

**Sustaining science
and other
key vulnerable subjects
in higher education**



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About HEFCE

The Higher Education Funding Council for England (HEFCE) distributes public money for teaching and research to universities and colleges in England. In doing so, it aims to promote high-quality education and research, within a financially healthy sector. The Council also plays a key role in ensuring accountability and promoting good practice.

Most HEFCE funding is distributed by formula, based either on numbers of students or research excellence. But a proportion is retained for targeted initiatives. One such initiative is that aimed at supporting strategically important and vulnerable subjects.

Contact Paul Hazell for further details on strategically important and vulnerable subjects: 0117 931 7452, p.hazell@hefce.ac.uk

For general enquiries contact the HEFCE switchboard: 0117 931 7317.

Foreword

Higher education has been through many changes in recent years. Since HEFCE was founded in 1992, student numbers in England have increased by two-thirds to just under two million. A higher proportion of them study as mature students for part-time degrees.

Funding also comes from a wider range of sources. Students – from the UK and abroad – make a significant contribution through fees. The Government, HEFCE and the UK Research Councils support significant innovation and research. Industry and employers are sponsoring more students and more research.

These trends have also prompted changes in students' subject choices: vocationally oriented courses, such as medicine, have grown in popularity while some more traditional science subjects have seen their take-up decline.

The decline in traditional science subjects has been a worrying trend. The diversity of higher education is one of its greatest strengths and some subjects are of strategic importance to the nation – they are the foundation of new ideas, the backbone of our economic development and innovative capability. Without them, we have fewer new ideas and new products, so it is essential that they flourish.

The good news is that this trend is now being reversed. Science is growing in popularity among university students, thanks in part to a rise in take-up in schools. There is also increasing interest in applied science subjects that employers want, such as environmental science and maritime technology. Enrolment in higher-level language courses such as Chinese – crucial to today's economy – is on the rise. However, although the change is encouraging, it remains work in progress.

The turnaround owes a lot to the imaginative work of individual universities and colleges underpinned, in the past few years, by over £350 million from HEFCE. This report explains what we've done and what we plan to do to ensure that strategically important and vulnerable subjects remain strong in the future.



David Eastwood

Chief Executive, HEFCE

Key points

- The number of undergraduates in physics, chemistry and maths is rising again after a number of years of decline.
- Figures from UCAS show that mathematics acceptances for 2008-09 have increased by 7.1 per cent to 5,682 compared with 2007-08; chemistry is up 4.6 per cent to 3,545; and physics is up 1.3 per cent to 3,040.
- Mathematics A-level entries for 2007 rose 7.1 per cent from last year to 53,331, while further maths was up 11.1 per cent to 7,241 entries. Entries for chemistry were up 1.6 per cent and those for physics rose one per cent.
- One factor in this improvement is HEFCE's £350 million programme to support strategically important and vulnerable subjects.
- The programme includes work with schools to boost interest in science, maths, engineering and languages. Engagement in schools is boosting the numbers of young people taking sciences at A-level, and helping to reverse a decline in other subjects including languages.
- We are providing £100 million to sustain high-cost science subjects while our demand-raising work is given a chance to take effect.
- We are providing significant support for new research and regional collaborations to keep English universities at the cutting edge of scientific innovation.
- The programme is giving support to area studies courses, which help business and diplomacy to work and trade in important global regions.
- HEFCE keeps its programme under regular review, and adjusts its support to reflect changing priorities. We also look at the international experience, recognising that this is not just a UK problem.
- Universities give HEFCE early notice when they are considering closing a department that teaches a strategically important and vulnerable subject. If it's in the national or regional interest, we will then work with regional partners to sustain and grow the subject.
- The recent Follett Review (HEFCE 2008/38) set the agenda for the next three years and encouraged HEFCE to focus on sustaining provision in vulnerable subjects rather than specific departments.
- HEFCE's work aims to stabilise and improve provision in important subjects so that they are no longer vulnerable and can be self-sustaining.
- HEFCE is broadening its support beyond school-focused programmes to reach adults in the workforce and their employers.

Background

Subjects that are particularly important to our national interest are not always those that attract the most students. These subjects may include the sciences and languages as well as employer-specific skills that are vital to our economy and trade. From time to time they need extra support if they are to be sustained and appeal to new generations of students.

History

It is not new for the higher education funding council to place special emphasis on protecting vulnerable subjects. The University Grants Committee, the Universities Funding Council and the Polytechnics and Colleges Funding Council – all of which funded English higher education before HEFCE – sponsored different initiatives to support minority subjects. From 1989 to 1994 the New Academic Appointments Scheme supported many new young academic staff in the natural sciences and technology. And in 2000, HEFCE provided a £5 million boost for Chinese studies that generated new students and new knowledge which today is helping our businesses work with that global power.

STEM subjects

But clearly the national interest extends beyond Chinese studies. There has been a real concern in recent years about the falling numbers of students opting for science, technology, engineering and maths (collectively known as ‘STEM’) subjects. Industry has felt that too few graduates are being produced to meet its demands, while Government has worried about the impact on our economic competitiveness. There has also been public concern about some high-profile closures of individual university science departments. Nevertheless, since 1996, HEFCE has invested over £3 billion in improving research equipment and infrastructure, including the refurbishment of science laboratories.

