

'Keeping HE Maths where it Counts'

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1996-2004. A shift in the age profile of academic staff has also been noted in these groups, indicating that staff were not being continuously replaced.

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1. Introduction

- 1.1 Closure of mathematics departments and the termination of recruitment to mathematics courses have a number of effects which are not restricted to the loss of student opportunity.
- 1.2 In this report we examine the case for ensuring an adequate level of regional provision in mathematics in HE. The major emphasis is on the case for the availability of high-quality 'local' course provision for able students who, for a variety of reasons, need or wish to live at home whilst studying on a full-time basis. By 'local' we mean within reasonable travelling distance, so that the necessary attendance is possible without overnight stays. Some of these students may come from non-traditional HE entrant backgrounds, so that this local provision contributes to addressing the widening participation agenda. This report looks at some of the drivers in the HE funding system which raise concerns about the continued existence of these courses.
- 1.3 Widening participation has other aspects, for example, admitting the most able students from non-traditional backgrounds to the most demanding undergraduate courses at prestigious Universities.

Reasonable travel distance between university department and school is clearly an important issue here.

- 1.7 In summary, reasonable sized populations should have access to a local mathematics department which can educate home based students who would otherwise not be able to afford to study the subject in HE, which can work with local businesses on mathematically based problems, and which can work with local schools to stimulate interest in mathematics and its study.

Terminology:

It should be noted that the term 'department' is not always used in University structures and where it is, it can mean different things. Throughout this report we will use the term 'department' to mean a group of academic staff highly qualified in mathematics and who offer undergraduate courses in mathematics. This may be in addition to other courses they offer either as service provision or for post-graduate students. The term 'mathematics' is used to embrace statistics throughout. [rad](#)

here. However, some part-time students find it difficult to study almost totally at home and need the stimulus of regular contact with staff and their peers.

2.3 Many full and part-time students wishing to remain at home have found places on courses in mathematics at their 'local' university, which although recruiting nationally, has provided a valuable resource for its community. These universities are sometimes ex-polytechnics and courses at such universities, which we have termed 'local', are often 'practice-based' courses, satisfying that aspect of the Benchmark statement [8] and producing employable graduates, some of whom go on to achieve at the highest levels in fields including academia. It is important that this type of provision, which also in its national role helps to cater for the spread of adequate pass grades in A-level mathematics achieved by applicants, remains available.

2.4 The project is intended to be 'rolled out' to the remainder of the three RDA regions (and ultimately to the UK as a whole) following evaluation of the results of the pilot phase. The Leitch Review of Skills 'Prosperity for all in the global economy' if [9] expressed the view that 'the critical barrier to access to university is dramatically improved so that young people from all backgrounds have a fair chance of attending'. It is also important that once students are admitted to a course at university, there is a fair chance of success. If the dual aims of widening participation and of increasing the number of graduates from 'mathematics-rich' programmes are to be met, then there must remain opportunities for participation in appropriate HE programmes in convenient locations distributed within the UK.

3. The Current Position

3.1 The existence of high-quality honours degrees with more moderate entry requirements (which are termed 'broader-entry' courses in this report) in mathematics in universities distributed throughout the UK is an important element in the achievement of part of HEFCE's strategic aim of widening participation. The courses we are concerned with are three-year programmes, are classified as G100 by UCAS, and as h

In this way, these courses also serve a valuable function for those students who have received less than perfect mathematics teaching at school and yet have achieved a reasonable performance at A-level in mathematics. Finally, and most importantly, these courses provide local provision in a vital STEM subject for students who wish to study full-time, but who are constrained to live at home for a variety of reasons. Experience indicates that a significant number of these are from backgrounds with no previous experience of HE.

- 3.3 In a similar way, non-urban, sometimes geographically isolated pre-1992 universities, for example Essex, Stirling, and Aberystwyth provide similar opportunities for local students. Prior to closure of courses, Bangor and Hull Universities also provided this service. Reference to the map in Fig 2 shows very clearly the effect of the cessation or recruitment at Bangor in producing a complete absence of 'local re-entry' provision in North Wales. Similarly, the closure of courses at Hull has removed this type of provision in East Yorkshire.

4. Health of Departments

- 4.1 Data on Departmental 'Health' is not readily available for mathematics as a whole. However, the Royal Statistical Society has carried out a detailed study of the health of the teaching of statistics focusing on its role as a part of the discipline of mathematics in HE.
- 4.2 According to a recent presentation [10] by the lead investigator, its draft report concludes that there is clear evidence of the unfortunate effects of RAE-based funding decisions on this teaching. Without a similar detailed study it is not valid to extend these results to the whole field of mathematics, but there is anecdotal evidence to support the view that if this were done, similar results would be found.
- 4.3 In summary, the study found that groups rated 5 or 5* in 2001 were largely stable over the period 1996-2004, whilst those rated 3 or 4 were on average 16% smaller in size in 2004 compared to 1996. (The data is available in the Appendix.)

known as service teaching, was an important part of many departments' portfolio of courses and has been taken 'in house' by the parent department in a number of universities, purely it seems, for financial advantage.

