

Government Response to the House of Lords Select Committee on Science and Technology Report: Higher Education in Science, Technology, Engineering and Mathematics (STEM) Subjects

Introduction

1. The Government thanks the Committee for its comprehensive report into Higher Education in STEM subjects, and for its recommendations. As the report recognises, maintaining the supply of STEM graduates is vital for the UK economy, whether they decide to stay within STEM disciplines or move into other fields. Supply and demand of STEM skills, at all levels, is complex and fluctuates constantly, again which is recognised in the report. Industry, Higher Education Institutions (HEIs) students, schools and Government all have roles to play in responding to the fluctuations.

2. There are a number of Government initiatives which are aimed at improving the fit between supply and demand, such as the Key Information Set and the National Careers Service. We are also progressing with implementation of the Higher Education White Paper *Students at the Heart of the System* and the Wilson Review of Business - University Collaboration. This work by the Government and its partners addresses many of the areas on which the Committee has made recommendations. The Government view is that this work should be given time to bed in before starting new initiatives.

3. This response primarily reflects the position in England. There are similar issues in Wales and some of the recommendations and commentary in the report are of relevance and interest to Wales. This report and its findings will be considered by the Welsh Government, its agencies and stakeholders, in conjunction with their own studies and reviews into STEM issues.

Definition of STEM

Recommendation 1

We recommend that, given the importance that the Government attach to STEM skills in stimulating economic growth and the wider importance of a STEM-literate society, the Government should work together with HESA, the Research Councils, HEIs and professional bodies to formulate and apply a standard definition of STEM. The definition should derive from a statement of the competencies and skills that a STEM graduate should possess and the characteristics that a STEM course should contain, including direct STEM content.

4. The Government recognises the possibility of confusion caused by having different definitions of STEM; however, these are designed for different purposes by different organisations (not all of which are Government-funded) and there are good reasons for the existence of different definitions.

5. A definition of STEM based on subjects studied (as in the definition used by the Department for Business, Innovation and Skills (BIS) based on JACs coding) is practical, objective and consistent over time. It can be used for international comparisons and other statistical analysis. Skill contents of courses as set out and monitored in the Quality Assurance Agency for Higher Education (QAA) Subject Benchmark Statements provide valuable information on educational standards but have a qualitative nature that makes them unsuitable for such analysis.

6. There is clearly merit in ensuring that where different definitions of STEM are used by Government and HEFCE (and others) that are all based on JACS but covering slightly different sets of JACS subjects (depending on the context), the analysis always makes explicit the precise definition that has been used (and why). The Government will discuss this with HEFCE and other key stakeholders.

The school and higher education interface, and maths

Maths study post-16

Recommendation 2

The number of students taking maths post-16 is insufficient to meet the level of numeracy needed in our society, and the level at which it is taught often fails to meet the requirements for studying STEM subjects at undergraduate level. We share the view that all students should study some form of maths post-16, the particular area of maths depending on the needs of the student. For example, prospective engineering students would require mechanics as part of their post-16 maths, whereas prospective biology students would benefit from studying statistics.

We recommend that, as part of their National Curriculum review, the Government make studying maths in some form compulsory for all students post-16. We recommend also that maths to A2 level should be a requirement for students intending to study STEM subjects in HE.

7. Common to many of the jurisdictions that have high performing education systems is a clear and structured approach to setting high expectations, with strong accountability. The Government therefore wants to set the same level of expectation, especially in the core subjects of English, mathematics and science. The Government is committed to creating a National Curriculum which matches the best in the world and focuses on the essential knowledge that all children need to help them succeed and progress into higher education and employment.

8. The National Curriculum only relates to subjects studied from 5 to 16 years of age so the review is not remitted to consider post-16 study but a high standard of pre-16 education is essential for successful study post-16. International studies, such as PISA, have demonstrated the need to raise standards more generally and give every child the opportunity to acquire the rigorous qualifications they need to progress and succeed in further and higher education. The Government's expectation is that students should study for qualifications which match the world's best at Key Stage 4 (age 16) and that those who do not achieve a 'good pass' at that stage in maths or English should continue to study towards those qualifications beyond the age of 16.

9. The Government fully recognises the benefits all students will gain by continuing to study mathematics post-16. That is why, in addition to the requirement from September 2013 on students who have not achieved a Grade C, the Secretary of State for Education has made it clear that he would like to see the vast majority of students studying mathematics to the age of 18 within a decade, and which we are doing much to support.