More recently, there have been HEFCE-funded programmes designed to encourage all young people to study the STEM subjects.

Roberts Review

A 2005 policy review led by Professor Sir Gareth Roberts has guided HEFCE’s recent work on strategically important and vulnerable subjects (SIVS). A review for HM Treasury by Sir Gareth in 2002 had identified shortfalls in science, engineering and technology graduates and his 2005 review (HEFCE 2005/24) concluded that:

- HEFCE should not be too interventionist, because the higher education system is generally healthy and vibrant. We have a world-class higher education system that is generally recognised as being second only to the USA
- the system is dynamic and competitive – individual departmental closures do not of themselves mean that a subject is nationally vulnerable
- any interventions should:
 - be based on good evidence
 - support a market-led solution and not simply increase student places where demand isn’t there
 - generally be delivered in partnership with other agencies.

This approach continues to guide HEFCE’s work today.

HEFCE: 'an enormously supportive broker'

Universities and colleges tell HEFCE when they are concerned that particular departments are experiencing difficulties. These early warnings allow us to act more effectively, when it is in the national interest, to sustain and extend provision.

Such early warnings not only help us to identify trends in provision nationally, they also allow us to make specific interventions. With advance warning we can provide support and even consider transferring provision to other universities.

For example, after the University of Exeter decided – in a high-profile case – to close its chemistry department, we supported the transfer of students to the universities of Bristol and Bath.

Professor Steve Smith, Vice-Chancellor of Exeter, says HEFCE acted as 'an enormously supportive broker':

'They worked with us and other universities in the region to come up with a solution which actually increases the number of funded places for chemistry in the South West. By working collaboratively through HEFCE we have been able to come to a solution which we think strengthens chemistry provision in the long term, and I welcome that role of HEFCE as a broker rather than a manager or a planner.'

Such early warning also helped sustain Japanese at Oxford Brookes University. An internal review in 2006 found the subject was too small as an academic unit to continue to operate as it had done. HEFCE helped expand Japanese provision by funding 30 extra student places, with support from the South East Regional Development Agency and the University of Oxford.

HEFCE's current programme

HEFCE has a £350 million programme funding a range of supportive activities between 2005 and 2011. Reflecting the findings of the Roberts Review, this funding is targeted at:

- increasing student demand for STEM subjects
- sustaining high-cost science subjects, through an additional and time-limited £100 million, while demand-raising work is given time to generate new students
- building research capacity in STEM subjects
- 'area studies' of particular countries or global regions
- modern foreign languages
- quantitative social science.

Professor Sir Brian Follett has recently reviewed our SIVS policies to ensure that they remain on the right lines. Our SIVS advisory group will ensure that we continue to address the most pressing priorities.

HEFCE's approach recognises the need for proportionate intervention with tailor-made solutions for specific subjects.

HEFCE's key programmes and their achievements

Increasing student demand for science, technology, engineering and mathematics

HEFCE is contributing £15 million to a programme to boost demand in STEM subjects. Programmes are being developed in partnership with Government and with significant subject bodies such as the Institute of Physics and the Royal Society of Chemistry.

These projects are designed to improve co-operation between schools, universities, colleges and employers. They encourage pupils through industry visits, school clubs and better careers information. HEFCE is raising aspiration and demand for STEM among those who may not have thought higher education, or STEM subjects, were for them.

Programmes have included:

- **the London Engineering Project**, targeted at 9 to 19 year-olds in south London
- **Stimulating Physics**, which includes significant mentoring for students and support for non-specialist teachers
- **Chemistry For Our Future**, a project involving virtually all the chemistry departments in England in stimulating interest in chemistry from primary school onwards
- **moremathsgrads**, a scheme targeting teenagers in schools.

Physics teacher goes back to university

Physics teacher Debbie Davis spent a year on a teacher fellowship at the University of Birmingham. It gave her ideas to enhance her own teaching, and she was able to tell university staff about how physics is taught in schools today.

Dr David Evans, the university's Head of First-Year Physics, believes fellows such as Debbie make an invaluable contribution. 'They can tell us what's on the syllabus and what to expect from our students,' he says, 'so we're not boring students with things they already know and we're not assuming knowledge they don't have.'

As a fellow, Debbie acted as a mentor for many students, who may find lecture theatres daunting after A-level classes with as few as three students. This is crucial in helping to retain undergraduates through to a degree.

The fellowship programme is part of the HEFCE-funded Stimulating Physics initiative, which is helping to reawaken interest in the subject at schools and universities.



Organised with the Institute of Physics, the programme also includes visits to electronics firms such as Sharp, where students can see how physics is part of the products they take for granted.

Non-physics specialist science teachers can improve their physics through twilight sessions, helping improve pre-GCSE teaching. Universities are developing degrees with a range of science modules and inter-disciplinary approaches that include physics. And a blog by physics students provides advice on university life.

For more information see www.stimulatingphysics.org

The results

Early results are encouraging in the sciences. After a significant decline in the number of chemistry, physics and maths students, that decline has been halted and in some cases reversed.

Chemistry

Between 1999 and 2003, the number of chemistry undergraduates fell from 11,933 to 9,531. But in 2006 the total was back up to 11,532 and the number of new chemistry undergraduates accepted in 2007 was, data from UCAS illustrate, over eight per cent higher than the previous year.