5.5 One element of thi

mathematics at A-level might be well received.

- 6.2 Table 3 shows the RAE ratings obtained in 2001 for Units 22 and 23, Pure and Applied Mathematics respectively. Colour has been used to denote those universities which did not achieve at least one grade 5 in either Unit 22 or Unit 23. There is clearly considerable commonality in the universities shown in colour in both Table 2 and Table 3. If the work of the RSS is valid and the conclusions it draws on the effect of post-RAE funding decisions on the ob

6.8 Table 5 reflects, in many cases, areas of relatively recent population growth. In some cases universities have been created, but mathematics provision is not widespread. In others areas, established universities operate local campuses delivering their programmes. Sadly, mathematics programmes do not appear to be offered in such cases.

6.9 As a particular example, Lincoln has a new University located on an impressive modern campus in the middle of the city. A course in mathematics, or even one rich in mathematics, is not offered at this University and one may wonder about the effect on local, mathematically able students in the area. Will, they, as before, leave the area to pursue the subject, or, perhaps and in some cases at least, more likely, elect to study a different subject which is offered in Lincoln? This decision will face many students in other cities and towns where a similar lack of provision applies. Actually, this concern seems to apply to the entire STEM subject area in a number of cases.

6.10 A strong regional presence of Mathematics and Statistics is important in terms of access to higher education opportunities. However in addition, Universities have a substantial economic impact on their locality through their direct activities including research and consultancy. A survey of graduates from HEI's in the North-West of England [14] confirmed the existence of 'local' students, with a strong commitment to the region, who worked in the North-West after graduation. Moreover, we believe that there is a tendency for a proportion of graduates tend to stay in the general area of the University after graduation and hence contribute to regional economic development in the longer term. Given the importance of Mathematics and Statistics to the knowledge economy, a region without a strong presence in these disciplines will likely miss out on this additional boost to regional economic development to its long term detriment. The Government's policy is to promote greater economic growth in regions that lag behind the UK GDP per capita average. In general these are the very regions where we have concerns for the future provision of Mathematics and Statistics.

6.11 In its evidence in January 2005 to the Select Committee on Science and Technology inquiry into strategic science provision, the London Mathematical Society noted five departments of mathematics had closed since 1999. These closures are a genuine and very real cause for concern, particularly given their locations and the effect on 'broader-entry' provision.

6.12 One of the major concerns of the Smith Report [5] involved the number and level of qualification of mathematics teachers. The report identified a role for HE mathematics departments in supporting schools and colleges. Specifically in paragraph 6.19 the report stated that 'The Inquiry believes that there should be closer working between all HE mathematics departments, schools of education and their local schools and colleges.' The report goes on to identify some advantages for teachers and pupils of such a relationship

mathematics department.

- 6.13 It has been conjectured that those who enter school teaching are more likely to attend a local or regional university, and to remain in the area on qualification. Those who do go further away are also less likely to return to their home areas. Data to support or reject this conjecture is needed and might be a significant factor in developing a strategy to improve the supply of mathematics teachers. According to a survey carried out by NFER [15], during the academic year 2004–2005, 24% of those teachers who were teaching mathematics ‘were either non-specialists or were predominately teachers of other subjects’. Actions to support such a strategy clearly need to be taken if we are to meet the government’s target of 95% of mathematics classes being taught by a specialist by 2014.