10. The first stage in achieving this is to ensure there are suitable qualification pathways available for all students to study mathematics after the age of 16. This work is being taken forward by the Advisory Committee on Mathematics Education (ACME) which the

Department for Education commissioned to take a leading role to improve provision and take up of post-16 mathematics. ACME has conducted a Call for Evidence across the mathematics community and in July 2012 presented initial options for post 16 mathematics pathways, which aim to be appropriate for all pupils to continue to study mathematics to the age of 18.

11. ACME will present final recommendations in October 2012, which the Department for Education will consider and take decisions at that point on next steps to develop suitable qualifications.

12. Further actions the Government is taking to drive up post -16 mathematics participation and improve the quality of teaching include:

- Expanding the work of the Further Mathematics Support Programme (FMSP) delivered by Mathematics in Education and Industry (MEI) so that it can continue to provide support to schools and colleges that want to offer further mathematics A level. Research carried out by the Institute of Physics has shown further mathematics to be of benefit to physics, engineering and computer science undergraduates with regard to the mathematics content of their degree. The FMSP also offers professional development for teachers who want to teach mathematics at advanced level.
- Establishing a number of mathematics specialist Free Schools. These schools are aimed at mathematically able students who have the ability and motivation to study mathematics (or a related subject such as physics or computer science) at a top university. They will immerse students in mathematics in a rich and deep way that will allow them to compete for access to top universities and to flourish at higher education level.
- Increasing the supply of teachers qualified to teach mathematics to A level by focusing on recruiting and training the best graduates as specialist mathematics teachers including offering bursaries of up to £20,000 to attract the best mathematics specialists into teaching.

13. On the recommendation that mathematics to A2 should be a requirement for students intending to study STEM subjects in higher education it is the responsibility of individual HEIs to determine their entry requirements. The Government has invited HEIs to become more involved in the development of A levels in order to increase their confidence in the qualification.

Maths A level course content and structure

Recommendation 3

We support the Government's efforts to involve HEIs in setting the curriculum and we urge HEIs to engage fully and make every effort to smooth the transition from school to HE, particularly in maths. In order to inform this process, we urge that HEIs work together to establish where the skills gaps are and which areas of the maths syllabus are essential for STEM undergraduate study. We would expect this work to be completed by July 2014.

14. The Government is pleased about the Committee support. The Department for Education is stepping back from A level development, inviting universities and Awarding Organisations to work together on the design and development of the new qualifications, including:

- Taking account of the outcome of Ofqual's recent consultation on the conditions it should set for the regulation of new A levels, which concluded on 11 Sept 2012. Ofqual will publish a summary of responses received and details of how it intends work to move forward on this in Autumn 2012.
- Determining whether there are problems with or gaps in existing A levels, including in mathematics, which could be addressed by the development of new qualifications.
- Showing evidence to Ofqual of how they have worked together. The emphasis will be on work done with research intensive universities such as those represented by the Russell Group.
- Developing the first new A levels, in some subjects, so they are available for first teaching in September 2014.
- Ofqual led annual post-examination meetings of Awarding Organisations and universities to ensure lessons are learnt to inform future development.

Recommendation 4

We support the recommendation by the House of Commons Education Committee that there should be a single comprehensive national syllabus, accredited by Ofqual, to offset the risk that competing examination boards will tend to drive down standards. We would expect the national syllabus for maths to meet the needs of all students post-16 as per our conclusion and recommendation in paragraphs 30–32. The proposed national subject committees will be critical to the success of the new scheme. Should the scheme go ahead therefore, we would seek assurance that the HEIs would have a significant role within the committees and that the committees would be given the capacity to be fully effective in ensuring that standards, particularly at A2, are maintained.

The Education Committee recommended that the Government should pilot a national syllabus in one large entry subject as part of the forthcoming A level reforms. We would recommend that maths should be the subject of such a pilot.

15. The Government considers that matters relating to the design and development of new A levels should be left to Awarding Organisations working with universities and learned societies, with the Department for Education stepping back from this process. This is because we believe that many of the current problems with A levels result either directly or indirectly from Government prescription and attempts to manage the development of the qualification.

16. The aim is for new A levels, in some subjects, to be available for first teaching in September 2014. The roll out of subjects from 2015 to 2018 will be coordinated by Ofqual on a subject-by-subject basis. It is expected that universities will want to prioritise those subjects which are most important for university admissions and which prepare students for undergraduate study.

Qualified teachers

Recommendation 5

We recommend that the Government increase their efforts to boost specialist STEM teacher recruitment. The Government should assess which existing initiatives have yielded positive results and which have not worked, so that resources can be concentrated on those schemes that produce the best outcomes.

