduated from universities not part of the Q-Step programme. This control group includes students studying subject area (B) Social science and excluded those studying (L1) Economics and (C8) Psychology) as their subject 1. It includes students from 21 HEIs that fall into the top 3rd of average tariffs in 2013/14 (the same year Q-Step was introduced), or 2017/18.
- Stage 3 – Final extraction of full dataset

Population one is referred to as the sample of programme students. Population two is referred to as the sample of module students. Q-Step students include both programme and module students (population one and two). Population three is referred as the "counterfactual".

To prepare the presentation of data and subsequent analysis the data is labelled and cleaned, e.g. removing entries such as "unknown" and "n/a". A simplified scale is introduced for some variables (for example data on salary) to facilitate interpretation.

B. Descriptive statistics – Graduate Outcomes Survey

The tables bellow present tabulations of the GOS data. Table 20 and Table 21 present the number of observations by HEI (Q-Step and non-Q-Step).

Table 22 presents the percentage of observations by variable and by group:

- Q-Step programme group (including Kent)
- Q-Step module group (including Kent)
- Q-Step module group (excluding Kent)
- Counterfactual

The variables included in the GOS data are binary or categorical. No continuous variables are used from the GOS data.

Table 23 presents a cross-tabulation for each of the outcome variables by grouping and by gender (m/f). GOS data shows a contrast in salary outcomes between males and females, with the majority of males earning more than £25k while only 42 per cent of females earn more than £25k. The cross tabulation by salary and gender also shows that a larger proportion of both male and female graduates earn more than £25k in the Q-Step module group relative to the control group. The percentage difference in males vs females earning more than £25k is only slightly higher than that in the control group.

A larger proportion of males (55 vs 48 per cent) that took a Q-Step module agree with the statement 'I am using what I learned during my studies'. This data contrasts with the females where a smaller proportion of those that took a Q-Step module indicated agreeing with this statement (51 vs 56 per cent).

Table 24 shows a similar cross-tabulation, by parental education (Parent has HE qualifications y/n). The data shows that whilst a larger proportion of Q-Step graduates have ended up in jobs with a higher salary (higher than £25k), this difference in outcome is greater for the sub-sample of graduates who

have parents that benefited from higher education. The data also shows that, in contrast with the control group, prospects of entering skilled employment increased for students who took a Q-Step module, and prospects increased more for those students who have a parent with HE qualifications.

Table 25 also shows a similar cross-tabulation by grouping and by school marker (Attended a private school/state-funded school or college). The difference in salary outcomes and (skilled) employment between graduates who went to private school and those that went to a state-funded school or college is about the same. However, relatively more Q-Step students, in particular programme students, who went to a privately funded school tend to find that their qualification was a requirement for their current job.

We were unable to control for students' exposure to QM prior to attending university.[51]

Table 20 Number of Q-Step graduates by HEI – GOS data

HEI	Programme students	Module students
Cardiff University	2	35
City, University of London	7	96
Queen's University Belfast	2	9
Manchester Metropolitan University	26	3
The University of Bristol	16	63
The University of Edinburgh	6	108
The University of Essex		7
The University of Exeter	45	53
The University of Glasgow	6	94
The University of Kent	2	719
The University of Leeds	11	27
The University of Manchester	2	193
The University of Oxford		100
The University of Sheffield	3	
The University of Warwick	4	30
University College London	8	15
Total	**140**	**1552**

Table 21 Number of non-Q-Step graduates by HEI – GOS data [counterfactual]

HEI	Counterfactual
Aston University	142
Bath Spa University	24
Birmingham City University	244
Edge Hill University	117

[51] The variable F_ZTOP_ALEVELS (Top 4 A-levels/Highers) was not included in the analysis. A substantial proportion of the sample did not have a valid grade in any of the applicable qualifications.