Physics

After a long-term decline in physics students to 8,581 in 1999 and 8,257 in 2000, numbers are now rising. There were 8,557 physics undergraduates in 2006 and UCAS reported a 10 per cent increase in new enrolments in 2007.

Mathematics

The number of mathematics students fell from 19,161 in 1999 to 16,611 in 2003, but numbers have risen again to 17,991 in 2006. UCAS recorded a nine per cent increase in undergraduate acceptances in 2007.

Engineering

Student numbers have fallen from a peak of 58,400 in 2001 to 53,276 in 2006. But UCAS figures show recruitment to most engineering courses rose in 2007 – particularly in civil, chemical and mechanical engineering. Overall engineering recruitment rose by five per cent over the period 2002-2007.

For more about HEFCE's work on STEM subjects, visit the HEFCE web-site, www.hefce.ac.uk, under About Us/Strategically important subjects/science, technology, engineering and mathematics.



Developing London's new young engineers

Some engineering disciplines have not benefited from the higher education boom over the last decade. A HEFCE-funded project aims to change that.

The London Engineering Project is working with 15 secondary schools and 35 primaries in the capital to make engineering more attractive as a degree option for young women (who make up only 14 per cent of engineering undergraduates), minority ethnic students and people from low-income backgrounds with no family history of going to university.

Oliver Goldsmith School in Camberwell, south-east London, is one of the schools that set up their own science and engineering clubs under the project. Led by the school's science co-ordinator, Hedney Gordon, Oliver Goldsmith's club now has 36 members, all in the final year of primary school, Year 6.

Pupils take part in scientific experiments and investigations. 'The club has been so popular that I would like to introduce activities for Years 4 and 5 too,' says Hedney.

Two miles away, at St Saviour's and St Olave's School for Girls (a secondary school), students have taken part in a four-day residential engineering course at Harper Adams University that gave them a chance to immerse themselves in the subject.

Some 14,000 young people have been engaged by the London Engineering Project and many stereotypes about engineering have been challenged.

For more information see www.youngeng.org under Club Network/Find out more about individual clubs.

Building research capacity in the STEM subjects

Three significant programmes are designed to improve research capacity in these subjects.

The **Science and Innovation Awards** are funded primarily by the Engineering and Physical Sciences Research Council, with the help of HEFCE and the other UK funding councils. With five-year grants of up to £5 million each, the fund is boosting research areas that would otherwise be absent or at risk. Nearly £100 million has been awarded since 2005. The full list of projects supported by the Science and Innovation Awards is at www.epsrc.ac.uk under Funding for Researchers/Funding Opportunities/Sustaining Research Capacity.

The **integrative mammalian biology programme**, co-sponsored by the Medical Research Council and the Scottish Funding Council, is designed to enable universities to maintain physiology courses and research at a time when the sector faces a shortfall in qualified staff – important for the development of new therapeutic approaches to tackle diseases and deliver better medicines. The £12.3 million partnership between HEFCE, employers and the Biotechnology and Biological Sciences Research Council started in 2007. For more about the integrative mammalian biology programme, see www.bbsrc.ac.uk under Working with business/Collaborative R&D/Strategic partnerships and ‘industry clubs’.

The sheer cost of world-class science can make it difficult for every region to compete so we are building **regional research collaborations**. The South East Physics Network, supported by £12.5 million of HEFCE funding, brings together the region’s physics providers to sustain provision and boost the local economy. Meanwhile physics in the Midlands has been strengthened by the creation, with £4 million funding from HEFCE, of the Midlands Physics Alliance with around 130 permanent staff in the universities of Birmingham, Nottingham and Warwick. The Birmingham Warwick Science City Interdisciplinary Research Alliance and Great Western Research are also underpinned by HEFCE investments.

Further detail about HEFCE’s regional investments is at www.hefce.ac.uk/news/hefce/2008/sepnet.htm

Teamwork makes physics cool in the Midlands

The Midlands Ultracold Atom Research Centre is now one of the leading centres of research in a field that is driving a revolution in quantum physics, thanks to the work of the Midlands Physics Alliance and funding from HEFCE.

Among other work, the scientists are using refrigerators made from lasers that can cool atoms to a few billionths of a degree above absolute zero – the lowest temperature in the universe.

Such ‘ultra-cold’ atoms are used, for example, in high-precision navigation, underground mapping and oil prospecting, and high-performance computers.

The £9 million centre, funded by HEFCE and the Engineering and Physical Sciences Research Council, brings together 14 staff at the universities of Birmingham, Nottingham and Warwick.

The project is one of several to benefit from the Alliance. The collaboration has also created a new Graduate School which draws on the collective resources of several science departments to provide taught courses for graduate research students, ensuring they benefit from similar standards to their US counterparts.

For more information see www.nottingham.ac.uk under Schools & Departments/Physics & Astronomy.



The results

It is too early to evaluate the research programmes, which typically run for at least three years. But research capacity has already been significantly improved, with funding made available to support 24 projects, including a new structural ceramics centre at Imperial College London, a renewable energy centre at Sheffield University and a centre of excellence in fusion plasma physics at Warwick University.

We have also supported a new atomic research centre at the universities of Birmingham and Nottingham and the Cambridge Statistics Initiative.

'Area studies' of countries or regions

A £25 million programme, to which HEFCE is contributing £11.2 million, is boosting research into economically and politically significant global regions. Such 'area studies' combine languages with an understanding of the politics, economy and culture of a country – skills that are highly valuable to business, industry and Government.

