Q-Step Academy Impact Report

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Q-Step Academy

An initiative of the Edinburgh Q-Step Centre

June 2020

Foreword

We are delighted to introduce this Q-Step Academy Impact Report. It illustrates our collective ambition at the School of Social and Political Science to make a tangible difference in our surrounding communities, as well as nationally and across the globe.

This impact report provides an opportunity to reflect back as well as look ahead. The Q-Step Academy began in March 2019 as part of a programme of work connected to the Edinburgh Q-Step Centre. It represented a significant expansion in the outreach ambitions of the School and built upon our expertise and a long tradition of innovation within quantitative social science. The Academy was also founded through partnership; working with colleagues across the University and beyond finding synergies with projects such as the City Deal and the Data Driven Innovation programme.

Looking ahead, the publication of this report coincides with a major investment by the School into methodological research and training. The Research Training Centre will advance the methods initiatives within the School including Q-Step and its Q-Step Academy.

The Centre aims to provide training in methods and apply rigorous social science methods to societal challenges. This report will guide you through the foundations of the Academy, giving an insight into the people involved and the achievements of the last year. It also unveils early findings of the research which has accompanied the project, and which will direct the agenda for the next year.

We commend this report to you and trust you will be informed and inspired by its contents. The success of the Q-Step Academy underscores the significance of connecting world-class research with learning and teaching. It highlights what can be achieved through collaboration and creativity and showcases a project which has brought positive change to our city and beyond.

Linda McKie
Head of School

Richard Baxstrom
Director of Learning and Teaching

Jeevan Sharma
Director of Research

1. Introduction

What is the Q-Step Academy?

The Q-Step Academy is an initiative of the Edinburgh Q-Step Centre and sits in the School of Social and Political Science at the University of Edinburgh. It and has two key aims. First, to raise the profile of social statistics in secondary schools in the Edinburgh city region and beyond, second, to widen participation in Higher Education.

The Q-Step Academy began in March 2019 as part of a programme of work connected to the Edinburgh Q-Step transitional funding application. It builds significantly upon previous positive outreach work and has forged a partnership with several local secondary schools and, through the Brilliant Club, with schools across the UK.

Over the past year the Academy has designed and delivered a diverse and innovative programme of social statistics training and undertaken research into effective strategies for teaching social statistics.

Q-Step Academy

Edinburgh Q-Step Centre
Director of Q-Step - Dr Ugur Ozdemir

Research Training Centre
Director of the SPS RTC - Dr Alan Marshall

School of Social and Political Sciences
Dean/Head of SPS - Professor Linda McKie

College of Arts, Humanities & Social Sciences
Head of CAHSS - Professor Dorothy Miell

University of Edinburgh
Principal and Vice Chancellor - Professor Peter Mathieson

I will definitely be using the Crime statistics resource with my Advanced Higher class. It's perfect for us and it really reflects how much you took on board teacher feedback as well as a thorough examination of the SQA Course specifications. I'll be recommending to my colleagues and urging them to get involved with Q-Step next year.

Politics and Modern Studies and teacher

I enjoyed the session on Life expectancy because it taught me how to calculate large numbers and the average life expectancy.

S6 Pupil after a Campus Masterclass

I have had a bad experience of maths at school but I feel more confident about handling numbers/using statistics after these sessions.

S6 Pupil, end of year evaluation

Figure 1: Q-Step Academy within the University of Edinburgh

What does the Q-Step Academy do?

Our Key Activities

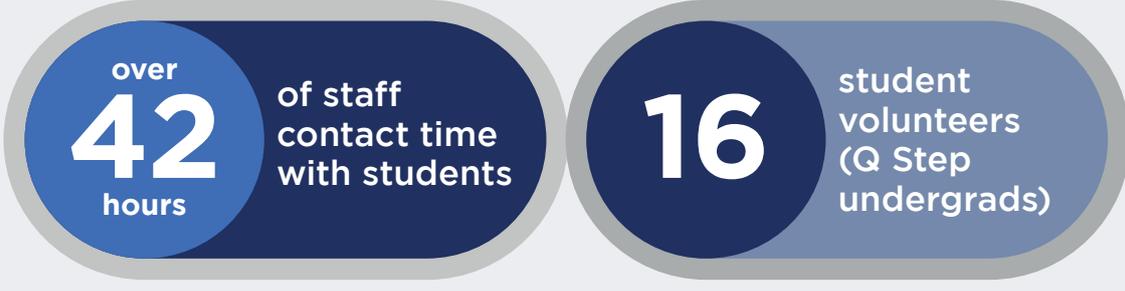Figure 2: Activities of the Q-Step Academy

Who is involved?

