

The Lancaster Postgraduate Statistics Centre CETL: building trust and statistical skills across disciplines

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Abstract

Statistics is often assumed to be a series of techniques. While it may be possible to teach postgraduate students generic techniques to enable them to carry out quantitative research, it is questionable how meaningfully this can be taught when separated from thinking about research data.

Teaching students as close as possible to their own postgraduate degree scheme is one way forward, but this strategy presents teachers of statistics with new problems. Both students and departments have not necessarily understood statistics as a way of thinking - or understood it as a discipline with multiple and sometimes discordant approaches.

The Lancaster CETL has allowed an opportunity to focus on teaching postgraduate statistics, yet in providing a focus for statistics attracts audiences from diverse interest groups. It presents us with the challenge to find a balance between what is possible generically and what needs to be specific.

Introduction

The Lancaster Centre of Excellence in Teaching and Learning (CETL), in common with all other CETLs in England and Wales, has the core aim of achieving excellence in teaching. However, our specific focus on postgraduate statistics teaching, both to statistics specialists and to postgraduates in other disciplines, is more unique. Our focus in this paper is on the *second group* – the large group of students who are forced to do statistics as part of their postgraduate disciplinary studies. We report on why this is such an important topic, on who are the core target groups we are engaging with, and on what portfolio of teaching activities and support provides a suitable way forward.

The ambiguities of postgraduate statistics teaching

The process of teaching statistics to students from other disciplines is one fraught with ambiguity. There are four main players - the statistics department, the statistics lecturer tasked with constructing and teaching such a course, the client department, and the students. Each group has their own expectations, concerns and internal pictures of what this process is about and how valuable it is.

We start with the central statistics (or mathematics) department. There is often a strange hierarchy within departments which orders teaching work according to prestige. At the top of the teaching pile is the Masters module given as part of a Statistics MSc, which provides an opportunity to pass on recent research knowledge to keen, mathematically-literate students. At the bottom of the hierarchy, in contrast, is the statistics course

undertaken for other departments. The central department might use the derogatory term “*service course*” which emphasises the marginal nature of such activity. Such courses are often given to staff who are new to the department to teach or to those whose research trajectory is weak. In some departments, such courses are undertaken purely as a way of raising money, and are not seen as part of the core business of the department.

The lecturer assigned such work may see such courses as valuable, but may pick up these undercurrents in the department, and worry whether such activity is valued for promotion. They can often be pulled in two directions - wanting to invest energy in this teaching, but wondering about the sense in doing this for their academic career. While some university promotion committees recognise cross-institutional teaching activity as valuable, this is not necessarily reflected by the Head of Department, School or Faculty.

The client department, in contrast, may be one of two types. The *enthusiastic* departments will be keen for Masters students to learn quantitative skills in statistics, but have no qualified or interested staff to teach such courses. For this type of department, the need for students to acquire skills in analysing data, in being able to read and understand a wide variety of research papers and in collaborating across disciplines, is well understood and supported. Alternatively, there are the *reluctant* departments. They may have been forced by ESRC or another research council to include a collection of statistics courses as a condition for obtaining research council postgraduate studentships. These departments may contain members who appear hostile to the notion of quantitative skills (as such courses take up valuable module time on a busy Masters course, and other work needs to be dropped), and are being forced to enter into a partnership with another department in which they have no interest. However, both types of department will have understandable concerns about allowing another department to undertake teaching in their postgraduate programme, with all the concerns this raises about managing the teaching quality and content of student courses. Another departmental concern is that of the research student. Doctoral studies can often lead students into collecting large amounts of data – and analysis of quantitative data may be beyond the capability of the supervisor.

Finally, we have the postgraduate student. Such students are usually extremely motivated within their own discipline. However, a significant proportion of them will be panicking about the quantitative components of the course. The students will wonder if the lecturer has any feeling for their own discipline, whether the lecturer will swamp them with mathematics and symbols, and they will be fraught with worry that their own lack of knowledge is going to be discovered. Of primary concern will be intelligibility, support, and assessment. Pedagogically, students are often socialized into a specific set of classroom practices – for example, in terms of expectations of lectures, group work and assessment. Research students present a completely different form of problem, with both supervisor and student often avoiding quantitative work until late in the thesis.