The results

The programme has supported five new centres:

- the Centre for East European and Former Soviet Union Language-Based Area Studies (University College London and the universities of Oxford and Birmingham)
- White Rose East Asia Centre (universities of Leeds and Sheffield)
- British Inter-university China Centre (universities of Oxford, Bristol and Manchester)
- the Centre of Russian, Central and East European Studies (universities of Glasgow, St Andrews, Aberdeen, Edinburgh, Paisley, Strathclyde, Newcastle and Nottingham)
- the Centre for the Advanced Study of the Arab World (universities of Edinburgh, Durham and Manchester).

For more details see www.hefce.ac.uk under **About Us/Strategically important subjects/area studies and related minority languages**.

A new chemical compound

A new project in Nottingham, Driving Innovation in Chemistry and Engineering (DICE), is building a research environment which will help to establish the UK as a centre of excellence and international expertise at the interface between chemistry and chemical engineering.

'Chemists have been traditionally working with the chemical industry, but often don't understand which ideas are likely to work and which aren't,' DICE director Martyn Poliakoff, Professor of Clean Technology in the university's chemistry department told The Chemical Engineer Today.

A particularly promising new field is 'green' chemistry, which is helping to solve problems associated with climate change. The centre offers a joint module on the subject both for chemistry and for chemical engineering students.

This theme appeals to the young. 'We had a session on 'green' chemistry for schoolchildren a few months ago,' says Professor Poliakoff. 'Out of 20, we got three to seriously consider a career in chemistry or chemical engineering which, before the session, they hadn't.'

The £4.4 million project is co-funded by the university with the Science and Innovation Awards (which are partly funded by HEFCE).

For more information see www.nottingham.ac.uk/dice



Modern foreign languages

A drop in the number of young people studying languages at school has been reflected in a fall-off in language students at university. Once again, HEFCE's approach has been to work with schools to address the shortfall.

The Routes into Languages programme encourages students with a passion for languages to become ambassadors for their subject in schools. It runs training courses for serving teachers, university-based taster days and exam preparation sessions.

The programme was developed in four English regions, funded by HEFCE. Since Lord Dearing's 2007 review of

languages¹, its work has extended across England, with a presence in every region.

The results

The number of students taking modern languages as a whole course or with another subject rose from 21,754 in 1999 to 24,185 in 2006. UCAS application data suggest a 16 per cent increase in acceptances for languages combined with another arts or humanities subject over the period 2002-03 to 2007-08.

For more information see www.routesintolanguages.ac.uk

Plymouth pupils take to languages

Over 100 Year 9 pupils (14 year-olds) from seven Plymouth schools enthusiastically entered a languages competition organised by Plymouth Business School. It was part of the Routes into Languages initiative funded by HEFCE and the Department for Children, Schools and Families.

They were challenged to design their own laptop presentation in two different languages – choosing from French, German and Spanish.

Behind the initiative is a strong push by the Business School's languages staff to show how important languages are to business – an important point in a city and county where tourism is a major industry.

The Business School has also organised a taster day for local pupils, with an opportunity for the visiting GCSE students to experience languages in the university setting, taste a range of international cuisine and learn about life at the university.

Other events organised across the country as part of the programme include language sessions for parents and children, GCSE revision support and language-teaching courses open to native speakers and teaching assistants.

There are also a number of research projects mapping existing provision, which will recommend improvements in teaching community languages, business languages and using international events.



¹ More information on the Department for Children, Schools and Families' Languages Review Group chaired by Lord Dearing, and its report 'Languages for all: languages for life, a strategy for England', can be found at www.teachernet.gov.uk under Subjects/Modern Foreign Languages/Languages review.

Quantitative social science

There is a real concern about declining expertise in quantitative or data-based social science, with a trend towards more qualitative research. The 2005 Roberts Review recognised both its strategic importance and its vulnerability as a subject. Working with the Economic and Social Research Council, HEFCE is evaluating the extent of the problem and contributing £4 million towards the £18 million programme.

Initiatives supported will include: developing a greater interest in the subject at school; improved undergraduate curricula; new masters programmes; and high-quality research and methods training throughout the UK.

Eight regional centres of excellence in England and Wales, co-ordinated by the National Centre for Research Methods, are helping to deliver the programme. Each centre has a particular specialism, covering areas such as the use of data in education, criminology and personal relationships.

For more information see www.ncrm.ac.uk

Land-based studies

Land-based studies – covering subjects such as agriculture, horticulture, sports ground management and animal care – was identified as vulnerable by the 2005 Roberts Review and had been so designated.

Subsequently, a review led by Professor Maggie Gill concluded that there was no widespread evidence of a threat to the sustainability of land-based provision. The subject is no longer treated as vulnerable (a key purpose behind HEFCE's strategically important and vulnerable subjects programme is enabling subjects to move from vulnerability to sustainability).

There are at least 12,000 full-time equivalent students on land-based studies programmes. Thirty institutions account for around 75 per cent of provision, with further education colleges providing around 40 per cent of the overall total.

But three specialist institutions – Harper Adams University College, Writtle College and the Royal Agricultural College – are responsible for 20 per cent of total provision between them. Professor Gill believes that the special issues surrounding small specialist institutions therefore have a

particularly important bearing on the potential vulnerability of land-based studies. So HEFCE has worked with these colleges to ensure they have a sustainable strategic plan that responds to business needs.