17. The Government agrees with the Committee that there is a continuing need to increase the number of specialist teachers of STEM subjects. We are already starting to see the results of work to address this, with significant improvements in the number and quality of trainee teachers in these subjects.

18. We accept that more needs to be done, which is why we are focusing more initial teacher training (ITT) funding on recruiting and training the best graduates as specialist teachers. In the academic year 2012/13 we are offering bursaries of up to £20,000 for mainstream postgraduate mathematics, chemistry and physics teachers: the amount is dependent upon the degree classification. In the same year we are, with the support of the Institute of Physics, launching a pilot ITT course in physics with mathematics to help more of the best graduates into physics teaching. Trainees will also be eligible for bursaries up to £20,000. We expect the course to be attractive to high quality physics and engineering graduates with a strong interest in mathematics and physics. We also want to reduce the volume of general science training in favour of specialist physics, chemistry and biology. The Teaching Agency will work with ITT providers to achieve this.

19. As well as recruiting more STEM graduates into teaching, we will help develop and maintain the subject knowledge of existing teachers. Much of the £135 million the Government has allocated to improve STEM education is focused on this. We are supporting mathematics teachers through the National Centre for Excellence in the Teaching of Mathematics (NCETM) and the Further Mathematics Support Programme. Support for science teachers is available through the network of science learning centres. The Government also funds specific support for teachers as part of its commitment to increase take up of GCSE triple science and A level physics. We are also developing a network of Teaching Schools to provide school to school support, many of which will specialise in mathematics and science.

20. The Government will review all these measures, and will reassess them according to supply and demand on regular basis, so that we can continue to focus on the activity that has the greatest impact.

Careers advice and education

Recommendation 6

We recommend that the Government should direct the new National Careers Service to ensure that appropriate advice is given to young people about the following: STEM subject choice at school and its possible consequences for future study and careers; the choices available within STEM subjects at HE level and beyond and the advantages of pursuing a STEM degree; and, relevant careers advice that highlights the jobs available to STEM graduates both within STEM and in other industries. In order to make STEM careers and subject choices more accessible to students, parents and teachers, we would encourage the Government to use new technologies by, for example, commissioning a STEM careers App.

21. We share the Committee's ambition for all young people to receive appropriate advice on the range of education and training options and the careers to which they might lead, including those in the area of STEM. The Government is restoring a focus on independent, professionally delivered careers guidance to help deliver this.

22. The National Careers Service offers an authoritative source of professional careers advice and information about careers and skills, including labour market trends. Central to

this is information about what jobs are in growing demand and where the opportunities are, and what skills and qualifications young people need and how to get them. This service will make significant use of new media and technology to help deliver its aims. The information and advice that is available through the National Careers Service website meets the Committee's recommendation. In addition STEMNET have developed a training module for careers advisors that is part of the Careers Professional Alliance offer.

23. The Government is giving schools responsibility for ensuring that young people receive appropriate advice through a new duty to secure access to independent and impartial careers guidance on the full range of post-16 education and training options. In practice, this will include advice on the implications of choices at 16 and the benefits that post-18 pathways, including higher education, can bring. The Department for Education recently published a guide for schools which provides examples of policy and good practice and signposts schools to other sources of help and advice, including STEM resources.

24. Schools are expected to work in partnership, as appropriate, with external and expert careers providers. This can include those engaged in delivering the National Careers Service or other providers, including those within an emerging commercial market. Examples include The Centre for Science Education at Sheffield Hallam University, in association with Babcock Power, and a STEM careers awareness pilot led by the University of Warwick. Schools can check the quality of providers through an easily accessible national standard which ensures that organisations provide an impartial and objective service, free from bias.

25. An Ofsted thematic review of careers guidance, reporting in summer 2013, will look at how schools are responding to their new responsibilities. This will identify good practice and establish a baseline for future improvements in the quality of provision. We will ask Ofsted to look at examples of STEM careers provision as part of their review.

Recommendation 7

Schools should ensure that support for careers education through continuing professional development (CPD) is provided to those offering careers advice to students.

