HoDoMS

Heads of Departments of Mathematical Sciences in the UK

From the Chair
Professor Peter J Giblin

This is a brief response to the Royal Society Science Higher Education in 2015 and beyond consultation.

A serious problem in responding to this consultation is the lack of data available. To some extent organizations like HoDoMS can collect data, usually by a general request to Heads of Department to provide information on a particular topic. This has been very useful in the past but it relies on HoDs responding, and understandably they do not always do so: they are very busy, and actually producing data may be time-consuming. So we are very cautious about sending out requests, and confine them almost entirely to simple factual matters such as the number of integrated masters students or the number of credits in a masters' degree.

The London Mathematical Society has begun to collect data by employing a student over the summer, and HoDoMS has expressed a willingness to use some of its resources to help fund such data collection. Many of the questions in the consultation would be far better answered by data gathered in such a way as this from official sources such as HESA.

For these reasons the response below is rather meagre and asks more questions than it answers.

a. The nature of the benefits to a student that accrue from studying an STM subject at HE level, whatever their future occupation.

This needs data from earnings 5 years after graduation, say. Possibly breakdown of jobs or rapidity with which a job is obtained. Very hard for individual departments to get.

b. The demand for STM graduates from the economy and wider society, and how this demand is changing.

Overlap with (a). Initial salary? Ease of obtaining job vs. class/subject of degree. Again no data collected by departments but universities do try to collect it. Analysis of the data is not trivial. There is some information on
http://www.prospects.ac.uk/cms/ShowPage/Home_page/What_do_graduates_do__2005/Maths_and_IT_editorial/p!eXecdkc
The desination of leavers surveys, e.g.
http://www.hesa.ac.uk/holisdocs/pubinfo/destinations.htm

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tend to be short-term. If students (as is often the case) do not start to look for a job until after graduation then they may well still be looking when these surveys are carried out.

c. The quantity of those graduating at all levels of the higher education system, and the quality, depth and breadth of their educational and training experiences

Numbers graduating from departments: isn't this nationally available from an official source? (Incidentally a byproduct of a HoDoMS enquiry recently is that, in departments offering an integrated masters degree, approximately 20% of students take the masters and 80% the bachelors option.) Data on quality: what does this mean? Many universities issue exit questionnaires but response is sporadic and collating it nationally would be a very large task. Crude data is available from student satisfaction surveys published as league tables, e.g. http://news.bbc.co.uk/1/hi/education/4265894.stm

d. The length of time HE studies should take, and how that time should be broken down (with reference to the Bologna proposals to standardise the structure of HE across Europe).

UK Consensus in mathematical sciences is (outside Scotland) 3 years BSc, 1 year MSc (or 4 year integrated masters), + 3.5 or 4 year PhD. Total of 8 should be available from school to PhD.
In Scotland the picture is more complex because of the 4 year first cycle degrees. Formally, both Integrated Masters and 1-year MSc courses fit within the Bologna Framework, albeit at the lower end in terms of input and hours studied[1]. However, there are concerns that the longer periods of training in the US and (most of) the EU make their graduates more competitive. A significant missing factor is a comprehensive system of financial support for students undertaking MSc courses. The Council for the Mathematical Sciences (CMS) is currently preparing a report on the situation, following much national consultation.

e. The current discipline boundaries, and whether a general science first degree option could be appropriate.

Degrees in Mathematical Sciences normally involve all aspects of MSOR (Mathematics, Statistics and Operational Research) though some students shy away from certain areas. Students are very reluctant to do any degree which doesn't have the look of a specialised honours degree. 'General' and 'ordinary' have a second-rate sound to students. Some universities do General Science degrees (though not under this name) as a preparation for teaching in any of the main sciences or mathematics. It is very important to have sufficient mathematics content since otherwise science subjects, especially physics, will suffer. This is especially vital if the student does plan to teach.
Note that many students enter mathematics degrees without a science background and go on to employment in, for example, the financial sector.

f. The changes to the skills, knowledge and experience of those entering the HE system and how the HE system can accommodate such changes.

The A level mathematics syllabus has undergone dilution over the years. Students arrive with a less thorough mathematical grounding than was the case 10-15 years ago. This raises the need for adjusting syllabuses at university (all universities have done this). Many universities

[1] This is dependent on the interpretation of ECTS, the EU credits system, adopted by the DfES. The situation is not completely clear and it is understood that the ECTS system is under review.

also provide additional 'remedial' or 'catch-up' teaching of less well-prepared year 1 students, though the take-up is variable. (It is not always possible to make such additional teaching compulsory for students.) Another common approach is to provide Student Resource Centres with drop-in help, but of course this is expensive in terms of staff time. Students can be trained to provide the drop-in help and in some ways this is the better solution; they may need to be paid of course.
Students do typically arrive at university with more 'transferable skills' such as IT skills than was the case. But school teaching which has of necessity to be very examination driven means that many students have poor study skills (doing old examination papers seems to be the main one).

g. The need to allow students to be flexible in their choices of occupation as they gain their qualification and afterwards.

Maths does allow flexibility. However university departments need to listen to employers' needs, e.g. training in teamwork, report writing. *It is hard, and time-consuming, to get information from employers about what they do want in a mathematics graduate.* Genuine data on this would be very useful.

h. The increasing number of students who choose to study later in their lives, and/or part-time, and/ or have geographic limitations on where they can study.

The university system can cope with unusual entrance qualifications, Access courses etc. There are Foundation years (Year 0) in many universities, sometimes run by Further Education colleges in the area. Mature students are welcomed, and most universities do part time degrees. However, provision outside the normal working day is often not economic.
The Open University provides access to HE maths up to MSc level to part-time students nationally, wherever they live, on an economic basis (and indeed much more cheaply than a conventional degree!).
There is still a need for good *regional* provision of mathematical sciences degree programmes, something which is under threat with department closures.

i. The financial impact upon students who undertake HE study.

A useful piece of data collection would be the relative effect of student loans versus commercial loans, particularly as regards second cycle degrees. There is no standard means of funding second cycle degrees at present, other than Integrated Masters degrees. (This is one of the reasons why integrated masters are worth protecting: their loss would mean a drastic fall in the number of second cycle students.)

j. The impact, on the UK, of international flows of students and STM professionals.

It is reported that there has been a decline in overseas student numbers, though the situation is different in different subjects, and this is having a major impact on some universities' finances. UUK are more informed about this. On the professional side, many non-EU people are being appointed to academic posts in the UK, partly because of shortages and partly because of the high standards of many non-EU applicants, for example from the former Soviet Union. HoDoMS does plan to gather data on the health of UK mathematics departments as regards staffing (there are ongoing discussions with the LMS as to how this might be done). This could include data on the proportion of non-EU staff in post.

It is worth noting that employing staff from abroad can have implications for teaching since some will need language training, not only so that they can be understood by students but so that they can understand what students are saying. (Especially in areas with a strong regional accent!)
Also the influx of highly qualified new staff from abroad affects the longer term job prospects for PhDs from the U.K.

k. The developments in HE and economic policy inside and outside the UK and how the HE system can accommodate these changes.

This seems rather generalised and I don’t think I can meaningfully comment.