The Postgraduate Statistics Centre – engaging with departments

The Lancaster Postgraduate Statistics Centre is built on a wide body of experience and engagement with other departments built up over many years through consultancy work, teaching activities and joint research projects. We initially saw our role as two-fold

- a) to develop and engage in excellent disciplinary based postgraduate statistics modules, providing support to students where needed.
- b) to provide training courses and support materials to enable students from other regional and national universities to benefit.

However, the work of the Centre has expanded to include an involvement in undergraduate teaching. Exceptionally, bodies such as the ESRC are recognising that starting quantitative work at the postgraduate level is too late, and that numeracy skills of whatever kind need to be introduced into the undergraduate curriculum. A recent ESRC call for funds to develop undergraduate curricula for quantitative courses in the social sciences

reflects this national concern, and we recognise that many of the issues relevant to postgraduates are also relevant at undergraduate level.

Our Lancaster disciplinary focus is broad. Our postgraduate work involves teaching separate MSc modules in Psychological Research Methods, Developmental Psychology, Sociology, Tourism, Engineering, Human Resources and Knowledge Management, Linguistics, Veterinary Science, and Medicine. At the undergraduate level, we have developed innovative modules in Sociology and in Criminology, which introduce students gently to the idea of number and data exploration. Pedagogically, we engage with colleagues in the Student Learning Development Centre, who provide crucial advice and collaboration in approaches and student support.

The way forward – support, encouragement and engagement

Building a collaboration between the client and host departments (and in particular the lecturer) with the intention of encouraging and engaging the student will be a crucial component for future new activity. Key aspects are:

- a) To engage with departments and their concerns, and to be fully available for staff-student meetings, for their teaching committee meetings and to discuss teaching approaches, and to crucially appraise courses.
- b) For the statistics lecturer, wherever possible, to be sympathetic to the discipline of the client department. We see the relationship as a long-term one, and it is often useful for the lecturer to attend undergraduate courses in Psychology, Criminology etc. to understand better the background and philosophy of the discipline.
- c) To provide topical and relevant practical examples which arise from the discipline itself. In some courses, this can be achieved by the students collecting data themselves, and proceeding through to analysis and report writing.
- d) To support students in their work. Partially this is done through drop-in activities but also through discussion and engagement in computer-based classes, and timetabling sufficient time for these. We are experimenting with digital recording of lectures as students then have the ability to return to difficult material at a time of their choosing.
- e) To address the ability of students to read and write research papers. Our evidence is that students fail to read empirical research papers in detail, as they lack confidence to read the detail of data and statistical analysis. Alternatively, they simply avoid quantitative papers entirely, placing a whole body of (predominantly US-based) research literature out of their reach. They, in turn, would then lack skills for writing such papers.
- f) To provide relevant student assessment methods related both to understanding and also with interpretation of results, to allow students to become fully research-literate in their future career.

Thus, in summary, the focus of our work is to teach relevant statistical courses to postgraduate students, and to generate enthusiasm and excitement about the ideas of the role of statistics in determining structure in data.

Central to implementing these goals is a set of assumptions about teaching. While statistical developments and thinking are core essentials in all our activities, so too is our ethos which requires teaching staff to be open to and attempt to make sense of the needs and concerns of the groups with whom they are working. It is not enough to say 'this is how it is done'; rather, we believe that long-term impact on both undergraduate and postgraduate statistical knowledge, understanding and thinking is achieved only through partnership. Awareness of the range of approaches to teaching and learning within universities – right down to differences in the ways in which people conduct lectures and tutorials – is an essential part of effective statistics teaching, along with sensitivity to people's varied expectations of what place statistics holds in their intellectual development.

More information on the activities of the Lancaster CETL can be found at <http://www.maths.lancs.ac.uk/psc>.