26. We agree with the Committee that continuing professional development is essential for those advising young people. The Careers Profession Alliance is taking forward work to develop initial training and continuing professional development resources for careers advisers. A STEM training module has been developed to support this. It is freely available from the Institute for Employment Research (IER) at the University of Warwick: <http://www2.warwick.ac.uk/fac/soc/ier/ngrf/stem/>

27. A number of education and employer organisations have collaborated to develop "Growing Ambitions", an online resource that provides information and advice for teachers and careers professionals to help channel the aspirations of young people. The website hosts over 4,500 free teaching resources that can be downloaded and used in lessons to help students make informed choices about their future. <http://growingambitions.tes.co.uk>

Higher education maths requirements at university entry

Recommendation 8

The lack, or low level, of maths requirements for admission to HEIs, particularly for programmes in STEM subjects, acts as a disincentive for students to take maths

and high level maths at A level. We urge HEIs to introduce more demanding maths requirements at entry for STEM courses. The proposed change should be introduced within a time frame that would allow current school pupils to adapt their subject choices at school to the new requirements. The benefits of this policy would be two-fold: it would send the right signal to young people of the importance of maths for their future career choices, therefore increasing the number of pupils studying maths at A level; and maths knowledge and skills at university entry are likely to improve. We further recommend that HEIs should work together to ensure that entry requirements for the same course are consistent across different HEIs.

28. This recommendation is for HEIs to consider, although the Government agrees that they should specify what maths they consider necessary to study STEM subjects. This, together with the work we are doing to get more students to study maths post-16, can only help underline the importance of maths, influence student choice and give HEIs the confidence to set out more demanding maths requirements for admission to their courses.

29. The higher education sector keeps under review its admission policies and continually strives to improve them. Good admissions policies consider all the achievements, qualities and potential of applicants, whatever their background. It is very much in an HEI's interests to admit those who will prove to be the best students and who will reap the most benefit from their chosen course. The decisions whether to admit an applicant to a specific course, whether to accept a particular qualification or indeed the weight to attach to a qualification, are matters solely for the HEI concerned.

30. The Government is committed to increasing progression through vocational routes. Accepting a wide range of qualifications, where these demonstrate the potential of a candidate to succeed, is in the interest of universities.

31. We are committed not only to increasing the number and range of Apprenticeships on offer, but also to improving their quality. We want Apprenticeships to become the gold standard for workplace training. We are expanding the number of Apprenticeship places and are committed to extending opportunities particularly at Advanced Level and Higher Apprenticeships. Final data for the 2010/11 academic year show 457,200 starts, an increase of 63.5% over 2009/10. Increases have been across all age ranges, in all sectors and throughout the country.

32. The Government is also working closely with UCAS on their Qualifications Information Review to ensure that vocational qualifications are properly considered as part of the review so that those students who have selected a vocational route have as much information as possible about the pathways that these qualifications can lead to, including progression to higher education.

Supply and demand in STEM higher education

Lack of data on the supply and demand for STEM graduates and postgraduates

Recommendation 9

The lack of reliable data on the supply and demand for STEM graduates and postgraduates makes it very difficult to assess whether there is a shortage of STEM graduates and postgraduates, and in which sectors. More needs to be done to identify areas of shortage so that remedial action can be taken and to enable

students to make informed choices about whether the courses they are considering will equip them with the skills needed by employers.

We recommend that the Government appoint a single body (or amalgamates the efforts of existing bodies such as HESA, UCAS, UKCES, CIHE, the Higher Education Careers Services Unit (HECSU) or the new National Centre for Universities and Business) to be a repository of relevant information currently collected by different agencies on the supply and demand for STEM graduates with a view to providing comprehensive, real time data analysis and a commentary with market intelligence of where STEM shortages exist, broken down by sector. This body should provide yearly updates to HEFCE, Government and other stakeholders on skills shortages so that remedial action could be taken to protect, or grow, those STEM areas which are needed to support economic growth and where market failure means that supply does not meet demand. All these data should be accessible to all stakeholders in order, amongst other things, to inform student choice.

33. The Government fully agrees that adequate and timely data and analysis of the supply and demand for STEM graduates and postgraduates are important to help inform Government policy, the funding and Research Councils, HEIs, individuals, students and employers.

34. It is essential that Government should support effective platforms for employers to provide advice on their needs and to work in partnership with universities, but the Government recognises the dangers of seeking to use this advice too prescriptively to shape university supply. Universities supply graduates who will create the jobs of the future, as well as fill immediate vacancies. It is vital to take a long view of emerging employer needs for skills in new sectors and technologies as well as meeting current skills needs. The priority for Government, therefore, should be to create an environment in which there is good information available to students, universities and employers about the courses, skills and attributes that are valued. Such an environment would allow individual and groups of universities and businesses to develop the long-term relationships within which foresight and feedback will thrive.