HEI	Counterfactual
Edinburgh Napier University	60
Keele University	125
Liverpool John Moores University	181
Newcastle University	201
Queen Mary University of London	189
St Mary's University College	51
St Mary's University, Twickenham	19
Swansea University	156
The Nottingham Trent University	312
The University of Birmingham	297
The University of Dundee	63
The University of East Anglia	189
The University of Lancaster	184
The University of Leicester	202
University of Northumbria at Newcastle	199
University of the West of England, Bristol	187
York St John University	42
Total	**3184**

Table 22 Descriptive statistics for GOS respondents (figures are proportions, totals are in bold)

Variable	Field label	Q-Step programme group (including Kent)	Q-Step module group (including Kent)	Q-Step module group (excluding Kent)	Counterfactual
Domicile (grouped)	UK	82%	78%	78%	94%
	Other European Union	11%	10%	10%	3%
	Non-European Union	6%	13%	12%	3%
		140	**1552**	**833**	**3184**
Parental education	Parent has HE qualifications	68%	64%	68%	52%
		119	**1330**	**682**	**2681**
Sex	Male	38%	37%	36%	33%
		140	**1552**	**833**	**3184**
Disability marker	Known to have a disability	21%	17%	14%	15%
		140	**1552**	**833**	**3184**
Ethnicity	White	81%	68%	78%	78%
	Black	7%	12%	4%	7%
	Asian	8%	14%	0%	10%
	Mixed	4%	5%	4%	4%
	Other ethnic group	1%	2%	1%	1%
		114	**1196**	**645**	**2960**
State school marker	Attended a private school	18%	16%	23%	8%
		111	**1199**	**624**	**2909**

Variable	Field label	Q-Step programme group (including Kent)	Q-Step module group (including Kent)	Q-Step module group (excluding Kent)	Counterfactual
Low participation neighbourhood marker	Not a low participation neighbourhood (exl N. Ireland)	90%	92%	92%	84%
		115	**1198**	**649**	**2972**
Class of first degree	Attained a first	31%	27%	30%	23%
	Attained an upper second	62%	58%	58%	63%
	Attained a lower second or below	7%	14%	13%	14%
		140	**1539**	**820**	**3171**
Main activity	Studying	22%	16%	16%	17%
	Working	62%	65%	65%	69%
	Self employed	4%	5%	4%	3%
	Unemployed	6%	8%	8%	6%
	Other activity	6%	7%	7%	5%
		140	**1552**	**833**	**3184**
First job since graduating	First job since graduating – Yes	26%	40%	37%	37%
		53	**635**	**336**	**1252**
Employment length	Yes, 12 months or more	47%	42%	43%	46%
		100	**1092**	**586**	**2316**
Employment basis	Contract was permanent	66%	64%	63%	66%
	Contract was fixed-term	22%	23%	25%	20%
	Other contract type	12%	13%	12%	14%
		97	**1129**	**602**	**2452**
Salary derived bands	11513–15000	6%	4%	5%	8%
	15001–20000	18%	18%	18%	29%
	20001–25000	31%	32%	30%	33%
	25001–30000	32%	25%	23%	22%
	30001–35000	11%	12%	14%	6%
	35001–40000	1%	4%	5%	1%
	40001–45000	0%	2%	2%	0%
	45001–50000	0%	1%	1%	0%
	50001–55000	0%	1%	1%	0%
	55001–60000	0%	0%	1%	0%
	60001–65000	0%	0%	0%	0%
		71	**719**	**390**	**1533**
Salary derived bands	£25k or less	55%	54%	53%	70%
	More than £25k	45%	46%	47%	30%
		71	**719**	**390**	**1533**
Qualification required for the job	Yes: both the level and subject of qualification was a formal requirement	22%	21%	17%	17%
	Yes: the level of qualification was a formal requirement	29%	29%	35%	21%

Variable	Field label	Q-Step programme group (including Kent)	Q-Step module group (including Kent)	Q-Step module group (excluding Kent)	Counterfactual
	Yes: the subject of the qualification was a formal requirement	0%	2%	1%	2%
	Yes: while the qualification was not a formal requirement it did give me an advantage	21%	22%	21%	25%
	No: the qualification was not required	28%	26%	25%	35%
		92	**1077**	**571**	**2323**
Qualification required for the job	No: the qualification was not required	28%	26%	25%	35%
		92	**1077**	**571**	**2323**
Work skills	Strongly disagree	9%	12%	12%	13%
	Disagree	18%	20%	21%	18%
	Neither agree nor disagree	20%	16%	15%	15%
	Agree	46%	38%	38%	35%
	Strongly agree	7%	14%	14%	19%
		74	**743**	**410**	**1646**
Highly skilled	High-skilled	73%	72%	75%	59%
	Medium-skilled	18%	18%	15%	23%
	Low-skilled	9%	10%	10%	18%
		99	**1130**	**608**	**2411**
Highly skilled	High-skilled	73%	72%	75%	59%
		99	**1130**	**608**	**2411**