Partnerships are at the heart of the Q-Step Academy model. Our activities are supported by a wide range of partners draw on the expertise of teaching staff in schools, academic colleagues, undergraduate volunteers, staff in professional services and external partners.

Management group	Associates	Local Q-Step academy	Collaborators
Dr Ugur Ozdemir (Director of Edinburgh Q-Step Centre)	Dr Gitit Kadar-Satat (University of Warwick)	Craigmount High School	Widening Participation team and Lothian Equal Access Program for Schools (LEAPS)
Dr Alan Marshall (Director of the SPS Research Training Centre)	Dr Michael Rosie (Senior Lecturer, Sociology)	The Royal High School	The Brilliant Club
Dr Helen Packwood (Lecturer, Social Policy)	Mr Richard Brodie (Teaching and Student Development Fellow)	Balwearie High School	The Data Lab, Scotland
Dr Valeria Skafida (Senior Lecturer in Social Policy)	Dr Alice Dias Lopes (Career Development Fellow)	St George's School for Girls	Scottish Government including the Scottish Household Survey team
Dr Jan Eichhorn (Senior Lecturer in Social Policy)	Dr Eloi Ribe (Career Development Fellow)	Tynecastle High School	Scottish Qualifications Authority
Professor Alison Koslowski (Social Policy)	Professor John MacInnes (Sociology)	George Watson's College	ESRC Festival of Social Science

Figure 3 The Q-Step Academy partners

2. Key achievements

- This has been a busy first year for the Q-Step Academy and key achievements and activities are outlined below. Including feedback from staff and students who have taken part in the programme.

- We have run quantitative social science taster sessions with around 440 pupils spanning primary to secondary ages;

- We have delivered an ESRC Festival of Social Science event on social statistics to secondary school pupils and teachers;

- We have worked with pupils from 8 schools across the city region; developing a program of quantitative research methods training in the 2019/20 academic year;

- We have offered 4 research projects as part of the Nuffield Research Placements programme;

- We have designed and published a Social Statistics module for national roll-out by The Brilliant Club;

- We have been invited to contribute to consultations around the SQA's new Higher in Applications of Mathematics;

- We have formed collaborations and connections with the Widening Participation team, the Data Education in Schools team and the Maths is OK: Unsettling Understandings of Maths Anxiety (University of Manchester);

- We have created placement opportunities for Q-Step undergraduate students to contribute to the School of Social and Political science outreach teaching material;

- We have developed free online teaching resources which draw on key Scottish surveys, titled 'Scotland by Numbers', which are available on the UK Data Service (UKDS) website

- We have disseminated research using teaching data to understand factors influencing learning social statistics.

- We have been awarded a Knowledge Exchange and Impact Grant (£3,374) and a Student Experience Grant (£1,590) to support our outreach activities.

- We have been working with the SPS communications team to develop a stand-alone website dedicated for the Q-Step Academy.

- We have collaborated with The Data Lab and offered a free Data Fringe event titled 'Understanding the 2019 UK General Elections Through Digital Data' for S5/S6 pupils (see section 8).

- We have collaborated with the Widening Participation team and offered a 'Global Challenges' programme for S3 pupils titled 'Engaging with Social Statistics Through Data-Driven Comics' (see section 8).

18 outreach events

5 'hands on' workshops

9 methods masterclasses

1 data summit

160 hours hosting Nuffield Research Placement students

1 ESRC Festival of Social Science event

3 widening participation events

outreach to **441** young people and their teachers

pupils from **8** different schools in the city region

10 sessions OFF campus

8 sessions ON campus

over **42** hours of staff contact time with students

**16** student volunteers (Q Step undergrads)

3. Research led Outreach

In addition to running an outreach programme the Q-Step Academy has also conducted research on good practice in the teaching and learning of social statistics. This research project has had several aims. First, to evaluate the effectiveness of the activities of the Q-Step Academy. Second, to validate a standardised tool for measuring maths anxiety among secondary school students and develop pedagogies that mitigate such anxiety. This complements a wider body of research within the SPS Research Training Centre[1].