35. As identified by the Committee, a range of partners are already collecting data on the supply of and demand for graduates and post-graduates, including those in STEM disciplines, and have developed strong statistical and analytical expertise. For example, HESA collect and publish a substantial amount of data on the supply of STEM graduates, including the Destination of Leavers from Higher Education (DLHE). There have also been specific studies into the supply and demand for high-level STEM subjects, for example, UKCES published an occasional paper on the Supply and Demand for STEM skills in December 2011¹.

36. The introduction of the Key Information Set, which will be available from September 2012, is a major development in helping students to make informed course choices. KIS will provide comparable information on individual undergraduate courses in the areas which students have said is most useful to them. In addition, to improve the accessibility of information, we are working with major providers of student data to make more data available where this is legally possible. As a starting point, the KIS dataset is being made publicly available in an easily accessible format.

¹ <http://www.ukces.org.uk/assets/ukces/docs/publications/briefing-paper-the-supply-of-and-demand-for-high-level-stem-skills.pdf>

37. The first recommendation of the Wilson Review of Business - University Collaboration highlighted the need for a regular cycle of business - university dialogue to provide feedback on the latest developments and experiences. In response to this, the Government has supported the establishment of the new National Centre for Universities and Business (NCUB). HEFCE will ask the new Centre to provide strategic advice periodically on industry's needs and perceptions of graduates and postgraduates (drawing on established evidence from bodies such as CBI and UKCES) across all disciplines including STEM. The aim will be to align this information with established patterns of evidence on the supply of STEM graduates, which HEFCE has produced to support its work on Strategically Important and Vulnerable Subjects (SIVS). This will enable HEFCE's SIVS Advisory Group to consider the implications for policy, funding and the public information made available to students.

Recommendation 10

We recommend that this body should also be responsible for holding, monitoring and analysing data for postgraduate education, including the employment of qualifiers from postgraduate courses on an ongoing basis—disaggregated into PhD, research Masters and taught Masters, and by subject areas.

We urge HEIs to contribute to the provision of data to this body by putting in place a robust, long-term tracking system for postgraduate provision and destination data.

38. HESA collects an extensive range of data on postgraduates, including detailed course level data allowing disaggregation by subject level and by Doctorate, research Masters and taught Masters. Existing HESA publications (such as 'Students in Higher Education Institutions' and 'Destinations of Leavers from HEIs') already provide some disaggregation of postgraduates both in terms of current student numbers and destinations of those gaining their qualifications. Additionally, HESA have informed us that they plan to review the appropriateness of the standard publication categories for postgraduates at the next suitable opportunity, to ensure that data is provided in the form that best meets users needs as part of their on-going strategy as an Official Statistics producer.

39. HEFCE is undertaking a number of streams of work in relation to postgraduate study - including work to establish what additional information is needed to improve understanding of the characteristics of the Postgraduate population, gathering evidence to monitor and review participation in postgraduate study following the changes to undergraduate funding and commissioning research into the information needs of taught postgraduate students.

40. The Government will ask the National Centre for Universities and Business (NCUB) to specifically consider the needs of postgraduates within their work on recommendation 9. The remit of NCUB covers all disciplines and the range of business–university collaboration activities. The Government is asking NCUB to provide strategic advice periodically on industry's needs and perceptions of graduates and postgraduates. The Government expects key partners with a core remit of providing key data sets to continue to deliver these analytical activities and to support NCUB in developing strategic advice, building on their strong track records of analytical expertise.

Supply and demand in undergraduate provision

Recommendation 11

We recommend that the Government commission a study to find out the first destination of STEM graduates with a first degree (by degree class) as well as postgraduates. The study should also attempt to find out the reasons that lie behind students' career choices. This information would help to explain what makes STEM graduates and postgraduates choose non-STEM jobs and allow STEM employers to take action to attract the best and brightest into STEM careers, particularly research.

41. A number of reputable bodies already provide data in this area and the Government does not see the value in commissioning further work. The annual Destinations of Leavers from Higher Education (DLHE) survey, run by the Higher Education Statistics Agency (HESA) provides information on the first destination (6 months after qualifying) of graduates at all levels, and breaks this down by subject studied. See:

http://www.hesa.ac.uk/index.php?option=com_content&task=view&id=1899&Itemid=239.

Tables 3 and 4 of Statistical First Release 178 contain information on first degree graduates by broad subject area, occupation and industry.

42. Further breakdowns are possible from the full dataset. For example, destination by degree class is a variable available within the dataset but is not published as a matter of course by HESA. Also, occupational and industrial breakdowns are possible at a more disaggregated level.

