An University Course on Government Statistics

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This paper will outline the development of a course in Government/Official Statistics presented in the Department of Statistics, University College Dublin, Ireland. Courses in government statistics would generally not be found in university statistics' departments but the experience in UCD may help others decide that such courses may deserve a position alongside the more traditional academic statistics courses.

INTRODUCTION

There are many disparate groups who call themselves *Statisticians*. Two of these groups are of interest here: academic statisticians in universities and government/government statisticians working in National Statistical Institutes (NSI's) around the world. The two groups rarely mingle; indeed it is probably true that academics in sociology and economics departments have more contact with government statisticians than do academics in statistics departments. Of course there are exceptions, however, the fact remains that interaction between the two groups is not widespread.

When we consider that the word "statistics" was coined originally to mean "facts for the use of the state" or "state arithmetic", it is ironic that academics calling themselves "Statisticians" do not display more interest in government statistics. Many graduates of Statistics programmes end up working in National Statistical Institutes, but few have any training directly applicable to such work. In Ireland the Central Statistics Office (CSO), relatively small by international standards, is the largest single employer of statisticians employing some 70 permanent statisticians.

A trawl through the web pages of many universities shows very little mention of government statistics. There are some notable exceptions, e.g. The Department of Social Statistics at the University of Southampton in the UK offers an MSc in Government Statistics in conjunction with the Office for National Statistics (ONS) and the School of Political and Social Inquiry at Monash University in Australia provides courses on government statistics. The Faculty of Economics in Ljubljana has recently developed a course on European Economic Statistics in association with the Training of European Statisticians (TES) Institute.

Most government statisticians around the world would receive their training "on the job", or more formally by International Organisations such as the TES Institute in Europe or the International Monetary Fund (IMF) in Washington, DC. The Department of Statistics in University College Dublin recently introduced a new course on government statistics. It was first delivered in the academic year 1999-2000 to a class of final year undergraduate; graduate diploma and masters level students.

The structure of this paper is as follows: The first section will describe the environment in which the course was delivered, the second section contains a description of the development of the course, the third section describes the course which resulted, the fourth section illustrates how students on the course were assessed, the fifth section gives an idea of the students' views on the course, the sixth section points out some changes which were made when teaching the course for the second time. Finally we summarise our experiences with this course.

BACKGROUND: THE DEPARTMENT & THE STUDENTS

University College Dublin is the largest university in Ireland with approximately 20,000 students enrolled. The Department of Statistics was formed in 1986, prior to then courses in statistics had been taught by the Department of Mathematics. At present there are eight full time academic members of the department. Each year approximately 120 students study statistics in first year with on average twenty or thirty continuing to a degree in statistics.

Students can study statistics either through the Arts faculty or through the Science faculty. The degree in Arts takes three years and students must combine statistics with another subject, which in practice is usually mathematics or economics. The Science degree takes four years and here students can opt to do a single honours degree in statistics or a joint honours degree in two subjects, here mathematics is often chosen as the second subject.

In the final year of the degree students study a variety of statistics courses: Design and Analysis of Experiments, Time Series, Survey Sampling, Survival Analysis, Bio-statistics, Actuarial Statistics, Statistics and Visualisation, Regression Theory, and Non-Parametric Statistics.

The Department of Statistics also offers a Higher Diploma in Statistics, which is essentially a conversion course for graduates of other cognate disciplines such as Psychology, Economics, Politics, and Computer Science. In addition a one-year taught Masters degree is available to graduates with a good honours degree in Statistics, Mathematics or Actuarial & Financial Studies.

COURSE DEVELOPMENT 1: GOALS

The goals of this course were:
1. To provide students with an appreciation of the extent to which government statistics pervades the everyday lives of citizens of a state.
2. To describe the processes by which data are collected, processed, analysed and disseminated in a National Statistical Institute.
3. To introduce some techniques used extensively in NSI's that are not taught in other courses in the Department of Statistics.