Harper Adams University College, for example, will use £4 million of HEFCE funding to set up the Rural Employer Engagement Development Network in collaboration with the Royal Agricultural College and the Landex group of specialist land-based colleges. This scheme will provide courses for businesses in the land-based sector.

For more information see www.hefce.ac.uk under **More news/'HEFCE provides £11 million to support workforce development'**.

² 'Review of provision for land-based studies: final report to HEFCE by JM Consulting and SQW Ltd' (2007) can be found on the HEFCE web-site under Publications/Research & evaluation.

The international experience

The UK is not the only place where strategically important subjects are vulnerable; recent research for HEFCE has shown that a number of other countries had similar experiences³.

Australia

Government funding and student fees make up the bulk of funding available for Australian higher education (much like in England). A 2003 report recognised the importance of science and innovation to the country's future, and the response has included both specific initiatives and a recent review of the impact of the general funding framework.

Recent initiatives include a £97.5 million programme funding an extra 5,740 science, engineering and technology places in higher education over five years. There is also a £19 million, seven-year programme to strength innovation, maths and science teaching in schools. A collaboration and structural reform fund is helping match the national priorities with major structural change in universities.

Denmark

In Denmark, there are specific concerns about the sciences, engineering and technology, as well as some languages. Apart from some specific languages support, the Danish approach to vulnerability is through an integrated 'system' planning process which has been informed by working groups in science, mathematics, Danish and languages. These groups helped to devise strategies for subject development in both school and university.

A new national strategy for science, engineering and technology education is being devised by a national working group. However, there has so far been little additional national support for such subjects in individual university or academic departments.

Sweden

Sweden has had a particular concern with some 'minor' languages which are seen as being of strategic importance to the country. These include Baltic, Slavic and Asian languages.

The Swedish answer has been to concentrate resources on fewer universities, relocating staff where necessary, with greater specialisation in specific languages in each. There is also more collaboration and innovation through the introduction of new specialisms within subjects.

³ 'Strategically important and vulnerable subjects: an interim evaluation of HEFCE's programme of support' (HEFCE and Evidence Ltd, 2008), available on the HEFCE web-site under Publications/Research & evaluation.

The Follett Review

Sir Brian Follett has led an advisory group that has been reviewing HEFCE's programme of support for strategically important and vulnerable subjects (SIVS). Its work builds on the earlier Roberts Review, and is designed to ensure that funding is well targeted.

The 2008 Follett Report⁴ supports the core policy approach agreed by Roberts, agreeing that the dynamism of the higher education sector is founded on the competitiveness and independence of universities and colleges. It recognises that this is a great strength and should not be threatened by over-intervention.

The Follett group identifies six key responsibilities in relation to these subjects:

- reviewing HEFCE's policy framework
- looking at likely future trends
- evaluating current HEFCE-supported work
- deciding on the criteria for when a subject is no longer 'vulnerable'
- working with others, including the Sainsbury Review of science⁵
- considering the future of the advisory group.

The report accepts that Government has a role in identifying subjects of strategic importance, while HEFCE should identify whether such subjects are vulnerable and any interventions necessary to reduce their vulnerability.

The group recommends that HEFCE be selective in sustaining provision in specific places. In particular, it believes it is clear that the closure of individual departments in strategically important subjects does not mean that a subject is vulnerable.

It recommends that HEFCE focus on the availability of vulnerable subjects, rather than specific departments, and have due regard to the needs of specific regions. Vulnerability should be addressed in a manner that promotes innovation and collaboration, and secures both national and regional benefits. The group also endorsed the earlier finding of Professor Maggie Gill's advisory group that land-based studies, included in the SIVS list in 2005, should no longer be seen as 'vulnerable'.

The review finds that HEFCE is delivering on the key criteria of the Roberts Review. Funding and support is being delivered professionally and thoroughly; HEFCE is acting with key partners to sustain and build capacity and collaboration between universities; and there are plenty of funding initiatives to bring new

⁴ 'Strategically important and vulnerable subjects: final report of the 2008 advisory group' (HEFCE 2008/38) is available on the HEFCE web-site under Publications.

⁵ Lord Sainsbury's review of science and innovation policy, 'The race to the top: a review of Government's science and innovation policies', is available at www.hm-treasury.gov.uk under Independent Reviews.

students into vulnerable subjects and to develop knowledge and innovation that can be applied by business.

But the group believes that programmes to address vulnerability need to be broadened beyond those targeted at schools and young people to include the needs of employers and adults in the workforce. SIVS would benefit from a broader range of undergraduates, and can help to improve the higher-level skills of the workforce:

‘Employer-responsive higher education is not concerned solely with immediate vocational needs. It is also concerned with highly valued subjects, such as those identified as SIVS, and the broader transferable skills and attributes (such as creativity, flexibility, leadership and team working skills) associated with graduate status. In the current employment market, jobs change more frequently, so these broader subject and graduate skills are becoming more important.’ (Final Report of the 2008 Advisory Group on SIVS)

Where next for HEFCE's SIVS work?

There have already been significant improvements in the number of student applications and acceptances for many of the subjects identified as vulnerable in 2005. There are also signs that take-up of science is improving at GCSE and A-level.