Research Questions[2]

1. What are students and teachers' perceptions of and attitudes toward social statistics?

2. What are some barriers and enablers for teaching and learning social statistics in secondary schools?

3. What support do teachers need in order to engage with social statistics in their teaching?

4. What is an effective measure of maths anxiety among secondary school pupils?
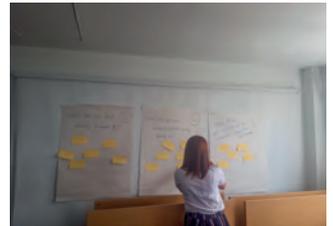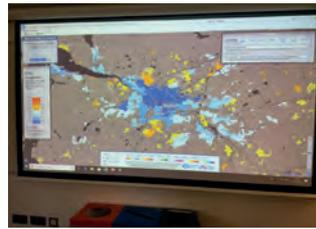
Method

Surveys: the research team designed and piloted a self-completion survey about attitudes to social statistics, statistical literacy, and maths anxiety. This survey has been administered to pupils in participating schools. The survey includes the Modified Abbreviated Math Anxiety Scale (MAMAS). This is a standardised maths anxiety scale for children and adolescents has been used in England, among other countries[3]. The survey also makes use of the Family Affluence Scale (FAS)[4] that has been developed to measure socio-economic status in research with children and adolescents. The FAS has been used extensively in research in Scotland and abroad.

Procedure: the survey has been administered twice. First, at the beginning of the school year (September-October 2019) so that we can establish a baseline and again at the end of the school year (May-June 2020)[5], to measure the impact of the new learning module on pupils' attitudes to social statistics, statistical literacy and maths anxiety.

1. Ralston, K., Gorton, V. Anxious girls or complacent boys? Examining reported anxiety of statistics in a sample of sociology undergraduates aimed at IJSRM
Ralston, K., MacInnes, J., Gayle, V., Crow, G., Is statistics anxiety negatively associated with course performance? aimed at MSOR Connections
2. This research is work in progress and will form part of the work of the Q-Step Academy in the academic year 20/21. The research questions will not be addressed in this Impact Report but in future research outputs.
3. MAMAS - https://pdfs.semanticscholar.org/fd86/074685e3da33e31b36914f2d4ccf64821491.pdf
4. FAS - https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5750958/
5. See section 5 on the impact of COVID-19 on the Q-Step Academy

Participants

113 young people completed the initial survey, between November 2019 and January 2020. Of those respondents, 59% are females, 39% are males and 2% who preferred not to say.

All respondents were in the senior phase of secondary school: 44% in S5 and 55% in S6. Most respondents (71%) attended a state school with higher than average rates of progression to higher education[1] whereas 23% attended a state schools with lower than average rates of progression to higher education and the remaining 6% attended a private school.
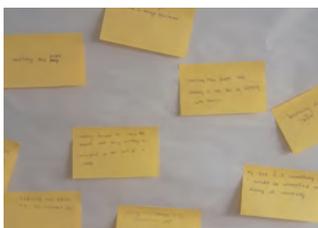
89% of the sampled S5 pupils reported they did or are planning to do National 5 Maths, however only a third (33%) said they are planning to complete a Higher Maths course.

