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Queen Mary is part of the federation of colleges that make up the University of London. The School of Mathematical Sciences is one of the largest mathematics departments in the UK. It is based on the Mile End campus, about two miles east of central London. I’ve worked there since August 2007. Until April 2009 I worked as a project officer for the East London region of the national ‘more maths grads’ project funded by HEFCE. I now work as the School’s Executive Officer for Teaching and Research.

The ‘more maths grads’ project aims to encourage more students to take up degree courses in mathematical sciences and to increase the numbers participating who are from traditionally under-represented backgrounds. The groups mentioned in our remit include people from lower socio-economic backgrounds, women, adult learners and people of Bangladeshi, Pakistani, Black Caribbean or Black African ethnicity.

In this article I will describe the HEI and local context for widening participation.

A. Gender

Over six hundred undergraduates were taking mathematics courses at Queen Mary in 2006/07: this increased to over seven hundred in 2007/08 and increased again in 2008/09. Around 45% of these undergraduates were female and 55% male. HESA statistics show that 38% of the Mathematical Sciences students across all universities in 2006/07 were female. Percentages of women in other subjects at Queen Mary are shown in the Table 1 below. I have tried to take the most appropriate comparative HESA figure in each case.

The first row in Table 1 shows the statistics for Queen Mary undergraduates in 2006/07. The second row shows the statistics for both Queen Mary undergraduates and postgraduates in 2006/07. HESA national statistics count undergraduate and postgraduate numbers in 2006/07, full and part time. All figures include Home, EU and non-EU students.

<table>
<thead>
<tr>
<th></th>
<th>Mathematical Sciences</th>
<th>Biology</th>
<th>Business Studies</th>
<th>Engineering</th>
<th>Computer Science</th>
<th>Economics</th>
<th>Physics</th>
</tr>
</thead>
<tbody>
<tr>
<td>QM undergrads</td>
<td>45%</td>
<td>63%</td>
<td>53%</td>
<td>19%</td>
<td>20%</td>
<td>41%</td>
<td>24%</td>
</tr>
<tr>
<td>QM overall</td>
<td>44%</td>
<td>61%</td>
<td>56%</td>
<td>20%</td>
<td>21%</td>
<td>41%</td>
<td>25%</td>
</tr>
<tr>
<td>National HESA</td>
<td>38%</td>
<td>60%</td>
<td>45%</td>
<td>15%</td>
<td>19%</td>
<td>35%</td>
<td>22%</td>
</tr>
</tbody>
</table>

Table 1 - Percentage of all students in maths and scientific/business disciplines that are female
From this table we see that the percentages of female students at Queen Mary are similar to the national percentages but with a higher proportion (1% to 8%) of female students in every case. Mathematics is at the higher end of this range. In 2006/07, Queen Mary had a ratio of 51% female to 49% male among its undergraduates, and 50% female to 50% male among its undergraduates and postgraduates combined, compared to a ratio of 57% female to 43% male among all students in the HESA data for 2006/07. This means that the Science and Engineering departments have a relatively higher proportion of female students when compared to national averages than other departments in Queen Mary do. 

B. Socio-economic classification

The report “Trends in applications and acceptances to mathematics, physics, chemistry, engineering and biology between the years 2002 and 2007” was produced by the UCAS Research Team and published by DIUS in 2008. Section 5.2 discusses trends for applications, applicants and acceptances for undergraduate degrees in these subjects when analyzed with respect to the NS-SEC socio-economic classification.

The first four rows of Table 2 show the growth in applications, applicants and acceptances for mathematics among UK-domiciled students from four of the NS-SEC groupings, comparing 2007 with 2002. The final two rows show the corresponding growth figures for 18 and 19 year old applicants who come from neighbourhoods lying in the lowest and highest 20% of UK neighbourhoods for HE participation.

The DIUS report includes among its conclusions the statement that

“Mathematics has had high growth from all types of applicant and this has meant a greater number of applications and acceptances. These trends have not been apparent for all subjects.”

The data above mean that our work was effectively supporting processes and change that had already been happening over the previous five-year period and had already been happening at Queen Mary.

In East London we were asked to focus our efforts in four of the thirty-two Greater London boroughs: Barking and Dagenham, Hackney, Newham and Tower Hamlets. Queen Mary’s main campus is situated in Tower Hamlets, with Hackney to the north, Newham to the east and Barking and Dagenham further east. All four boroughs contain areas of significant deprivation and every school or college we worked in had a large proportion of students who fell into one or more of our target widening participation groups.

Indeed, the Office for National Statistics website (http://www.statistics.gov.uk) has many pages of tables in the Neighbourhood Statistics section containing data relating to various social indicators such as life expectancy, approximated social grade and population density. These data indicate that the four target boroughs contain substantial numbers of students in our target widening participation groups. Ofsted reports for the schools and colleges we worked with provided additional information on the ethnicities and likely socio-economic groupings of their students.

C. Ethnicity

Table 3 compares the ethnicities of Queen Mary’s mathematics undergraduate students in 2006/07 with the overall Queen Mary undergraduate statistics. To give some idea of how this might compare with the national breakdown, the third column contains the HESA national statistics for first year UK domiciled full-time undergraduate students studying first degrees in all subjects in 2006/07.

