

# Developing numeracy in criminology students through crime data

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## Abstract

Criminology students at Lancaster, as elsewhere, do not expect quantitative ideas to play a role in their undergraduate degree. Many have poor mathematical skills and have difficulty with the interpretation of data in numerical form. In parallel with this, the Economic and Social Research Council has recognised that many social science undergraduates are not exposed to mathematics and statistics in their degree courses, and this will lead to a lack of quantitative social science researchers for the future. The Council are thus funding the development of innovative undergraduate courses to tackle this problem.

This paper describes the characteristics of an innovative course in criminology "Measuring Crime" which introduces second-year students to basic concepts of numeracy, graphics and reading and understanding tables, as well as the various sources of crime data and their similarities and contradictions. It introduces students to the idea of crime data as quantitative information rather than case studies or interviews. It encourages students to plot data and to understand and question the source of commonly voiced research statements. Statistical concepts such as trend lines are also introduced quietly through graphics. Although a shock for many students, the course is in general well received.

## 1. Introduction

Studying statistics is not traditionally popular within social sciences. Students often choose academic routes which deliberately avoid anything numerical, while others are numerically competent but dislike anything quantitative. However, there is an increasing move to ensure that all students develop the skills of dealing both with number and with data. Adrian Smith's report "Making Mathematics Count" [1] recommended that all post-14 students should acquire skills in numeracy. Some university disciplines indeed need little in the way of numerical skills, and numeracy training would be for them an acquisition of life skills in topics such as spreadsheets and tax calculations. However, most social science disciplines use quantitative methods, and such students will need exposure to the ideas of gaining knowledge through data exploration and handling.

The Economic and Social Research Council (ESRC) has two specific concerns about the lack of engagement with social science methods. The first relates to demographics. The Commission on the Social Sciences reported a deficit of quantitative skills in UK social science [2] and this was echoed by a 2005 report from the Higher Education Funding Council for England [3]. Both reports fed in to a comprehensive review by the ESRC on the demographic review of the UK social sciences [4] which was published in 2006, and concluded that

*"Quantitative social science is a particular concern to the ESRC, as supply is seen as insufficient, particularly as this subject underpins other disciplines. As the report implies, there are two different issues to be explored. One is the survival of quantitative disciplines like Social Statistics and Demography, given the decreasing numbers of students choosing to study these disciplines at undergraduate and postgraduate level. The other is the supply of*

*staff with advanced quantitative skills across the social sciences more generally, be it in Social Policy, Sociology, Politics or Geography."*

The shortage of staff in UK social science research is a major concern for the health of social science generally. The second concern is academic. There are a large number of papers published every year with quantitative social science analyses, originating mainly from countries such as the United States and the Netherlands, and there is an increasing recognition that properly trained social scientists need to engage with *all* the literature, and not just the literature they feel able to approach.

The ESRC response is to develop a life course approach to developing quantitative skills, with, unusually for a research council, initiatives taking place in schools and at the undergraduate level, with the aim of improving the supply of quantitatively literate social scientists for later postgraduate study. There has also been a recognition that research methods courses are often taught by staff hostile to quantitative methods; and also a reappraisal about what quantitative methods can contribute to social science by groups that are traditionally hostile. For example, Oakley [5] identified the hostility against quantitative methods and stated:

*"...the most sustained war on the quantitative paradigm was undoubtedly waged by feminist social scientists, who, from the early 1970s on, identified pervasive masculine biases across the different disciplinary traditions of social science."*

She identifies good aspects in both qualitative and quantitative methods, and suggests that it is time to move on from the dialectics of the earlier debate.

## **2. Criminology and quantitative methods**

Quantitative methods are used extensively in criminology, yet few UK criminology courses teach any form of quantitative methods – so research posts in the Home Office tend to be filled by psychologists rather than criminologists.

Our approach has been to design a course which will counter the hostility to and avoidance of numbers and data. The programme allows students access to crime datasets and the debates surrounding them, but in such a way that students who are nervous of statistics are not put off. The course, a half unit (10 week) course, given in the second term of the second year, follows on from a traditional course in research methods that runs in the first term of the second year. The 'Measuring Crime' course aims to:

- Revise basic ideas of numeracy – percentages, proportions.
- Begin to use spreadsheet software.
- Provide skills that allow students to turn numerical data into graphs.
- Provide skills that allow students to produce well labelled and informative graphs.
- Get students to think about trends and how to interpret them.
- Get students to think about relationships between phenomena and within datasets.