77% of the sampled S5 pupils did or were planning to do Higher Modern Studies and 90% reported they are planning to do Advanced Higher Modern Studies.
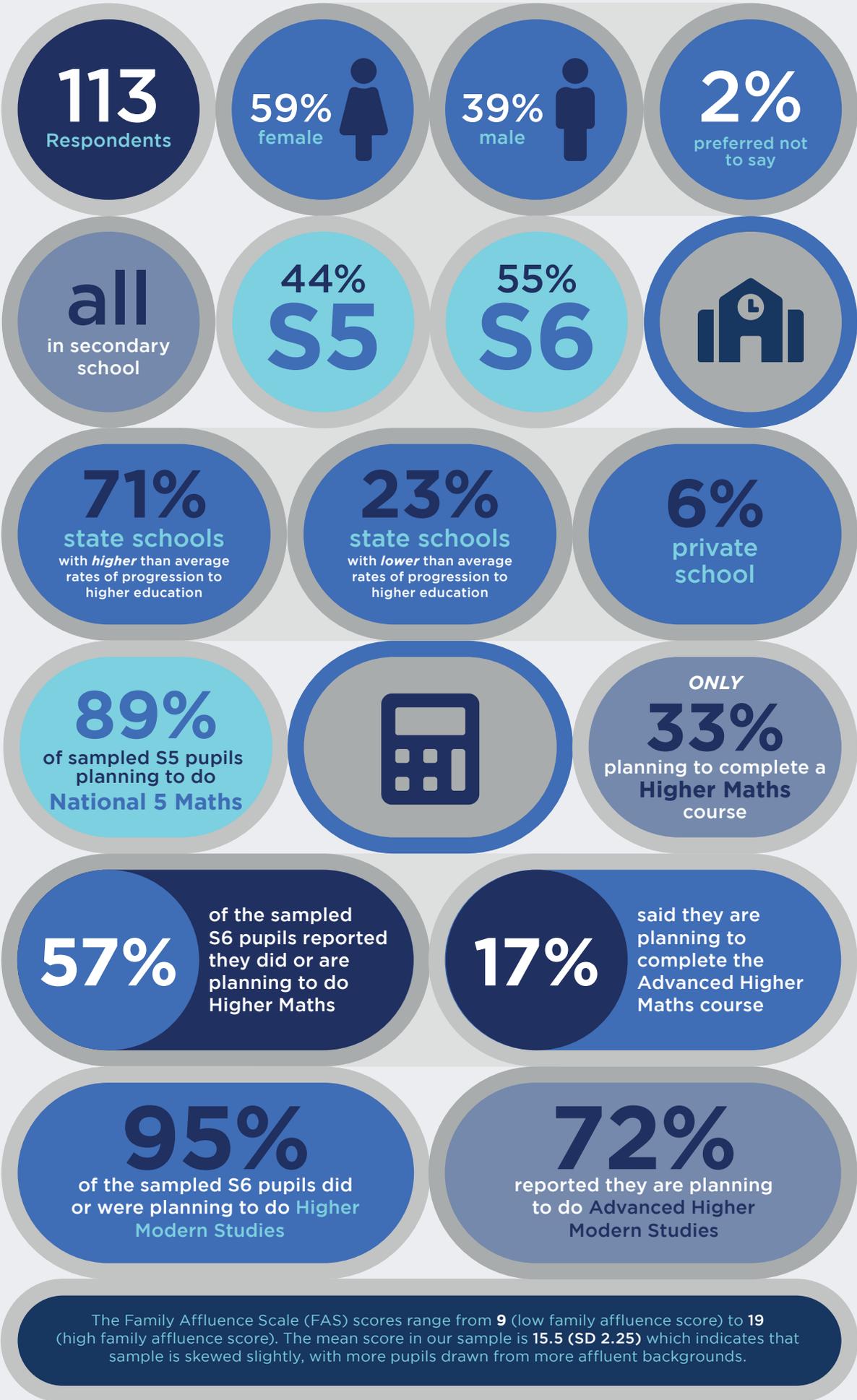
57% of the sampled S6 pupils reported they did or are planning to do Higher Maths and 17% said they are planning to complete the Advanced Higher Maths course.

95% of the sampled S6 pupils did or were planning to do Higher Modern Studies and 72% reported they are planning to do Advanced Higher Modern Studies.

The Family Affluence Scale (FAS) scores range from 9 (low family affluence score) to 19 (high family affluence score). The mean score in our sample is 15.5 (SD 2.25) which indicates that sample is skewed slightly, with more pupils drawn from more affluent backgrounds.