The ethnicity profile of Queen Mary mathematics undergraduates is significantly different from that of Queen Mary undergraduates as a whole. In particular, one third of all maths undergraduates in 2006/07 came from our project’s target ethnic backgrounds: Bangladeshi, Pakistani, Black African and Black Caribbean. The proportion of all Queen Mary undergraduates in 2006/07 with these ethnic backgrounds was 13%.
Ethnicity data for each borough, for London and England are available from the website of the Office for National Statistics,(http://www.statistics.gov.uk) as follows. Estimates from June 2006 from the Neighbourhood Statistics section of the website of the Office for National Statistics can be found in the Resident Population Estimates by Ethnic Group (Percentages) table for each local authority. The data suggest that the ethnicities relatively least well-represented at Queen Mary in 2006/07 in comparison with their prevalence in the local East London population were Black Caribbean and White, and these groups were less well-represented among Queen Mary mathematics undergraduates. For further details on some of the ethnicity-related trends in mathematics and other STEM subjects see the DIUS research report discussed above.

D. Prior attainment and standards in Queen Mary

As we have seen, Queen Mary already attracts many students from widening participation backgrounds to mathematical sciences courses. In addition, around 10% of the undergraduates are mature students.

There is pressure from within the university to raise academic standards. In 2008/09 the entry requirement for the G100 mathematics course was 280 UCAS points, but it will be 320 UCAS points for 2009/10. Unistats gives the following information for full-time first year UK-domiciled students. The table indicates one reason why the School of Mathematical Sciences is under pressure to raise the prior attainment required of its applicants. The UCAS tariff has some known flaws but the data below highlight the overall trends.

Across the UK, the number of acceptances overall and for mathematics for UK-domiciled students within each of these prior attainment groupings is rising according to the third and fourth columns of the table. These data are taken from “Trends in applications…” , Section 5.5. The figures in brackets are the absolute numbers of additional acceptances from each of these groupings. I have estimated the numbers for the highest achieving applicants from other data within the report. The proportion of applications in mathematics where applicants then attained over 360 UCAS points was between 65% and 70% for the period 2002 to 2007. For applications to all subjects this proportion was between 25% and 30%.

The data above suggest that the 2002-2007 increase in applications to mathematical science courses did enable most university mathematics departments to increase their proportion of high achieving applicants.
Summary: the widening participation context at Queen Mary

Widening Participation and maths outreach activities have been in place at Queen Mary and in East London for several years. In the course of our project activities we have worked with local personnel from Aimhigher, the Further Mathematics Network, NCETM, Setpoint, QMUL Widening Participation and Education Liaison departments, and with the mathematics and physics outreach officer for Queen Mary, Laura Thomas.

During the period of activity of the more maths grads project at Queen Mary:

- Queen Mary already attracted a higher proportion of women onto undergraduate mathematics courses than the national average for mathematics courses (see Section A). The same was true throughout Queen Mary but mathematics was particularly strong among science and engineering disciplines.

- The School of Mathematical Sciences at Queen Mary already attracted a higher proportion of students from each of the different Asian backgrounds recorded, compared to the university overall. For Black backgrounds it attracted roughly similar proportions to the university overall (see Section B).

- Many undergraduates studying mathematics at Queen Mary come from London and particularly East London – around 65% of the undergraduates live at the home of a parent or guardian during term time. There is a continuing effort to strengthen links with East London schools and colleges, and maintain a strong presence in the efforts to regenerate the Thames Gateway area.

- Tower Hamlets is home to a large community of people with Bangladeshi ethnicity. One of our partner schools in the more maths grads project is five minutes' walk from the main Queen Mary campus and over 95% of its students have Bangladeshi ethnicity. Both Hackney and Newham have a population with a broad range of ethnicities. At one of our project’s partner secondary schools in Newham, over 90% of the students have a language other than English as their first language, and a third are at an early stage of learning English. In Barking and Dagenham the population has a higher percentage of people with White ethnicity than the average for London. It has substantially fewer people in senior/intermediate professional grades than the other three boroughs, and correspondingly more people in skilled manual grades.

- The academic staff working at Queen Mary in the School of Mathematical Sciences come from a variety of different countries, including the UK, Germany, Russia and the USA. The proportion of academic staff that is female is between 10% and 20% and the majority of academic staff are of white ethnicity. The profile of postgraduate research students falls somewhere in the middle: about a third of research students are female and a wider variety of ethnic backgrounds is represented.

- We have worked with over twenty secondary schools and sixth form colleges in these boroughs since August 2007. All of these institutions were less than twelve miles away and within just over an hour’s journey by public transport from Queen Mary’s main campus.

- The public perception and uptake of mathematics has been improving anyway, in contrast to some subjects in the physical sciences. The number of students doing A-level maths is on the increase, as is the number of students taking mathematical science degrees; applications were up by 10.4% last year and by 35% at Queen Mary.

It is difficult to predict how any particular widening participation agenda will be affected by future government policy changes, but it is likely that it will continue to be an area of interest for Queen Mary for many years.

References

1. Queen Mary Student Administration Student Statistics Section: summary reports for HESA and HEFCE.