The course structure includes formal lectures (to cover concepts of how and why crime is measured); lab computer sessions to develop data handling skills and interpretation of crime data; and assessment is through worksheets, one essay plus an exam. The overall aim of the lectures is to allow students to assess the strengths and weaknesses of various sources of crime data and to make effective comparisons between these sources. The lectures cover issues surrounding the reliability and validity of (victim and offender) sample surveys, as well as providing a framework within which to critique the main sources of quantitative crime data e.g. the British Crime Survey, police recorded crime, court statistics, the Offending Crime and Justice Survey. This involves discussing the methodology of the self-report surveys. In addition students are provided with an explanation

of how offences are dealt with at various stages of the Criminal Justice System. This provides an understanding of why some crimes are included in police recorded crime figures and some are not, and why some receive a sanction and some do not. In doing so, students understand why it is necessary to be cautious when comparing, for example, police recorded crime figures with court statistics. Other topics covered in the lectures include prediction and risk using quantitative crime data, and methods of evaluation (of crime reduction programmes) using quantitative data. The practical work includes the use of real datasets (e.g. British Crime Survey, Offenders Index & Criminal Statistics drawn from the courts) and we show that they are real by getting students to access them from official websites. Practical sessions include use of Excel and SPSS but no formal statistics.

A major component of the course is to get students to think about issues of measurement. The course begins with a seminar where students are asked to consider how they might estimate the number of robberies in Lancaster in the last year. The aim of the discussion is to introduce the students to the idea that there is no one source of data which can measure the totality of crime. Police recorded statistics miss out the individuals who do not report; crime surveys will not have sufficient numbers of respondents in Lancaster; and insurance data will also be unreliable. The discussion of the various data sources and their strengths and weaknesses leads to a discussion of why police recorded crime and the British Crime survey (a victimisation survey) have shown changing trends over time in recent years.

### 3. The practical component of the course

We highlight two aspects of the practical work which challenge the student to think about data and information in a critical way.

#### 3.1 100 years of homicide

Students are asked to download the dataset "100 years of crime" [6] from the Home Office Website.

The coursework changes every year, but each year students are asked to compare the trends for two different offences, and to use Excel to graph these trends. For example, in 2008 students had to graph the yearly number of homicides in England and Wales since 1899 to the latest year. They were also asked to do the same with "attempted homicide" and to compare the two graphs (Figure 1).

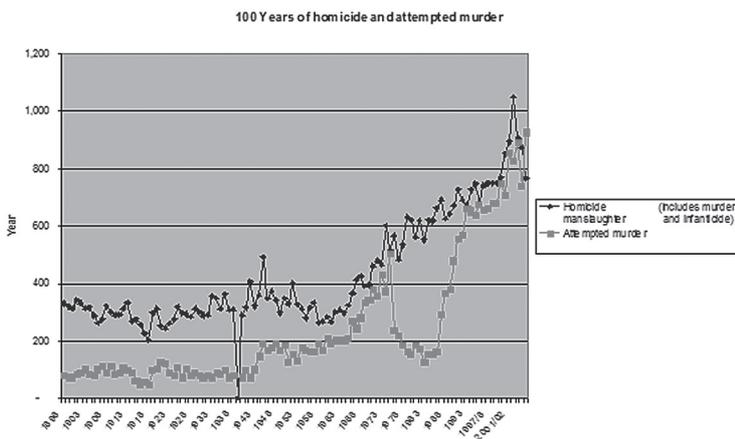


Figure 1: 100 years of recorded homicide and attempted murder

The first issue they confronted was definitional – they needed to understand what the word "homicide" means in criminology, and to understand the distinction between murder, manslaughter and infanticide. They were then asked to describe the trend lines. Most students identified the relatively flat trend line up to 1960, and contrast that with increasing numbers after 1960. Some students were able to delve more deeply and identify volatility during the two world wars and declining trends following the wars. Some also identified the 2001 peak as being

related to the Shipman homicides. Most however did not appreciate that data was missing in 1939, and report instead that there were no homicides at all in that year. This leads into a discussion of data and interpretation, the need to read carefully the documentation relating to the collection of the data, and which killings are recorded as homicide and which not.

More complex question can then be addressed. What for example does it mean that more homicides are recorded in the 21st Century compared to the late 1800s? Why does the direction of the attempted murder trend line differ from the homicide trend line between the early 1970s and late 1980s? Would this be an artefact of measurement, or does this reflect changes in behaviour?

### 3.2 Verifying criminal facts

Students are encouraged to question crime “facts” by engaging in numerical detective work. We take the example of domestic violence.