43. In addition, the Longitudinal Destinations of Leavers from Higher Education (LDLHE) survey provides a longer term picture of graduate employment and study outcomes of a sample of DLHE respondents 3.5 years after qualifying. See:

http://www.hesa.ac.uk/index.php?option=com_pubs&Itemid=286&task=show_year&pubId=1714&versionId=54&yearId=262. These statistics are also available by subject area, occupation and industry.

44. Tables attached at Annex 1 show, for the most recent 6 months and longitudinal surveys, the proportion of graduates in employment by subject (STEM versus non-STEM). The results are broken down by degree class for first degrees, and by an indication of whether those in employment are in a STEM-related job.

45. This evidence suggests that in terms of initial destinations (Table 1) STEM postgraduates are more likely to be in STEM-related jobs than STEM undergraduates; and for first degree STEM graduates, those with a higher degree classification are most likely to be in STEM jobs. The longitudinal analysis (Table 2) suggests that the proportion in STEM jobs increases over time.

46. Note that this analysis should be seen as indicative rather than definitive. There is no standard definition of what constitutes a STEM job. Tables 1 and 2 use occupational codes at the most detailed level possible. They are based on detailed Standard Occupational Classification (SOC) codes from the first 3 broad occupational groups (those often referred to as "graduate jobs") split into STEM and non-STEM according to a definition that was used in the 2009 DIUS report *The Demand for STEM Skills*. Further detail is provided in Annex 2.

47. Any such classification is necessarily somewhat arbitrary – whilst some occupations are quite clearly "STEM," for others it is less obvious. As is the case for STEM subjects

(discussed in the response to recommendation 1) there is a range of definitions that could be used for STEM jobs. HESA does not itself define 'STEM jobs' or 'STEM employers' but can provide the raw data to allow others to do that, depending on the analysis they wish to perform. Such breakdowns are available on request from the Agency's Bespoke Data Service

48. In terms of the reasons that lie behind STEM graduates' career choices, the Government's view is that the research published by BIS in 2011 (*STEM graduates in non-STEM jobs*) and referred to in paragraph 81 of the Committee's report has already addressed this issue.

49. As noted in the Committee's report, this study concluded that there is no single clear reason why some STEM graduates are not in what would be considered STEM jobs at any point in time. Career decision-making can be a progressive and complex process, with a range of motivations that will vary over time. Whilst the majority of students studying STEM subjects do want a STEM career, not all do, and the report indicated that, for those not in STEM jobs, seeking an alternative career was often a positive choice rather than because they found it difficult to get a STEM job.

50. Earlier analysis had indicated that there is an earnings premium for STEM graduates who worked in a STEM job. The 2011 report indicated that whilst starting salaries and prospective earnings were an important factor in career decisions, they were the main driver for only a minority of graduates and other factors were more important for many (e.g. interest in the job, personal reasons). Additional influences on the choice not to pursue a STEM career noted in the study included: non-STEM jobs being perceived to be more attractive; in some cases a lack of real knowledge about working in STEM jobs; and STEM skills being used and valued in non-STEM jobs.

51. It is worth noting that the annual DLHE survey and the biennial Longitudinal DLHE survey also contain some basic information on reasons that lie behind graduates' employment choices, which could be looked at by subject studied and type of job. This includes reasons for taking the current job, whether the subject of study or type of qualification obtained were important factors for the employer, and satisfaction with career to date (Long DLHE only). This information may be useful in supplementing and updating elements of the BIS research over time.

Recommendation 12

Given the significant number of students choosing to study "softer" science courses, we recommend that HEFCE and HEIs collaborate in conducting a study into the career progression of students of new STEM courses (such as some sports science and forensic science courses) to enable those undertaking these courses to decide whether they are being equipped with the skills graduates need to succeed in the STEM job market.

52. As discussed in recommendation 11, data is available through HESA (from the DHLE and Long DHLE surveys) that could be used to study the early career progression (at 6 months and 3.5 years) of students on particular courses, including new STEM courses.

53. The Government agrees with the Committee that prospective students should have better information on undergraduate courses, and be able to compare one subject with another. As part of a wider set of information being provided for students, the Key Information Sets (KIS) will provide graduate employment and salary information at course

level, subject to publication thresholds. These will be available from September 2012. The Government is working with HMRC to explore whether more detailed information on employment and salary outcomes for particular courses can be published.

The role of Government and HEFCE in ensuring supply of STEM graduates and postgraduates meets demand in terms of quantity

Recommendation 13

It appears that SIVS policy has had a positive impact on STEM and the Government should therefore continue to support the initiative. There are concerns that the HE reforms may erode STEM provision in favour of cheaper subjects. The SIVS policy is an important tool to help counteract that. The new approach to SIVS proposed by HEFCE is to be welcomed in that it will allow other subjects, such as computer science, to be offered support if they are deemed vulnerable.