Table 23 Descriptive statistics for GOS respondents, by gender (figures are proportions, totals are in bold)

Variable	Field label	Q-Step programme group (including Kent)		Q-Step module group (including Kent)		Q-Step module group (excluding Kent)		Counterfactual	
Sex		Male	Female	Male	Female	Male	Female	Male	Female
Salary derived bands	£25k or less	36%	71%	47%	58%	42%	59%	64%	72%
	More than £25k	64%	29%	53%	42%	58%	41%	36%	28%
		33	**38**	**259**	**460**	**138**	**252**	**499**	**1034**
Qualification required for the job	No: the qualification was not required	23%	33%	25%	26%	23%	27%	35%	35%
	Yes: the qualification was required	78%	67%	75%	74%	77%	73%	65%	65%
		40	**52**	**398**	**679**	**210**	**361**	**748**	**1575**
Work skills	Strongly disagree	3%	16%	11%	12%	9%	14%	14%	13%
	Disagree	22%	13%	20%	19%	21%	20%	21%	17%

Variable	Field label	Q-Step programme group (including Kent)		Q-Step module group (including Kent)		Q-Step module group (excluding Kent)		Counterfactual	
	Neither agree nor disagree	22%	18%	15%	17%	14%	16%	17%	15%
	Agree	50%	42%	42%	36%	44%	35%	33%	36%
	Strongly agree	3%	11%	13%	15%	12%	15%	15%	20%
		36	**38**	**285**	**458**	**159**	**251**	**521**	**1125**
Highly skilled	High-skilled	26%	29%	22%	31%	20%	29%	37%	43%
	Non high-skilled	74%	71%	78%	69%	80%	71%	63%	57%
		43	**56**	**424**	**706**	**229**	**379**	**775**	**1636**

Table 24 Descriptive statistics for GOS respondents, by parental education (figures are proportions, totals are in bold)

Variable	Field label	Q-Step programme group (including Kent)		Q-Step module group (including Kent)		Q-Step module group (excluding Kent)		Counterfactual	
Parental education	Parent has HE qualifications	Yes	No	Yes	No	Yes	No	Yes	No
Salary derived bands	£25k or less	38%	86%	49%	61%	45%	69%	71%	70%
	More than £25k	62%	14%	51%	39%	55%	31%	29%	30%
		42	**22**	**383**	**266**	**230**	**120**	**666**	**668**
Qualification required for the job	No: the qualification was not required	20%	45%	22%	29%	21%	34%	33%	37%
	Yes: the qualification was required	80%	55%	78%	71%	79%	66%	67%	63%
		55	**29**	**593**	**353**	**332**	**158**	**981**	**981**
Work skills	Strongly disagree	10%	11%	12%	11%	11%	15%	12%	15%
	Disagree	14%	28%	18%	22%	20%	20%	19%	17%
	Neither agree nor disagree	18%	17%	16%	16%	17%	11%	17%	13%
	Agree	51%	39%	40%	34%	39%	36%	36%	33%
	Strongly agree	6%	6%	14%	18%	13%	19%	16%	22%
		49	**18**	**402**	**250**	**235**	**117**	**685**	**723**
Highly skilled	High-skilled	24%	34%	24%	36%	21%	39%	37%	45%
	Non high-skilled	76%	66%	76%	64%	79%	61%	63%	55%

		59	**29**	**611**	**376**	**353**	**165**	**1005**	**1025**

Table 25 Descriptive statistics for GOS respondents, by state school marker (figures are proportions, totals are in bold)