But there is still much to do. Existing programmes – teacher training, master classes, taster days, teacher fellowships, internet activities – will continue to play a big part in our work.

We will continue to take an overall view of higher education provision. When the individual interests of universities and colleges do not necessarily match the national or regional interest we will continue to target our investment at emerging problems.

We plan to implement the key recommendations of the Follett Review, so we will do more with employers to encourage adults to update their skills and to ensure that companies benefit from this. Both the Leitch Review of Skills and the Sainsbury science review were clear about the importance of doing so to our continuing international competitiveness and national prosperity.

Our separate programmes to boost interest in physics, chemistry, engineering and mathematics are delivering new students. But we believe they could be even more effective as part of a single integrated programme to raise demand for STEM subjects, ensuring that the different strands complement each other. This way we will raise demand for STEM from all students, not just those who have traditionally been attracted to these disciplines.

Where it is in the national or regional interest, we will work with other funders to support regional research collaboration and generate new knowledge and discovery in SIVS.

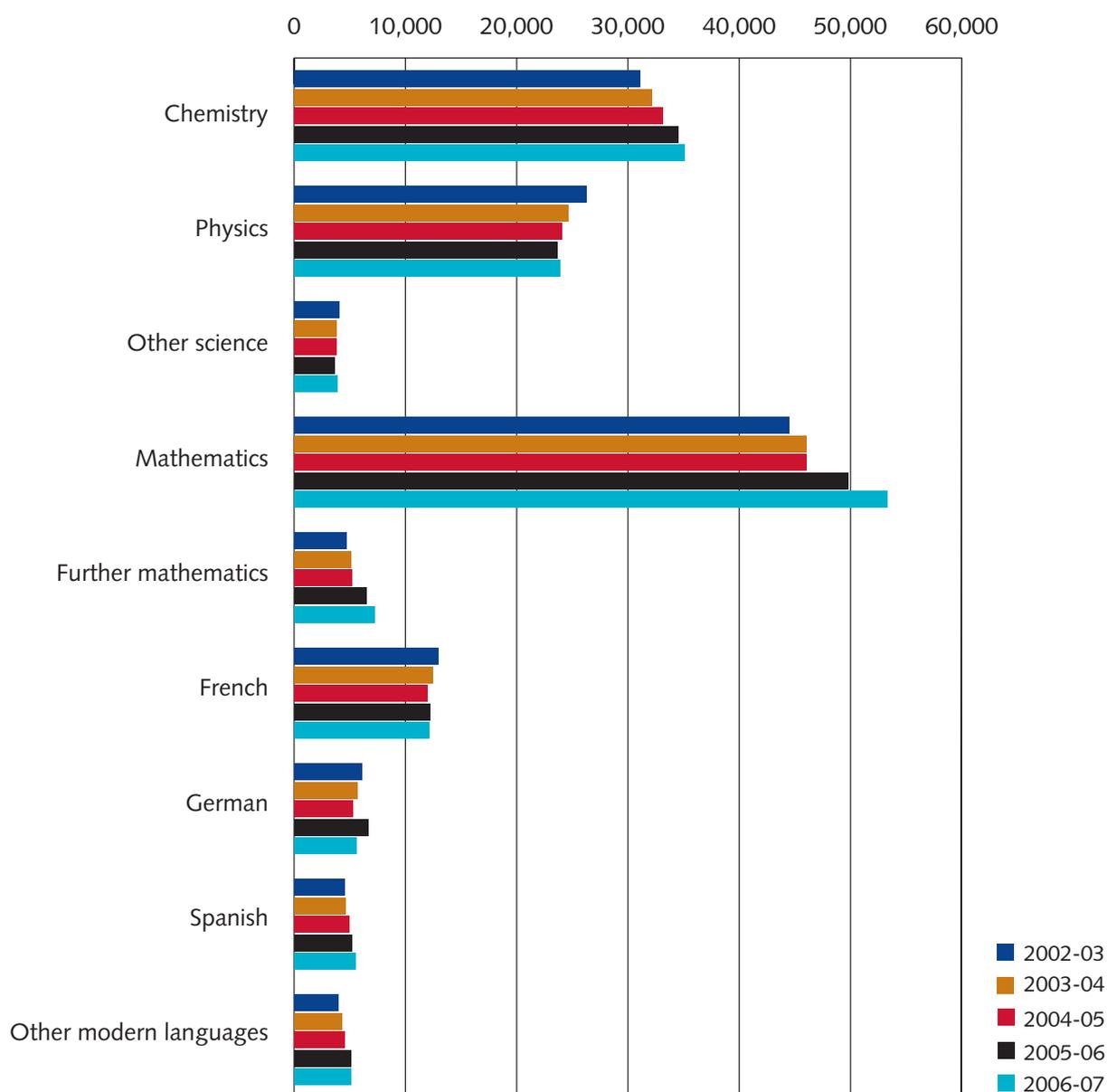
We will continue to rely on the evidence when considering whether or not a subject is vulnerable. Of course, MPs, peers and others will make their views known about particular departments that concern them. But we must continue to take a holistic view about provision across England and within regions. Equally, because we want subjects to be sustainable in their own right where possible, a discipline that can no longer be considered vulnerable will see a managed withdrawal of additional support. Vulnerability is not a permanent state.