113
Respondents

59% female

39% male

2% preferred not to say

all in secondary school

44% S5

55% S6

71% state schools with *higher* than average rates of progression to higher education

23% state schools with *lower* than average rates of progression to higher education

6% private school

89% of sampled S5 pupils planning to do **National 5 Maths**

ONLY **33%** planning to complete a **Higher Maths** course

57% of the sampled S6 pupils reported they did or are planning to do Higher Maths

17% said they are planning to complete the Advanced Higher Maths course

95% of the sampled S6 pupils did or were planning to do Higher Modern Studies

72% reported they are planning to do Advanced Higher Modern Studies

The Family Affluence Scale (FAS) scores range from **9** (low family affluence score) to **19** (high family affluence score). The mean score in our sample is **15.5 (SD 2.25)** which indicates that sample is skewed slightly, with more pupils drawn from more affluent backgrounds.
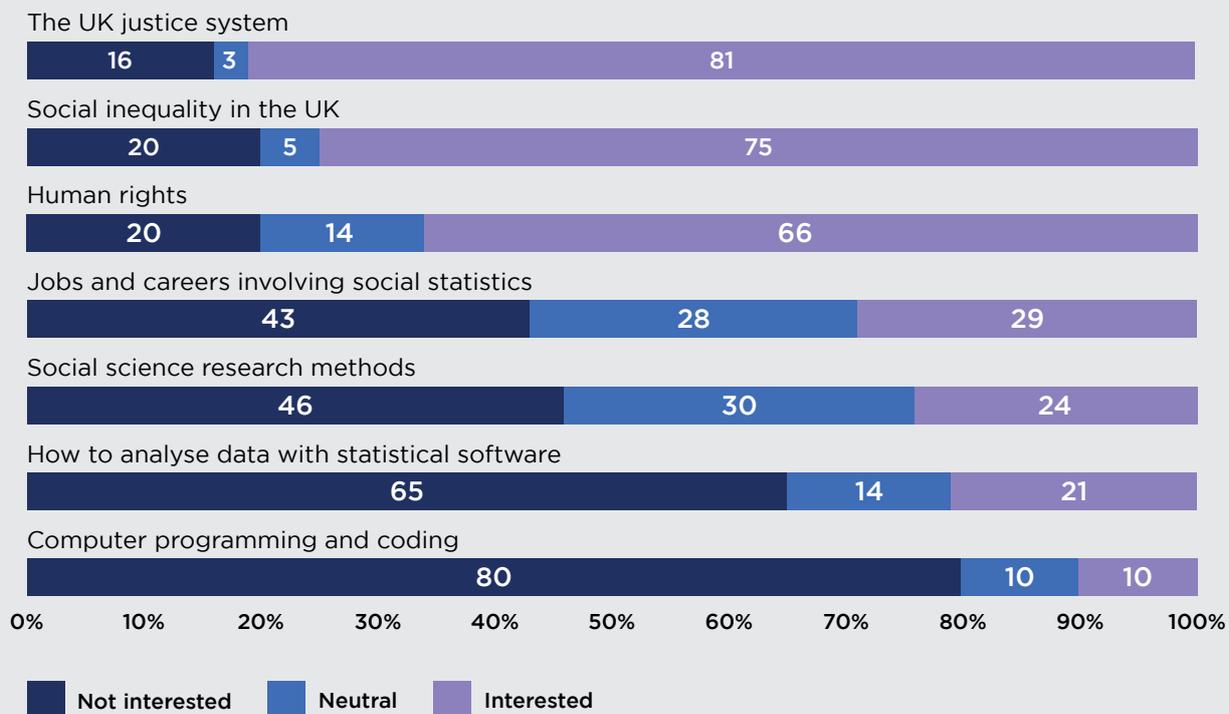
Preliminary findings

We explored pupils' interests in different topics related to social statistics (Figure 2). Most of the surveyed pupils reported they are interested in learning more about social issues like the UK justice system (81%), social inequality in the UK (75%) and human rights (66%), all of which are introduced by the modern studies senior phase syllabus. By contrast, only about a quarter (24%) stated they are interested in learning more about social science research methods, 21% reported they are interested in analysing data using statistical software and 10% in computer programming and coding. 29% said they are interested in learning about jobs and careers involving social statistics.