Variable	**Field label**	**Q-Step programme group (including Kent)**		**Q-Step module group (including Kent)**		**Q-Step module group (excluding Kent)**		**Counterfactual**	
State school marker	Attended a private school	Privately funded school	State-funded school or college	Privately funded school	State-funded school or college	Privately funded school	State-funded school or college	Privately funded school	State-funded school or college
Salary derived bands	£25k or less	42%	64%	40%	58%	33%	60%	53%	72%
	More than £25k	58%	36%	60%	42%	67%	40%	47%	28%
		12	**50**	**96**	**551**	**75**	**267**	**117**	**1349**
Qualification required for the job	No: the qualification was not required	13%	36%	14%	29%	11%	29%	24%	36%
	Yes: the qualification was required	87%	64%	86%	71%	89%	71%	76%	64%
		15	**64**	**132**	**754**	**98**	**353**	**168**	**1994**
Work skills	Strongly disagree	9%	10%	7%	12%	5%	13%	7%	14%
	Disagree	27%	17%	22%	20%	24%	20%	26%	17%
	Neither agree nor disagree	18%	19%	15%	17%	16%	15%	24%	15%
	Agree	45%	48%	39%	37%	38%	38%	33%	35%
	Strongly agree	0%	6%	16%	14%	16%	13%	9%	19%
		11	**52**	**97**	**534**	**74**	**262**	**123**	**1427**
Highly skilled	High-skilled	13%	33%	12%	33%	11%	32%	23%	44%
	Non high-skilled	88%	67%	88%	67%	89%	68%	77%	56%
		16	**69**	**142**	**783**	**107**	**368**	**176**	**2063**

C. Propensity score matching

In preparation for the econometric analysis, data on programme students, module students, and Q-Step students (programme and module students) is matched to the counterfactual population using propensity score matching (PSM). To ensure the econometric analysis is based on a sufficiently large sample, we match using Nearest neighbour [5]' and draw on all observations in the 'common support' area and this has not excluded many data points. The matching is performed on the variables: Parental education, Sex, Disability marker, Ethnicity, State school marker, Low participation neighbourhood

marker, and Class of first degree. The outcome variable used is “Highly skilled”, which has the least missing observations.

D. Results from the econometric analysis

Table 26, *Statistically significant (p<0.05)

Table 27 and Table 28 present the results of an econometric analysis that builds on the GOS data. Logit models with Random Effects (panel data model) are run using the outcome variables Salary, Qualification required for the job, and Highly skilled.[52]

The analysis includes the variable “Median earnings” which is a proxy for HEI level quality of teaching/HEI offer and measure of the medium earnings of graduates in 2016/17 in sociology, social policy and anthropology one year after graduation.[53]

We find a positive impact of Q-Step for module students, and for a sample that combines module and programme students (which given sample sizes in those two groups is dominated by the former). We did not a find a positive significant effect Q-Step for programme students alone and the main report provides some hypothesis for these results (see Section 4.2.3).

Table 26 Impact of Programme students [i.e. dummy where programme students=1, Counterfactual=0]

Logit model with RE	**Salary over £25k**		**Qualification required for the job**		**Highly skilled**	
	Coef.	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**
Programme student	**0.75**	***0.11***	**0.00**	***0.99***	**0.31**	***0.33***
Parental education	0.04	*0.75*	-0.09	*0.43*	-0.15	*0.16*
Sex	-0.21	*0.15*	0.06	*0.59*	-0.07	*0.54*
Disability marker	-0.01	*0.96*	0.05	*0.76*	0.14	*0.34*
Ethnicity						
White	0.30	*0.28*	-0.07	*0.74*	-0.45	*0.03**
Black	-0.20	*0.47*	-0.10	*0.60*	-0.53	*0.01**
Asian	0.21	*0.48*	0.21	*0.40*	0.08	*0.74*
Mixed/other	0.00		0.00		-0.06	*0.95*
State school marker	-0.85	*0.00**	-0.61	*0.01**	-0.76	*0.00**
Low participation neighbourhood marker						
Not a low participation neighbourhood	0.42	*0.05**	0.12	*0.47*	-0.05	*0.76*
Low participation neighbourhood	-0.18	*0.83*	0.23	*0.60*	-0.57	*0.19*
Class of first degree						

[52] The variable Qualification required for the job was not used in the analysis. The modelling would require a multinomial logit model and this model did not compute.