We will convene a new advisory group to examine a wide range of indicators of graduate supply and demand, which will report annually to HEFCE and Government. It will be chaired by Peter Saraga, former managing director of Philips Research Laboratories UK. This group will next review the list of vulnerable subjects in 2011, taking into account the range of factors that may impact on SIVS – such as the planned 2009 review of tuition fees.

HEFCE's goal is always to make a subject sufficiently strong again that it can be removed from the vulnerable list. But we also recognise that this is a long-term challenge dependent on sustainable funding settlements.

Trends in demand for vulnerable subjects

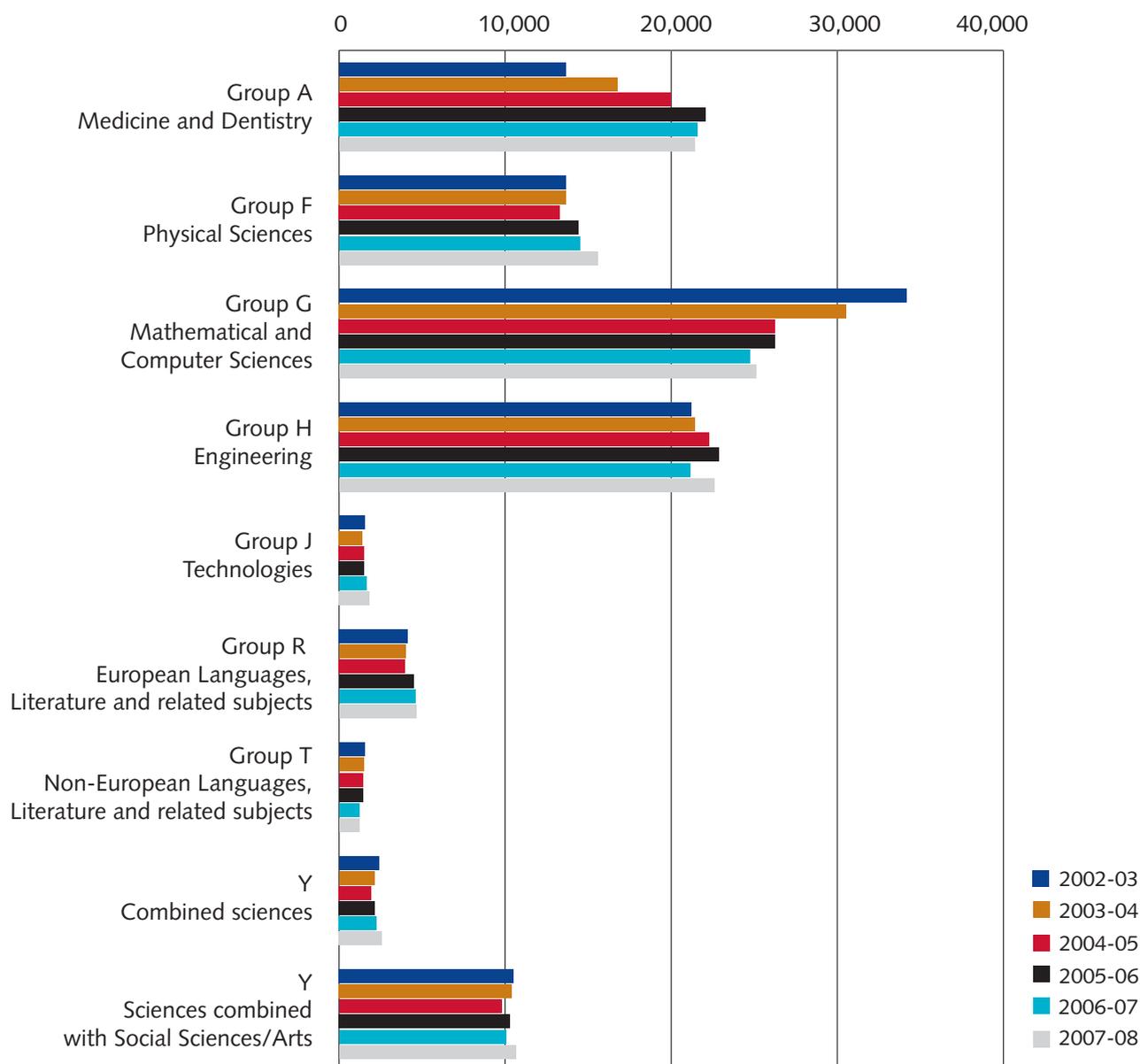
Table 1 A-level entrants 1996-2007



Note: mathematics figure includes maths and further maths

An important part of HEFCE's work has been stimulating interest and demand in the sciences and mathematics among young people. A-level demand in chemistry declined between 1998 and 2003, but has since started to grow. In physics, demand fell between 1998 and 2006, but A-level entrants rose again in 2007.

Table 2 Applications made via UCAS to higher education programmes 2002-03 to 2007-08, by Joint Academic Coding System subject group



There has been a significant decline in the number of A-level students taking modern languages, particularly French, which has fallen by 46 per cent since 1996, though both French and German numbers have started to stabilise. However, there has also been a 34 per cent increase in Spanish A-level entries since 1996 and a 50 per cent rise in entries in other languages (including Mandarin and Russian).

