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The Q-Step Centre at Queen's

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Description

The Q-Step Centre at Queen's has integrated and enhanced quantitative research training across a range of social science disciplines including criminology, social policy, politics and sociology. As part of this enriched training, we offer a specialist thematic minor degree in quantitative methods (QM) providing students with advanced quantitative skills alongside teaching in their core social science discipline. The degree pathway utilises small-group interactive teaching labs, where students work with real-world data to answer real-world research questions. The minor degree consists of a series of specialist modules ranging from introductory data management and visualisation (level 1) through to advanced multivariate and multi-level modelling (level 3). In addition to the minor degree, the Q-Step Centre has promoted the embedding of quantitative skills across social science curriculums in both SSESW and HAPP. Exposure to quantitative research evidence and the critical evaluation of that evidence is no longer constrained to just compulsory research skills modules. Working with quantitative research and statistics is now an integral part of teaching and learning across a wide range of substantive (non-research methods) modules offered in both schools. The Q-Step Centre also provides several taster sessions and introductory courses tailored for GCSE and A-Level students to promote the importance and value of quantitative social sciences, as well as specialist 'in-house' support and training to academic staff.

Motivation and Aims

The UK has a shortage of social scientists trained in quantitative methods and consequently fails to meet the demand from employers for staff who can apply such methods to evaluating evidence and analysing data. In recent years there has been a decline in the number of social sciences PG students with advanced quantitative skills (except for a few disciplines). In many UK social science disciplines, quantitative analysis forms a small and decreasing proportion of the work undertaken by early career researchers. Yet these skills are increasingly in demand. Quantitative methods are increasingly important in addressing key social science questions across a range of disciplines, particularly in a world where the availability of data is increasing at a substantial rate. The Q-Step Initiative aims to generate sustainable institutional change in UK higher education that will increase the critical mass of quantitatively skilled social scientists. Through training and other activities, Q-Step aims to produce a new cohort of social science graduates who can exploit the emergence of new forms of data and recent developments in quantitative methodology and social statistics. The vision for the Q-Step Centre at Queen's is as an established education hub that delivers high quality innovative quantitative methods teaching UG students, expands educational and employment pathways for quantitative social science graduates undertakes outreach work to schools and colleges and supports teaching staff in the development and inclusion of quantitative research and methods within their teaching portfolios. Our priorities include: - Increasing the numbers of quantitative social science graduates, - Enhancing the provision of advanced QM teaching - Improving student knowledge, understanding and practical application of quantitative research in their academic and ongoing professional work, - Promoting quantitative social sciences to key stakeholders within NI society.

Methodology

The Q-Step Centre at Queen's has sought to fundamentally reform the teaching of quantitative social sciences through enriching the UG curriculum, creating a shift in the culture of methods teaching, and equipping students with high levels of statistical literacy, and a critical appreciation of quantitative data and its role at the centre of our method of inquiry. There are three core elements of our work.

1. Q-Step Quantitative Methods Degree Pathway The Q-Step Centre has developed a new thematic minor degree pathway in quantitative methods. The pathway consists of two optional modules and four core modules, plus a double-weighted quantitative dissertation. The “..with Quantitative Methods” pathway is now offered to students undertaking degrees in Criminology, Social Policy, Sociology and Politics. Curriculum development was guided by a number of core teaching principles: - Students should work with real-world data (large, complex and messy) rather than small scale artificial and manufactured examples. Students are exposed to the practical realities of working with real-world data from the outset. Handling, cleaning and checking messy data, an essential skill new data analysts need to acquire. - Students should address real-world problems in their data analysis and modelling. Analytical techniques should be taught as social science tools, used to answer fundamental research questions. - Modules should be taught largely through hands-on data labs, rather than through traditional lectures. Data labs should have a low ratio of staff to students permitting direct support and input to students. - The focus of teaching should be on the statistical concepts rather than on statistical recipes (formulae). Before applying statistical procedures, students should have a deep understanding of the underlying statistical and methodological concepts. - Given the rapid rate of methodological developments quantitative social sciences, UG social statistical teaching needs to accelerate the pace of students learning. Students need to be introduced to multivariate analytical methods at UG level if they are going to be in a position to exploit cutting edge approaches at PGT and PGR levels.

2. Embedding Quantitative Methods across the Curriculum. With embedding QM across the Social Science Curriculum, we aim to raise levels of statistical literacy and QM competencies among all our social science graduates, not just those on a specialist degree pathway. The focus here is to ensure that all students receive high-quality QM training across all our relevant disciplines. Embedding involves working closely with module convenors to identify quantitative research relevant to substantive issues and debates covered within specific modules. The Q-Step Team can support the development of specialist teaching material and resources, the integration of the empirical research into the module content, or provide direct teaching input on the selected quantitative research.