[53] Missing data for Edge Hill University, Queen Mary University of London, Queen's University Belfast, St Mary's University College, The University of Dundee, and York St John University. https://www.gov.uk/government/statistics/graduate-outcomes-leo-subject-by-provider-2016-to-2017

Logit model with RE	Salary over £25k		Qualification required for the job		Highly skilled	
	Coef.	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**
Attained a first class	-0.05	*0.73*	-0.47	*0.00**	-0.46	*0.00**
Attained an upper second class or below	-0.20	*0.44*	-0.62	*0.00**	-0.76	*0.00**
Median earnings	0.00	*0.40*	0.00	*0.02**	0.00	*0.02**
_cons	-1.61	*0.39*	-0.50	*0.61*	-0.71	*0.51*
/lnsig2u	-0.86		-3.19		-2.51	
sigma_u	0.65		0.20		0.29	
rho	0.11		0.01		0.02	
N	1176		1582		1726	

*Statistically significant (p<0.05)

Table 27 Impact of Module students [i.e. dummy where module students=1, Counterfactual=0]

Logit model with RE	Salary over £25k		Qualification required for the job		Highly skilled	
	Coef.	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**
Module student	**0.66**	***0.01****	**0.45**	***0.00****	**0.50**	***0.00****
Parental education	0.07	*0.55*	-0.02	*0.86*	-0.15	*0.10*
Sex	-0.27	*0.02**	0.07	*0.52*	-0.17	*0.08*
Disability marker	-0.06	*0.70*	0.08	*0.53*	0.10	*0.43*
Ethnicity						
White	0.33	*0.11*	-0.13	*0.44*	-0.35	*0.03**
Black	-0.03	*0.89*	-0.13	*0.39*	-0.37	*0.01**
Asian	0.03	*0.92*	0.29	*0.20*	0.20	*0.36*
Mixed/other	-2.29	*0.03**	-0.13	*0.82*	-0.83	*0.10*
State school marker	-0.69	*0.00**	-0.69	*0.00**	-0.88	*0.00**
Low participation neighbourhood marker						
Not a low participation neighbourhood	0.33	*0.07*	0.02	*0.91*	-0.08	*0.57*
Low participation neighbourhood	-0.54	*0.42*	0.16	*0.71*	-0.58	*0.14*
Class of first degree						
Attained a first class	-0.27	*0.03**	-0.37	*0.00**	-0.50	*0.00**
Attained an upper second class or below	-0.61	*0.00**	-0.72	*0.00**	-0.82	*0.00**
Median earnings	0.00	*0.03**	0.00	*0.00**	0.00	*0.00**
_cons	-2.18	*0.04**	-0.56	*0.44*	-0.39	*0.62*
/lnsig2u	-1.50		-3.60		-2.83	
sigma_u	0.47		0.17		0.24	

rho	0.06		0.01		0.02	
N	1704		2263		2467	

*Statistically significant (p<0.05)

Table 28 Impact of Q-Step students [i.e. dummy where programme & module students=1, Counterfactual=0]

Logit model with RE	**Salary over £25k**		**Qualification required for the job**		**Highly skilled**	
	Coef.	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**
Q-Step student	0.60	*0.02**	0.39	*0.00**	0.47	*0.00**
Parental education	0.00	*0.97*	-0.04	*0.65*	-0.15	*0.10*
Sex	-0.28	*0.02**	0.06	*0.54*	-0.16	*0.09*
Disability marker	-0.02	*0.91*	0.09	*0.47*	0.10	*0.39*
Ethnicity						
White	0.32	*0.11*	-0.14	*0.41*	-0.33	*0.03**
Black	-0.02	*0.92*	-0.11	*0.49*	-0.35	*0.02**
Asian	0.03	*0.91*	0.32	*0.16*	0.22	*0.29*
Mixed/other	-2.30	*0.03**	-0.10	*0.86*	-0.81	*0.10*
State school marker	-0.67	*0.00**	-0.68	*0.00**	-0.87	*0.00**
Low participation neighbourhood marker						
Not a low participation neighbourhood	0.31	*0.10*	0.04	*0.79*	-0.07	*0.63*
Low participation neighbourhood	-0.65	*0.33*	0.21	*0.61*	-0.51	*0.19*
Class of first degree						
Attained a first class	-0.30	*0.02**	-0.41	*0.00**	-0.52	*0.00**
Attained an upper second class or below	-0.58	*0.00**	-0.74	*0.00**	-0.83	*0.00**
Median earnings	0.00	*0.03**	0.00	*0.00**	0.00	*0.00**
_cons	-2.28	*0.04**	-0.56	*0.44*	-0.56	*0.45*
/lnsig2u	-1.29		-3.44		-2.88	
sigma_u	0.52		0.18		0.24	
rho	0.08		0.01		0.02	
N	1760		2333		2542	

