

Item 7: Monitoring the state of Statistics in UK universities

For many years, COPS has routinely gathered data on numbers of staff and research students in mathematics and statistics departments in the UK. Each year, a summary of these numbers is produced, but no-one ever analyses the data, to quantify trends.

Statistics groups are under threat on at least two fronts. First, few school pupils come to university with the intention of studying statistics, so that we are dependent on other disciplines to gain access to sufficient numbers of students. Second, short-term RAE-driven considerations have led many universities to replace applied statisticians by others (often mathematicians or probabilists) for which recruitment is easier. As statistics groups shrink or disappear, we produce fewer graduates, and hence suffer a positive feedback loop. How severe is this problem? We don't know, because we haven't taken our own statistics seriously! Non-response isn't addressed, and we have failed to analyse our data.

What data do we collect?

1. The number of postgraduate students completing in the previous year by the following categories: advanced course, master by research, and PhD.
2. Current number of students in each of the above categories.
3. Funding bodies for UK postgraduate students.
4. Number of CASE studentships.
5. Name, thesis title and supervisor of PhD students who completed in the previous year.
6. Academic staff numbers in the following categories: professors, readers/senior lecturers, lecturers.
7. Gains and losses of academic staff.
8. Age distribution of academic staff.
9. Full-time research staff in post at the end of the previous year, categorized by whether they are research council funded or not.

What data do we want/need?

An analysis of staff numbers, of the gains and losses, and of the changes in age distribution, say in the last 20 years, would be useful, as would trends in numbers of postgraduate students. Existing data should allow this, though a method of imputing

missing values will probably be needed. This may require collection of additional data, e.g. on when small departments ceased to exist, to avoid bias generated by fewer returns from departments that have been worst hit.

A difficulty is that we may get biases in trend estimates as university structures change. There is a trend towards larger departments, and statisticians can end up in disciplines other than mathematics, making it difficult to assess the health of our discipline. Also, the focus through COPS means that we preferentially monitor the larger and more successful statistics groups.

While a retrospective analysis is crucial for quantifying the state of the discipline, a review of what data we should be gathering may allow more useful analysis in future. It would be useful to have each university provide the following information on a regular basis:

1. List of schools/departments that employ at least one statistician.
2. For each of these schools, number of lecturing staff (full-time equivalent) that teach statistics.
3. For each school, number of research staff (full-time equivalent).
4. For each school, number of postgraduate students (3 categories: PhD, other research, taught masters) graduating in a given year whose research has a substantial statistics content. (This is difficult to define, especially for research students, as distinct from taught masters students.)
5. It would also be useful to have the same kind of information for undergraduates. Perhaps base a measure on percentage of credits that are statistics for each student graduating, to get a full-time equivalent measure of graduates.

This would be expensive (and not straightforward) to gather. COPS doesn't have the funds to do this effectively. Someone would need to be employed, if it were to be done properly – someone who could chase up contacts at each university, conduct analyses, and write reports.

Another source of data, albeit for a small number of time points, is RAE. Table 1 shows evidence of the decline in statistics between 1996 and 2001 (8% decrease in number of staff submitted), relative to pure mathematics (8% increase) and applied mathematics (2% increase). This contrasts with 1992-1996, where statistics did well (3% increase, compared with decreases of 2% and 10% for pure and applied mathematics respectively). Perhaps the sudden downturn is in part the consequence of low grades awarded to statistics departments in the 1996 exercise? My impression is that the decline has continued beyond 2001.

Why might we want better information?

My main motivation is that we have a marked mismatch between the supply of statistics graduates and the demand. This makes it difficult to recruit staff to all but the best departments, so the departments that fall below a 5 in RAE terms cannot attract strong research staff when they seek to recruit – and therefore are not allowed to recruit in those universities where RAE is the over-riding priority. (Increasingly, I believe that even the best departments struggle to recruit top applied statisticians.) In such departments, eventually teaching loads become too great for remaining staff, so degrees are cut, or more staff move on, making the crisis even greater. Funding per student for statistics students in most departments is on a similar level as funding per student in arts subjects, yet we have more contact hours, the expense of running computer labs, etc. – and smaller class sizes! So we need data, coupled with sound analysis, to get the message through that there is an increasing demand for the skills of the applied statistician, but a decreasing supply.

Steve Buckland, 6/4/05

Table 1. Numbers of departments (M) and of individuals (N) submitted in each RAE, pure mathematics, applied mathematics and statistics.

		RAE 1992	RAE 1996	RAE 2001
Pure mathematics	M	44	45	47
	N	479.4*	470.0	509.7
Applied mathematics	M	67	65	58
	N	797.6*	721.5	738.8
Statistics and OR	M	50	55	46
	N	407.0	419.7	386.7

*59 Oxford mathematicians pro-rated between pure and applied, based on 1996 split