COURSE DEVELOPMENT 2: LOGISTICS

This course would be delivered to five different groups of students: final year undergraduate students in Arts, final year undergraduate students in Science, students on the Higher Diploma in Statistics course, and students pursuing a Master's degree in Arts or in Science. The standard length of one-semester courses in the department is 24 lecture hours. For this course, in addition to those 24 hours, six extra hours were scheduled in the computer laboratory.

COURSE DEVELOPMENT 3: PREPARATION

The fact that the students already take separate courses on Time Series and Survey Sampling heavily influenced the content of this course. It would have been natural for those two topics to take up a significant proportion of a course on government statistics, but here they were not included at all.

Another factor to be considered was that students in the Arts streams who had previously studied Economics, Politics, Sociology or similar subjects would probably be more familiar with many of the concepts in government statistics. Because this may place students from Science streams at a disadvantage, the course would have to contain some elements that would appeal to Science students.

In advance of preparing the course, a lengthy search was performed on the World Wide Web with a view to seeing what other universities believed should be contained in a course such as this. The real outcome of this web search was that this course would have to be developed ab initio because, as mentioned in the introduction, courses on government statistics are few and far between.

The next stage of course preparation was a search for relevant textbooks. It quickly became clear that there wasn't a textbook that would satisfy the requirements of this course. While they weren't appropriate as textbooks, several books were recommended as additional reading for students.

This lack of success meant that material for the course would have to be culled from many different sources. I had a personal advantage here in that I had worked as a Statistician in the CSO for four years prior to coming to UCD. Without the aid of this experience and the help of former colleagues in the CSO, the development of this course would have been much more difficult, if it indeed would have been possible at all. As it was, approximately 650 hours were involved in the preparation of this course for its first year.

It is worth noting again at this point that the government statistics course in Southampton is delivered in conjunction with the ONS. In fact, one could argue that it is not just a very important requirement but rather a necessity that someone with direct experience of a NSI be heavily involved in a course such as this.

COURSE DEVELOPMENT 4: COURSE MATERIALS

Given that there were no books that could be used as texts for this course, the question was where would material be found. The solution for part of the course was to use the books which government statisticians use themselves in their work. So for example, when seeking material on National Accounts the UN System of National Accounts and Eurostat's European System of Accounts proved ideal. For describing Balance of Payments, what better source than the Balance of Payments Manual, Compilation Guide and Textbook published by the International Monetary Fund?

Another invaluable source of information was a recent book published by the CSO to celebrate their 50th anniversary. In particular, this book includes a chapter on the history of economic statistics in Ireland (Murphy, O'Hagan, & Redmond, 2000), which provided much material for the section of the course on National Accounts and Balance of Payments.

It was clear that to provide a proper introduction to this course, there should be some time spent describing the history of government statistics. In this area there are many available resources, one of the most valuable in an Irish context was a series of papers (Linehan, 1991,1997) delivered to the Statistical and Social Inquiry Society of Ireland by Thomas Linehan, ex Director General of the CSO.

To complete the course and to satisfy the requirements, described earlier, of including some material that was more attractive to the Science students, a section was included on Index Number Theory and another on Databases. Reference material for these was abundant.

THE COURSE: CONTENT

The course consisted of six sections:

Section 1: History

This section, comprising 3.5 hours, describes the history of government statistics with particular emphasis on Ireland. Some topics covered include the Domesday Book, the first censuses, and the history of international organisations such as the IMF and Eurostat. Because it is impossible to delve very deeply into this topic in so short a time, students are expected to do additional background reading. For international comparison purposes this reading concentrates especially on the development of government statistics in the UK.

Section 2: Legal and Institutional

This section begins by looking at the regulatory framework governing the collection of government statistics. In Ireland statistics are collected under the Statistics Act and one lecture is devoted to this act.