Figure 1: Location of Courses in Mathematics in the UK

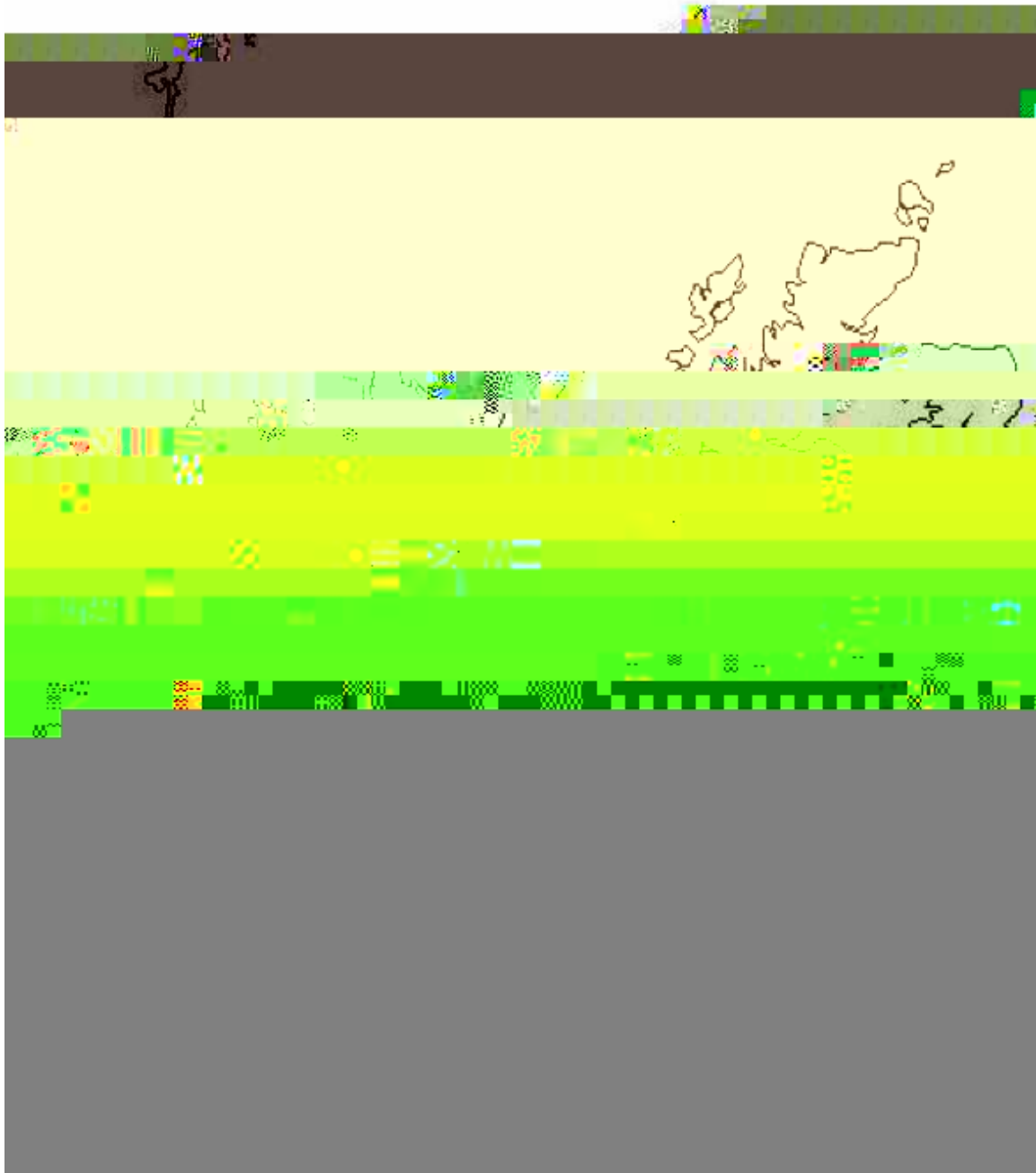


Figure 2: Location of Broader Entry Courses in Mathematics in the UK



Figure 3: Population Density

Counties, unitary authorities, Inner and Outer London in England, unitary authorities in Wales, council areas in Scotland and district council areas in Northern Ireland for 2004.

Source: Census 2004 based population estimates, Office for National Statistics; General Register Office for Scotland; Northern Ireland Statistics and Research Agency

Image reproduced with permission from Social Trends 36, available from www.statistics.gov.uk.

Table 2: Published Admission Requirements

Oxford and Cambridge have not been included in this table as they set Entrance Tests (although both feature in Figure 1). Universities shown in **red** admit on minimum points totals which are less than 280, and have a (maximum) requirement of grade of B in A-level mathematics. Those shown in **blue** require 280 points alongside (at most) a grade B in mathematics. Those shown in **black** require students to have gained more than 280 points and a grade A in A-level mathematics. The two Scottish Universities shown in green offer entrance to year one of a four year programme, see note * below.

† Where not given by the University, points are calculated on A-level grades alone unless there is a specific pass requirement at GCSE level.

* Admission to year 2, Admission to year 1 on 240 points and a good performance in maths and one other technology subject. j

RESEARCH RATINGS FOR DEPARTMENTS OFFERING COURSES IN MATHEMATICS
(G100 UNLESS OTHERWISE SHOWN)

University	Unit 22	Unit 23	University	Unit 22	Unit 23
Aberdeen	5	4	Aberystwyth	3b	4
Aston			Bath	5	5*
Birmingham	5	5	Bolton		
Brighton		3a	Bristol	5	5*
UWE, Bristol		3a	Brunel (G104 sandwich)		5
Cardiff	5		Central Lancashire		
Chester		3b	City		4
Coventry		3a	Dundee		5
Durham	5	5*	UEA	5	4
Edinburgh	5*	5	Essex	3a	3a
Exeter	4	5	Glamorgan		
Glasgow	5	5	Greenwich (G140)		
Heriot-Watt		5)			

Table 5: Provision in large towns Source: www.lovemytown.co.uk based on 2001 Census publications Key Statistics for urban areas in E

7. Conclusions

- 7.1 Steps need to be taken to ensure that there is an adequate level of provision in mathematics in HE on a su