*Statistically significant (p<0.05)

Appendix C Overview of LinkedIn data

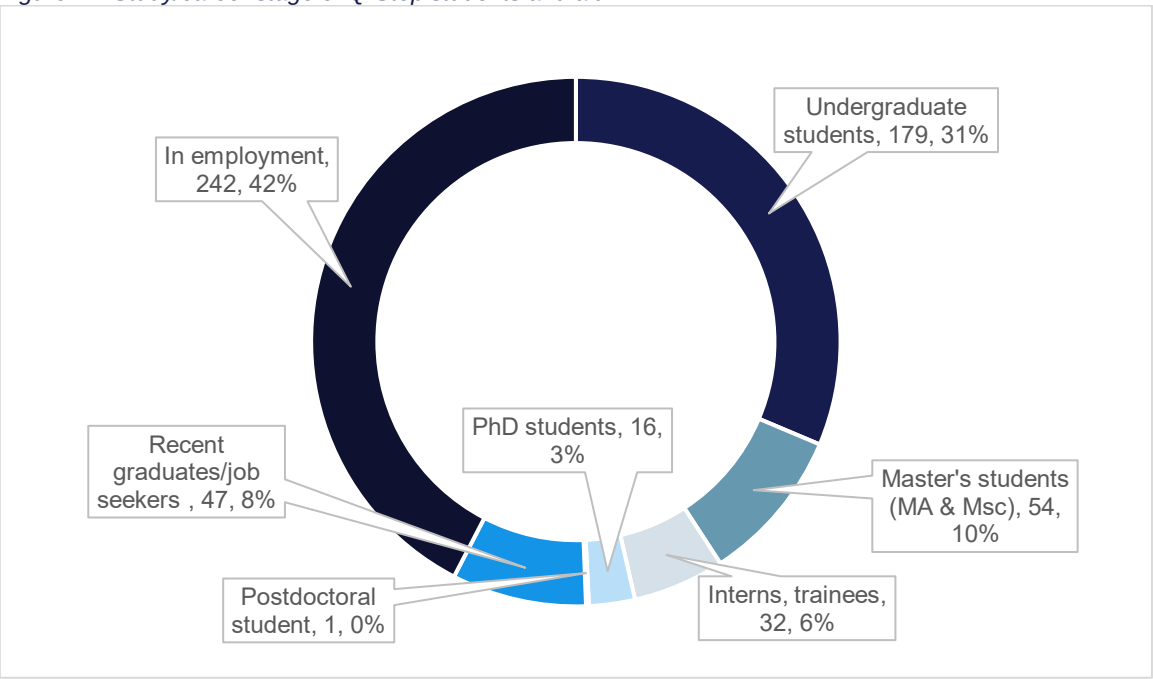
586 Q-Step students and alumni are on LinkedIn, out of which 570 detail their role. We have profiled the role of these students and alumni and find that the data includes:

- 179 undergraduate students,
  - Including 12 who also detail having a student job, internship or employment, e.g. Vice President of the University College London Q-Step Society, Tutor at Education To Inspire, Digital Learning Assistant, Co-founder at UnbOx, Co-founder of Plastic Free Penzance
- 54 Master's students (MA and Msc)
  - Including one student who is also a Teaching Assistant at The Sultan's School in Oman
- 32 interns, trainees
  - Hosts include the Home Office, the Scottish Government, Dymon Asia Capital, Praxis Care, Deezer, Novartis, National Records of Scotland, Mirae Asset Daewoo, Cabinet Office, Arup, Penta Foundation, University of Nottingham Manuscripts and Special Collections, Latham & Watkins, Ashurst, Allens, Kilburn & Strode, Taylor Bennett Foundation and Brunswick Group, Campbell Johnston Clark, In2Science, and The University of Leeds
- 16 PhD students
- 1 Postdoctoral student
- 47 recent graduates/job seekers and including one retired alumnus
- 242 in employment

The vast majority of those in employment are in professional employment. A profiling of job titles shows that many alumni have taken up employment where quantitative skills are a requirement or natural asset. 27 per cent of those in employment are consultants or analysts, 15 per cent have a research job (e.g. research offers or research data manager), 14 per cent or data scientist or similar, 12 per cent are public sector civil servants or similar, 8 per cent are in sales, business, marketing, 7 per cent are policy advisers or similar, another 7 per cent are in finance or investment, and 3 per cent have founded a business or initiative. An overview of specific job examples is provided in Table 29.