Table 3 Entrants to Higher Education Statistics Agency cost centres (FTEs), 2002-03 to 2006-07

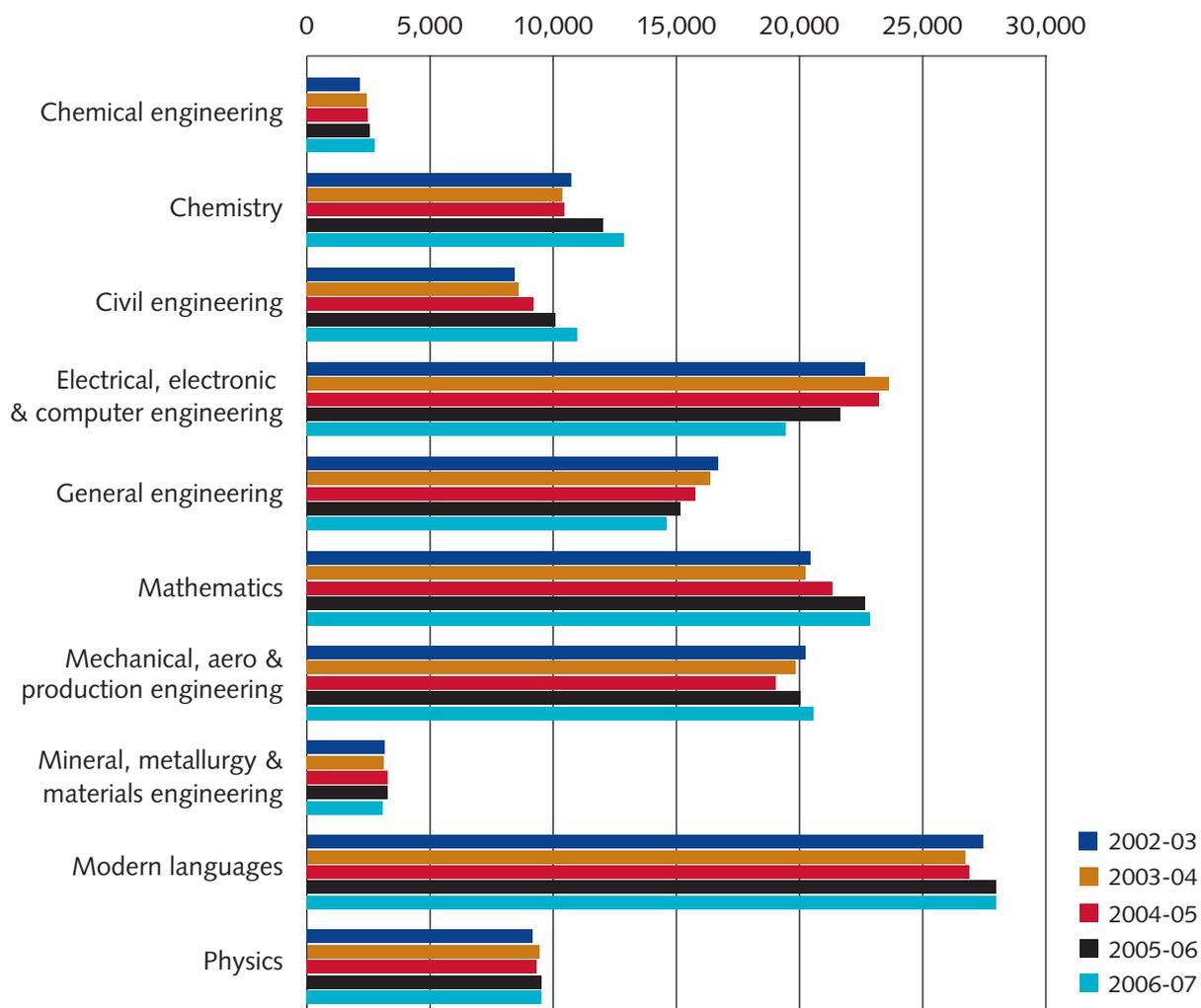


Table 3 shows that the number of chemistry students is increasing again after a low point in 2003-04, while physics students have remained broadly stable, if at a lower base. Engineering has dipped since 2000 and modern languages have improved since 2003. All subjects have recorded improvements in the 2007 UCAS data.

Table 4 Salaries for STEM graduates and selected other graduates three-and-a-half years after graduation

Subject	Mean salary
Medicine	£40,078
Architecture	£26,873
Modern foreign languages	£26,823
Engineering	£26,006
Mathematical sciences	£25,757
IT and computer software engineering	£25,631
Physics, astronomy	£24,759
Humanities and language-based studies	£23,979
Nursing	£23,749
Business and management	£23,552
Education	£22,963
Chemistry	£22,512
Psychology	£21,391
Media studies	£21,187

Table 4 shows how the salaries of graduates in vulnerable subjects compare with those in selected other subjects three-and-a-half years after graduation. The figures, from HEFCE's 'Early careers of graduates from higher education' report (HEFCE 2008/39), show that several of the subjects attract relatively high salaries, but chemistry, for example, appears to lead to an initially lower salary. There may be important implications for industry in these figures, where demand for particular graduates needs to be strengthened.

Higher Education Funding Council for England

Northavon House

Coldharbour Lane

BRISTOL

BS16 1QD

tel 0117 931 7317

fax 0117 931 7203

www.hefce.ac.uk/SIS