Figure 2: Please tell us how interested you are, or not, in learning about these topics (n=112-113)

The UK justice system
Not interested	Neutral	Interested
16	3	81

Social inequality in the UK
Not interested	Neutral	Interested
20	5	75

Human rights
Not interested	Neutral	Interested
20	14	66

Jobs and careers involving social statistics
Not interested	Neutral	Interested
43	28	29

Social science research methods
Not interested	Neutral	Interested
46	30	24

How to analyse data with statistical software
Not interested	Neutral	Interested
65	14	21

Computer programming and coding
Not interested	Neutral	Interested
80	10	10

Legend: Not interested, Neutral, Interested

Although interest levels in learning more about social research methods, data analysis and computer programming are relatively lower than other topics, a majority of the surveyed pupils (74%) agreed that 'it is vital to know some statistics because so much of today's world depends on data' (Figure 3). 57% also agreed that learning about statistics is important for their future employment. Less than half of the respondents (48%) agreed that they are good in maths and 68% felt that receiving extra tuition in maths will help them get better grades.

> Thank you for all of your support last year with our Advanced Higher pupils and the workshops you ran for us. The experience the pupils gained was invaluable.
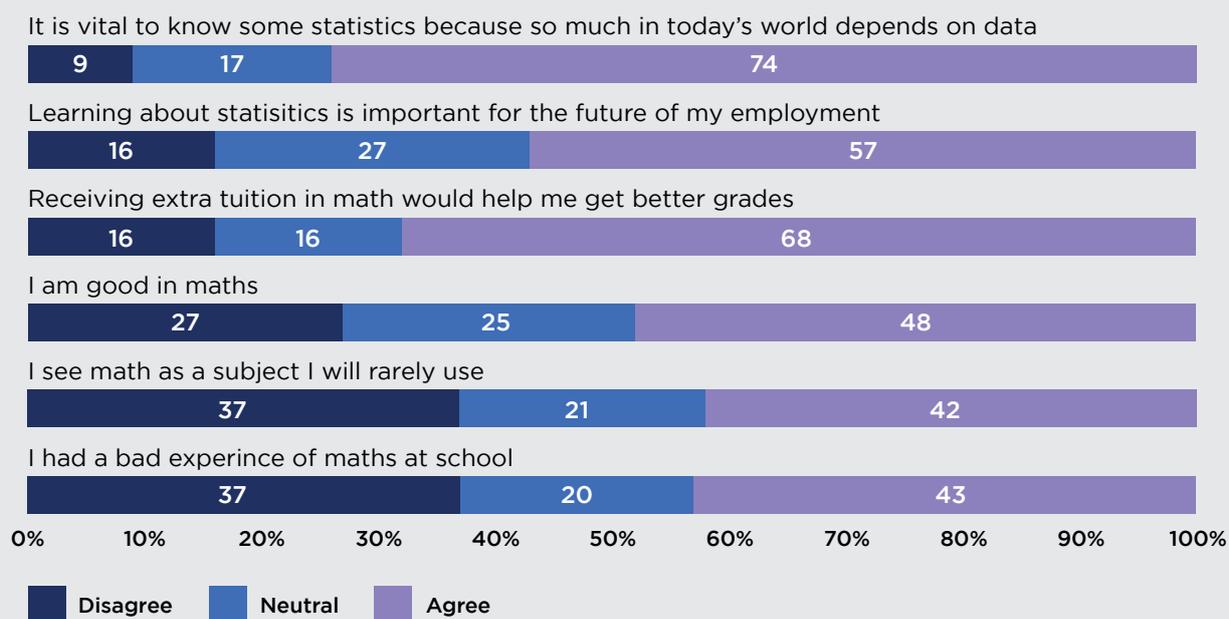>
> **Modern Studies and History teacher**

> I really enjoyed the Campus Masterclass when the map was taken out and we looked at the places in/ near Glasgow like Calton and Lenzie.
>
> **S6 Pupil after a Campus Masterclass**

> Taking part in the Q-Step Academy has allowed me to learn more about social statistics and what it would be like to study social science and quantitative methods at University.
>
> **S6 Pupil, end of year evaluation**

Figure 3: For each of the following statements about maths and stats, please tell us how much you agree or disagree with it (N=112-113)

It is vital to know some statistics because so much in today's world depends on data

9	17	74

Learning about statisitics is important for the future of my employment

16	27	57

Receiving extra tuition in math would help me get better grades

16	16	68

I am good in maths

27	25	48

I see math as a subject I will rarely use

37	21	42

I had a bad experince of maths at school

37	20	43

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

■ Disagree   ■ Neutral   ■ Agree

Taken together, figures 2 and 3 suggest that while most surveyed pupils identify the usefulness of statistics, only some of them also are interested in developing 21st century data analysis skills or exploring careers involving social statistics.