Based on the total sample of alumni in employment, 40 per cent are male. When looking at the percentage of males in sales/business/marketing and finance/investment we find that 60–77 per cent are male. Females tend to have a stronger representation in data science and research jobs, with 65–78 per cent of those jobs being taken up by female candidates.

Figure 12 Study/career stage of Q-Step students and alumni



Source: LinkedIn data from the Nuffield Foundation

Table 29 Q-Step graduate career destinations (employed)

Key words	Examples	Number	Percentage of employed	% female	% male
Consultant, consulting, analyst	• Senior Insight Analyst at TalkTalk • Data Science Analyst at Accenture • Financial Analyst at IBM	67	27%	54%	46%
Research	• Student Research Assistant at Leeds City Council • Research Officer at Office for National Statistics • Research data manager at NatCen Social Research	36	15%	78%	22%
Data, statistics	• Data Scientist at Inspera AS • Data Scientist at Airbus • Civil Service Statistician	34	14%	65%	35%
Civil, admin, officer, public sector, public affairs, council	• Public Sector Worker • Research Officer at Office for National Statistics • Civil Service Statistician	30	12%	67%	33%
Sales, business, marketing	• Business Development Manager at The Growth Company • Sales at Procter & Gamble	20	8%	40%	60%

Key words	Examples	Number	Percentage of employed	% female	% male
	• Business Analyst, Fraud Machine Learning at Barclays				
Policy, politics	• Research Assistant at SRUC Rural Policy Centre • GSS Fast Stream – Policy Adviser at DfE • Tax Policy Adviser for HMRC	16	7%	56%	44%
Finance, investment, economist	• Investment Associate • Junior Financial Analyst at Vanguard • Tax Analyst at IFP – Institute for Financial Policy	13	5%	23%	77%
Founder	• Co-Founder of OX1 Incubator • Founder, Dreaming Spires • Founder of KSAP – Putting your vision in the spotlight using digital marketing, PR and event management services	7	3%	43%	57%
Teacher, lecturer	• English Teacher at EF Education First • College Lecturer in International Relations • Teaching Assistant at Elms Bank School	7	3%	57%	43%
Communications	• Communications Manager at The University of Exeter • Senior Account Executive at MHP Communications • Senior Executive at Newgate Communications	7	3%	57%	43%
Reporter, journal, news, editor	• Journalist at News UK • Senior Editor at The Oxford Blue • Co-Founder @ Forum.eu | The University of Oxford | Reuters Institute for the Study of Journalism	5	2%	20%	80%
Other	• Manager Pricing at Panel Sampling • Growth at Upgrade Pack • Comedy Producer and Director at Stamptown Productions • Assistant Coordinator at Syrian Futures	59	24%	71%	29%

Key words	Examples	Number	Percentage of employed	% female	% male
	• Music producer, DJ and sole trader • International Payments • Legal Solutions Specialist at Freshfields Bruckhaus Deringer				
Total		**242**	**100%**	**60%**	**40%**

Source: LinkedIn data from the Nuffield Foundation. Note that numbers are not cumulative because the key work search is not mutually exclusive.

100 St John Street,
London, EC1M 4EH
Registered charity: 206601

T: + 44 (0) 20 7631 0566
E: info@nuffieldfoundation.org
Follow us on Twitter @NuffieldFound

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About the Nuffield Foundation

The Nuffield Foundation is an independent charitable trust with a mission to advance educational opportunity and social well-being.

We fund research that informs social policy, primarily in Education, Welfare and Justice. We also provide opportunities for young people to develop skills and confidence in science and research.

We are the founder and co-funder of the Nuffield Council on Bioethics, the Nuffield Family Justice Observatory and the Ada Lovelace Institute.