3. Outreach and engagement activities The Q-Step Team undertake a range of activities to promote quantitative social sciences to new cohorts of potential students. These range from a one-hour introductory session on data visualisation for schools, up to a 3-day research summer school for A-Level students.

Literature Review

The deficit in the numbers of quantitative social science graduates has been recognised across several significant research and policy papers.^{1,2} With the anticipated growth in data science and the increasing need for advanced numerical skills in the workplace arising from open data and big data initiatives³, national bodies have recognised the potential growth in the number of employment opportunities within quantitative social sciences.^{4,5} The importance of quantitative social sciences and the various career paths open to graduates was also outlined in the recent Academy of Social Sciences publication Positive Careers report 6.

Successes | Challenges | Lessons Learned

Curriculum development: The core success of Q-Step Centre at Queen's has been the development of an integrated and innovative social science QM curriculum that takes UG students from introductory data visualisation and analysis (level 1), through bivariate analysis and multiple regression (level 2) to more advanced statistical approaches such as logistic regression and an longitudinal data analysis in level 3. **Student achievement:** We have been overwhelmed by the progress and development of our initial cohort of students progressing through the QM pathway. Students have exceeded our expectation and every level. Our recent graduates are operating at a level of technical competency well beyond traditional UG Social Science students. **Research dissertations:** We have experienced a growth in the number and quality of undergraduate quantitative research dissertations. This is the result of increased QM supervisory capacity, the added visibility of QM research across the curriculum, a focus on secondary data analysis (avoiding problems associated with very small scale quantitative research) and a streamlined ethics procedure for UG secondary analysis studies. **Work placements:** Q-Step work placements have been in place since year 1. Students have gained frontline experience with a range of employers, including the Northern Ireland Assembly, NISRA, Department of Justice and the Public Health Agency. **Recruitment:** Student recruitment has been the most substantive challenge faced by the Centre. To ensure long term sustainability, we restructured student recruitment, so rather than recruiting directly (via UCAS), we now recruit from within the relevant schools' first-year intake offering students the opportunity to transfer into the minor degree pathway. This opens up the QM pathway to a broader range of potential students. **Statistical anxiety:** Amongst social science students, anxiety surrounding the teaching of statistics can be high. Even amongst those students opting for a specialist QM pathway, apprehensions can quickly escalate when new topics are introduced. As a result, we have developed several strategies to reduce students concerns regarding their mathematical and statistical abilities: - Maintaining a low student: teacher ratio, particularly in lab classes to provide in-depth support ensuring the all students are progressing; - Teaching statistical concepts rather than statistical recipes. Students are not required to memorise statistical formula (although they are used within the class), rather the focus is on the conceptual understanding of the procedure being taught, together with its technical application. **Cross-school and cross-faculty modules:** Specialist UG or PG social science data analysis modules may only be viable if offered on a cross-school or cross-faculty level. While some advances have been made in this area, some issues still exist. **Software:** We currently teach statistical programming in both SPSS and STATA. However, these packages are proprietary, expensive and may not be available in all workplaces. As a result, we are considering the switch to open source (free) statistical

software such as Jamovi and R, to maximise the portability of students' skills across any work environment. While there are significant merits to this, the opportunity costs of having to rework all our teaching resources to new software would be considerable.

Scalability and Transferability

Q-Step would readily transfer to other subject areas. The recent Royal Statistical Society Annual Conference hosted a session examining the need for a national Q-Step initiative for medical and health sciences, an idea which was met with general support. Similarly, aspects of Q-Step programme at QUB may be of interest to other disciplines, such as the minor degree specialist pathway, cross-school curriculum design and teaching, and the shift away from the lecture as the core mode of delivery. However, the Q-Step model is resource-intensive, particularly concerning supporting small classes, the development of additional learning resources to facilitate advanced skills, and the need for ongoing feedback via guided practice.

References

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5. The British Academy (2013). Stand out and be counted: QA guide to maximising your prospects, for students studying social science and humanities subjects. London: Author.
6. Lenihan, A. & Witherspoon, S. (2018) Positive prospects: Careers for social science graduates and why number and data skills matter. London: Academy of Social Sciences.

Further Information

- <https://www.nuffieldfoundation.org/students-teachers/q-step/>
- <https://www.qub.ac.uk/sites/QStep/>