Initial analysis of the UK Modified Abbreviated Math Anxiety Scale (MAMAS-UK) within our sample shows excellent internal consistency (n=112, $\alpha=0.91$). A two-factor exploratory analysis accounted for 68% of the variance with factor loadings ranging from 0.59 to 0.85 on the Math Evaluation Anxiety (MEA) factor and from 0.46 to 0.68 on the Learning Math Anxiety (LMA) factor. These results are consistent with previous international and UK research.

4. The impact of COVID-19 — challenges and opportunities

The outbreak of the coronavirus pandemic has brought significant challenges to the operation of the Q-Step Academy. Due to the closure of schools across Scotland our free Data Fringe event that was planned for March was cancelled and the 'Global Challenges' programme that was scheduled to take place between April and May was postponed. The Q-Step Academy will deliver this summer's Nuffield Research between July and August remotely by using a range of online communication platforms and learning tools. While challenging, this situation also brings the Q-Step academy an opportunity to develop its capacity around the delivery of remote teaching to secondary school pupils.

Disruption to the school year has also had an impact on the distribution of the evaluation research, with many students not completing the follow up survey. Collaborations between the Academy and local schools is still strong and there may be opportunities to reconnect with students who have taken part in the Q-Step Academy program in coming months.

Thanks so much for yesterday's masterclass they were really enthusiastic about the session. They were really impressed with the amount of data available using the maps and setting the criteria, and the fact that they could have a look at their own area was fascinating to them!

Maths teacher

This has been a really good opportunity to put on my CV, on my UCAT but also get experience of uni life and working in a uni atmosphere.

S5 pupil during a Nuffield Research Placement with Q-Step

5. Main Outcomes

In summary, the Q-Step Academy has met its ambitious aims over the last year. Research and outreach have helped to raise the profile of social statistics and contribute to research into the teaching of social statistics in schools. Below is summary of the main outcomes of this research:

- Schools have contributed to the design of new free learning and teaching materials on social statistics that will be developed by the Q-Step academy.

- Schools have gained access to free learning and teaching materials on social statistics, including digital online materials.

- Teachers have been supported by the Q-Step Academy team in the delivery of new learning and teaching materials on social statistics.

- Relationships between the University of Edinburgh and school in Edinburgh and the City region have been enhanced through this collaboration leading to further opportunities – such as wider engagement with schools (careers fairs and other events), tailored support for Advanced Higher Dissertations and connecting with national networks of Modern Studies teachers.

- Increased attainment by pupils, in particular, more advanced statistical literacy.

- A better understanding of maths anxiety in secondary school, especially among learners of social subjects.

- Contributions to an emerging body of literature about math anxiety and the teaching and learning of social statistics in secondary schools.

> Thank you so much for an amazing event the pupils really enjoyed it and a number of pupils have said they are now considering a Q-step approach to subject choice.
>
> **Modern Studies teacher**

> I've got my social subjects and English background, but I also get to use my maths and science – it's made me realise that this is something I would want to do.
>
> **S5 pupil during a Nuffield Research Placement with Q-Step**

> As always thank you very much for your time and enthusiasm with our pupils it really does make a massive impact.
>
> **Modern Studies and Geography teacher**

> They've brought social science and maths together!
>
> **S5 pupil during a Nuffield Research Placement with Q-Step**

Plans for the future

- The Q-Step Academy will seek to strengthen and extend its collaboration with our five partner secondary schools - offering interactive teaching materials and events that combine social science and quantitative research methods

- The Q-Step Academy will continue to collaborate with the Widening Participation team to deliver sessions and taster events to secondary school pupils in the City Region.

- The Q-Step Academy will maintain and extend its partnership with external partners like The Data Lab and the Data Education in Schools to deliver sessions and taster events to secondary school pupils in the City Region.

- The Q-Step Academy will develop its research around the learning and teaching of social statistics and will disseminate findings through seminars, conferences and publications.

- In all the above, there will be opportunities for Q-Step staff members and students to draw on their interests and expertise and contribute to the development and delivery of outreach activities, including online.

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Q-Step

A step-change in
quantitative social
science skills

Funded by the
Nuffield Foundation,
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