**Some facts about domestic violence**

- One in four women will experience domestic violence at some time in their lives.
- Two women are killed by their partner or former partner every week.
- A woman is raped, stabbed or beaten every six seconds.
- There are more animal sanctuaries in Britain than refuges for women fleeing domestic violence.

Figure 2: Four statements about domestic violence – can they be verified?

Figure 2 represents four facts often used on domestic violence websites. Can we identify where such statements come from? By investigating data sources and Home Office reports, we can show that the first uses the British Crime Survey, the second the Homicide Index, the third a London survey of calls logged to Police stations in London. The fourth statement has so far not been verified.

### 4. Feedback and Evaluation

Now that the course has been running for a number of years (the first course ran in 2005), students are almost all positive about the course. The average number of students on the course is about 60 and each year the module evaluation returns similar findings. On the whole the students find the course intellectually stimulating. In fact, in the module evaluation for the 2009 course, 67% of respondents rated the course as ‘Very Good’ or ‘Good’ and 80% of respondents said that they either ‘Strongly Agreed’ or ‘Agreed’ that they had learnt a lot from the course. When asked to identify which parts of the course are found to be most valuable, students consistently identify two areas in particular.

Firstly, students remark on the practical skills they develop in the computer workshops. They appreciate the fact that not only do they learn how to use Excel and SPSS, but that more generally they become more proficient with computers. Students recognise the benefits that these transferable skills will give them in their academic pursuits as well as in the job market. As one student remarks:

*The module has taught me how to use the Excel package and has enabled me to become more confident with computers. (2008 student)*

Secondly, students identify as valuable the development of their criminological skills and their ability to critically analyse crime data by thinking about crime in a different way. That is, they learn to appreciate that both legal and *ad hominem* definitions of crime and particular criminal acts are not constant and universally understood. In turn, they improve their understanding of criminological statistics and what they really mean. Students finish the course feeling that they have the practical and intellectual skills to offer a competent critique of any literature or comment relating to crime data:

*I loved that we were genuinely building skills in proper statistical applications; it really felt like "doing" criminology. It was also interesting to see criminality calculated in such a quantitative way, especially in terms of prediction. (2009 student)*

In giving their feedback students often remark on their initial resistance to working with quantitative information and new technology. In addition, many students remark on how challenging they find the course, and how the content of both the lectures and (in particular) the computer workshops at first seems daunting but as the course progresses they begin to appreciate the value of these sessions and many come to really enjoy the learning experience.

There are always a small number of students who struggle to get to grips with computer technology, and some (not necessarily the same students) who struggle with the academic challenges that the course presents. We are aware of the needs and concerns of our students and provide appropriate support. Consequently, those students that do find the material and tasks difficult to tackle still make progress in these areas and this is reflected in their feedback:

*Gaining experience with computer software was challenging, however I now have the confidence to tackle it on my own. (2006 student)*

When developing the course an area of concern was to ensure that the links between the lectures and the workshops were made clear and that the course was seen as a coherent whole. For example, one of the lectures on the course discusses the social processes that lead to crimes being recorded (or not being recorded) by the police. The associated workshop gets students to investigate crime figures in one particular year and encourages them to think about why more crimes are committed than are prosecuted and why at each stage of the Criminal Justice System (e.g. crimes reported to the police, crimes recorded by the police, offences heard in court, etc.) these figures gradually reduce. Each year students comment that they are appreciative of these connections. We feel this is important as it means that students are more likely to engage with the workshops and will get more from each component part of the course.

In summary, each year the feedback from students makes clear that they understand how the skills picked up in this course provide them with the basic building blocks that assist their overall academic and working performance. The work that is produced by the students shows that not only are they capable of working with quantitative data and understanding quantitative criminology but, with the correct approach to teaching and learning, many of them are extremely competent. The feedback the course receives provides convincing evidence that for many students the barriers to obtaining quantitative social science skills are perceived and not real. In other words, students often feel that taking a quantitative route is something that they are not cut out for but when they are faced with the challenges of such a course they realise their own abilities and potential.

## **5. Conclusions**

Throughout, we try to focus on substantive areas of criminology that students find interesting, rather than teaching statistical techniques in isolation from the context of study. We want students to think critically and constructively about the data and apply what they know from criminology to make sense of it.

One of the major aims of the course is to develop students' capacity to critically evaluate crime knowledge by being able to understand and read official information, to interpret data intelligently and apply what they know about criminology to draw useful inferences. Students start the course nervously but most engage positively and successfully with the course (hence, it is important that it is a compulsory module), and feedback has been encouragingly positive in spite of the challenges this course presents to students.

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