The impact of International Organisations on the collection of government statistics is presented. Worldwide most government statistics are collected according to standards laid down by international organisations such as the IMF or the International Labour Organisation (ILO). In addition, European countries must work under mandatory regulations and directives from Eurostat and the European Central Bank. It is important therefore that students appreciate the procedure by which statistical policy is decided and implemented at European level and so, some time was devoted to this area.

The course then describes in detail the operation of the Central Statistics Office in Ireland as an example of a National Statistical Institute. Important issues in the processing of statistics with which students have no prior experience are introduced. These include non-response, missing data, quality control and confidentiality. Other topics are discussed, such as statistical disclosure control and the impact of IT on government statistics including Computer Assisted Personal Interviewing (CAPI) and Edifact.

Section 3: The Statistics

Here we examine the different areas of government statistics under the headings: National Accounts, Balance of Payments, External Trade, Demography, Agriculture, Building, Business Register and Data Bank, Industry, Labour Market, Prices, Retail Sales, Services, Transport, Tourism and Vital Statistics. A determined attempt was made to keep the course current and relevant. In the area of Macro-Economic statistics, for example, the European single currency has had a large impact both on NSIs and on the students themselves. We also describe some non-CSO sources of government statistics and draw some international comparisons. A very popular example in class was the report on names of new babies produced each year by the CSO.

Section 4: Index Numbers

Some history of cost of living indices is presented. The Laspeyres and Paasche index numbers are introduced, as are problems such as substitution bias. This leads to the idea of superlative index numbers and the Fisher index. Students are shown how to calculate index numbers using chain linking. The calculation of a Consumer Price Index is discussed including how a fixed basket of goods is determined using a household budget survey. Purchasing Power Parities are mentioned.

Section 5: Databases

NSIs are in the business of collecting data and that data is stored in databases, which these days are likely to be relational in nature. Over four lectures and six hours in the computer laboratory students are introduced to the basic ideas of a RDBMS. Concepts such as referential integrity are illustrated with examples. MS Access was found to be a tool that the students can learn very quickly. They are shown how to design a database including several linked tables, how to design forms for data input and how to create SQL queries to extract information from the database.

Section 5: Additional Topics

Guest lecturers who are involved in the collection of government statistics or whose work makes significant use of government statistics are invited to speak to the students. This has the effect of reinforcing the relevance of government statistics.

THE COURSE: PRESENTATION

Students taking statistics classes generally expect their courses to be more mathematical than discursive in nature. Because of this and the amount of material to be covered in each lecture it was decided after the first two lectures of the course that the students should be given copies of the notes instead of transcribing notes in class. This would allow more time for interaction in class.

There was also a requirement that students supplement the lectures with external study. In addition to the recommended reading for the course, students were encouraged to use the World Wide Web to look for additional sources of information. This was facilitated by the provision of a Course Homepage on the Department of Statistics website. On this page links were placed to various sites of interest. The course notes were then placed on the website each week in Acrobat PDF format for students to download and print.

ASSESSMENT

It was decided to include as much continuous assessment as possible in this course. In UCD there is a maximum limit of 30% of a course that can consist of continuous assessment, and the remaining 70% must be from a final exam. How best to incorporate the continuous assessment element? The students in the class were divided into groups of two or three and assigned a project to be completed over a period of 6 weeks. The projects would involve the students independently researching an aspect of government statistics, delivering an oral presentation and producing a written report.

In the first year of its delivery there were 5 projects assigned. Students had to research various government statistics that are produced by the CSO. The projects covered the following areas: unemployment statistics, agricultural accounts, BOP40 (a balance of payments survey), tourism statistics, and the consumer price index including the household budget survey. The students were expected to include descriptions of the concepts measured and of the data collection procedures involved. They were also asked to play the role of consumers of the statistics and analyse the most recently disseminated statistics. Students could contact the CSO to get copies of the latest releases, survey forms and survey methodologies. They could find other information in economics textbooks and it was hoped that they would also contact some foreign NSI's to get an international comparison.