We recommend that the body in charge of collecting and analysing data should, by providing evidence and analysis to HEFCE and the Government, contribute to the process of establishing which subjects should be given SIVS status.

54. We agree that comprehensive evidence and analysis should inform which subjects are given SIVS status. HEFCE's SIVS Advisory Group regularly reviews the quantitative and qualitative evidence available to understand the health of STEM disciplines and it has undertaken specific work to understand the relationship between industry demand and university supply. The Advisory Group will inform any interventions to support provision in certain disciplines through the annual cycle of evidence gathering, and as already outlined in the response to Recommendation 9, this will align with evidence gathered by the new National Centre for Universities and Business to contribute to the process of establishing which subjects are given SIVS status.

Recommendation 14

While HEFCE has a legitimate role in determining which subjects are vulnerable and should be supported as part of the SIVS programme, we recommend that the Government should decide which subjects are strategic and should therefore be given SIVS status. The Government's decision could be included in the Secretary of State's annual letter to HEFCE.

55. In the higher education White Paper and the January 2012 grant letter to HEFCE, BIS directed HEFCE to provide funding to support *'those subjects which are strategically important and vulnerable and require support to avoid undesirable reductions in the scale of provision'*. Following consultation, the HEFCE Board has agreed that to optimise the impact of SIVS support, it should continue to be provided for the STEM, Modern Foreign Languages and Quantitative Social Sciences disciplines supported within the programme to date, but it should not be restricted to a single list of subjects.

56. Instead, HEFCE will continue to gather evidence on the risks to all subjects and should consider interventions. HEFCE will publish a list of the interventions made within the SIVS programme, alongside the evidence underpinning the intervention and any subsequent evaluation, on its web-site.

57. The Secretary of State for Business, Innovation & Skills can at any time highlight to HEFCE particular subjects which he thinks to be strategically important and on which he would like HEFCE to take action to ensure they are sustained.

Demand and supply in postgraduate provision

Recommendation 15

It is clear that STEM postgraduates are valued and in demand amongst employers, and that they play a significant role in driving innovation, undertaking research and development, and providing leadership and entrepreneurship. It appears to us that, although the Government recognise the central role that STEM plays in their strategy for growth, they fail to articulate how they intend to highlight to students the benefits of postgraduate study, to reduce the decline in STEM qualifiers in some STEM subjects, or to improve our understanding about the demand for postgraduates and the value they offer to the economy. They also fail to make clear what support they will give to postgraduate STEM provision in order to realise their vision. This is, in our view, a mistake.

We recommend that the Government set up an expert group to consider the supply and demand of STEM postgraduate provision in the UK and to identify weaknesses and areas of skills shortage. The Government, as the strategic leader, should agree the terms of reference of this group with a view to formulating a strategy for STEM postgraduate education in the UK which will underpin their strategies for growth. As part of the expert group, we urge employers to spell out their needs to Government and to identify skills shortages at STEM postgraduate level.

58. The Government fully recognises the important role of postgraduate study in sustaining higher level skills for the UK and in contributing to the development of the next generation of researchers for academia and for supporting the wider economy and sustainable economic growth. As mentioned in response to recommendations 9 and 10, it is essential that Government should support effective platforms for employers to provide advice on their needs for postgraduates and to work in partnership with universities. It is equally important that Government does not seek to use this advice too prescriptively to shape university supply. As well as filling immediate vacancies, Universities train the postgraduates which will be needed to create and fill the jobs of the future.

59. The Government recognises that more work is needed and has, therefore, asked HEFCE to undertake a number of streams of work on postgraduate study. This includes gathering evidence to monitor and review participation in postgraduate study following the changes to undergraduate funding, as part of a longer term assessment of the impact of these funding changes. This project focuses on building a better understanding of the postgraduate sector and identifying any vulnerabilities that may arise as a result of the funding changes. HEFCE is also commissioning research into the information needs of taught postgraduate students, and working to establish what additional information is needed to improve understanding of the characteristics of the postgraduate population. This work is closely aligned with its development of STEM and SIVS policy, and also involves the Research Councils, employer representatives and sector representatives. HEFCE is actively seeking feedback from these key stakeholders on what they perceive as the key areas for action. This will help identify any potential mismatch between supply and demand for postgraduate provision, including in STEM disciplines.