THE STUDENTS' VIEW

This course was completely different from any other statistics courses the students had encountered. As was anticipated the Arts students, particularly those who had studied economics or politics initially acclimatised to the course better. To date none of the students on this course had studied sociology. Student reaction to the course was generally very positive. Some became very interested in learning about a side of statistics that was new to them.

Several students reacted to the course in a slightly disappointing manner. As mentioned it was anticipated that science students might find the more descriptive parts of the course not to their liking initially. In the second year of delivery there were three science students who did not perform as well as expected on this course. They preferred courses where the work was more defined, with more problem-based content. While they did deal quite well with the two parts of the course specifically included for the benefit of science students (Index Numbers and Databases), they never fully got to grips with the rest of the course. This was in contrast to science students in the first year of the course and to the Arts students in both years. These successfully dealt with both parts of the course. This may have been an isolated incident but the situation will have to be monitored in future years.

LESSONS LEARNED

The content of the course only changed a small amount on second delivery. However, the formats of both the final examination and the projects were changed. In order to stimulate the students' interest, the topics chosen for the projects were ones with more relevance to their daily lives. Instead of concentrating on one particular area of government statistics, each topic would involve the students researching several areas e.g. National Accounts, Consumer Price Indices, and Balance of Payments.

In the first year it was noticed that some students did not really know how to efficiently find information from several different sources and summarise that in a report. Direct transcription from reference material was noted. In order to prevent this, a set of guidelines was provided in the second year.

For reference, a list of the second year projects and the guidelines follows:

Projects
1. Economists warn that the Irish economy is in danger of overheating. They cite the recent increase in inflation as one piece of evidence. Discuss, using as many sources as you can find to back up your opinion.
2. Using at least five different indicators (Government Statistics) compare Ireland's economic performance since 1990 with the rest of the world and explain why the Irish economy has become known as "The Celtic Tiger".
3. There is currently a housing crisis in this country. Construction firms are booming but only a few years ago builders couldn't find jobs. Using as many different Government Statistics as you can, describe the extent of this situation and explain what you think is its cause.

Project Guidelines
The main body of your reports should be at least 15 A4 pages in length and 12pt fonts should be used. These 15 pages will include no photocopied material and should include a one page Introduction and a one page Conclusion. There should also be a section entitled International Comparisons. The other sections in the main body are at your discretion. In addition to these 15 pages: You should include copies of the relevant pages of any releases to which you refer. There should also be an appendix detailing methodologies and data sources used by the CSO or other NSIs. There should be a second appendix listing all sources used in the preparation of the report. Plagiarism is not allowed. All group members should participate fully in the work and should sign the common report. For consideration, reports must be submitted by the deadline.

ALTERATIONS
In 2003 significant changes were made to the structure of degree programmes in University College Dublin. Because of these changes, this course was not offered in the academic year 2003/2004. For the forthcoming year the course will be reinstated. It appears likely that the Official Statistics course will now incorporate a section on survey sampling as a separate course will no longer be provided covering that topic.

CONCLUSIONS
This course was designed with three goals in mind. I believe that the course has succeeded in meeting each goal. In particular the students leave the course with a better understanding of both the work done by a government statistician and how the results of that work pervade society. The lack of a relevant textbook was immediately obvious, however that gap provided an opportunity and a text is currently being developed from this course. Some of the students from this course have gone on to work in the world of government statistics and have indicated that the course was indeed beneficial.

The course has contained a guest lecturer from the world of government statistics each year and this idea was extended in the third year. In Autumn 2001, UCD organised a conference on Government and Public Statistics to which practitioners and academics were invited with a view to strengthening the ties between these communities. The conference gave students an invaluable opportunity to see not just one guest lecturer but rather a significant group of government statisticians presenting their views and work. We believe that the experiences of this course were very positive and feel that similar courses would no doubt complement the courses already provided in other Statistics Departments.

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