60. Within the current stakeholder landscape, the UK has a wealth of expert employer advice from business – through the UK Commission for Employment and Skills Commissioners, Sector Skills Councils, the advisory groups of the Research Councils and HEFCE, and most recently through the board of the new National Council for Universities and Business (NCUB). We expect these advisory groups to support the work of HEFCE on postgraduate study and to develop effective working relationships with NCUB.

61. The Government recognises that postgraduate study is undertaken for a wide variety of reasons, and while the likelihood of improved future employment prospects is one of these reasons, it is not the only one; we would not wish to reduce the varied and dynamic postgraduate higher education sector to one part of a simplistic supply and demand mechanism.

62. The UK already has a wealth of expert employer advice from business on postgraduate skills needs, as for undergraduates and listed in response to Recommendation 9. Given the extent of the current work on postgraduate provision and the number of bodies' involvement in this area, we see no need for an additional expert group to consider the supply and demand of STEM postgraduate provision, in relation to Government growth strategies. As HEFCE will be consulting to ensure that a wide range of views are reflected in the findings of their work, this will have a similar effect to the creation of a separate expert group.

Quality, standards and benchmarks

Quality assurance

Recommendation 16

The Government's response to the Higher Education White Paper consultation stated that they will "not at this stage be seeking to introduce changes to primary legislation" but they would move their reform agenda forward "primarily through non-legislative means". It is not clear to us, therefore, if Parliament will be given the opportunity to scrutinise the proposed changes to quality assurance and HEFCE's power. We recommend that the Government clarify in their response to this report what opportunity Parliament will be given to scrutinise further the proposed changes to quality assurance, as set out in the Higher Education White Paper. The Government should also set out a timetable for when the changes will take place and outline the form they will take.

63. The 2011 Higher Education White Paper *Students at the Heart of the System* made two proposals relating to the quality assurance of higher education provision. It recommended taking a risk-based approach to quality assurance and asked HEFCE to consult on the criteria and triggers that could underpin such a system. HEFCE's consultation ran until 31 July. Dependent on an analysis of the responses to the consultation, HEFCE will invite the QAA to consult further on the detailed operation of such a system, aiming for a risk-based approach to quality assurance to be introduced from 2013/14.

64. Secondly, one element of the proposed single regulatory framework described in the Technical Consultation following the White Paper was that higher education providers designated for student support should subscribe to the QAA. The Government's response to the White Paper announced that we will not at this stage be introducing changes to primary legislation, but will move our reform agenda forward primarily through non-legislative means.

65. The Government response also announced that we will arrange for alternative providers, and those FE colleges that do not receive HEFCE funding, to be treated alongside other providers of higher education in being covered by limits on their numbers of publicly funded students. The Government will consult later this year on the process for applying these changes. This is not a legislative change but the House of Commons

The role of the QAA and the role of HEIs in driving up quality

Recommendation 17

Given the skills gaps that exist in key areas across the graduate pool, the QAA has a long way to go in ensuring that industry is sufficiently involved in setting standards and benchmarks. We recommend that the QAA should do more to recruit employers, SMEs in particular, to engage with HEIs and take part in setting QAA standards and benchmark statements. The QAA should be in a position to report back on how it plans take this recommendation forward by July 2013

66. It is important to acknowledge the respective roles of the QAA, institutions and other stakeholders in the setting of standards and the assurance of quality and standards. It is autonomous institutions that set, maintain and assure standards, and the QAA, among other bodies, supports these processes through the quality assurance system, including external review. Institutions engage employers and their representative organisations at course, subject and institutional levels. Professional, Statutory and Regulatory Bodies accredit programmes/awards which incorporate the respective professional standards that apply. The QAA provides public assurance about these processes through external review. It also seeks employer input to the revision and development of subject benchmark statements, many of which do not stop at describing threshold standards but seek to expand on disciplinary excellence. The Government supports the principle that employers should have a voice in quality assurance arrangements. It is for the QAA to consider whether it wishes to review its engagement with employers and their representative organisations.

Recommendation 18

We further recommend that the remit of the QAA should be reviewed with a view to introducing a system to assure quality, standards and benchmarks in HEIs that is fit for purpose. This should include the development (and achievement) of objectives for the inclusion of employers in the setting of standards and benchmarks, and a yearly list of thematic problem areas, accompanied by an action plan, where consistent skills gaps occur.

67. As your report acknowledges, it is HEFCE which has statutory responsibility for assessing the quality of education in the universities and colleges that it funds, and HEFCE contracts with the QAA to assist in carrying out this responsibility. This contract includes a general priority for QAA to consult and advise HEFCE about developments in the quality assurance of work-based learning and employer engagement in higher education, and to provide a commentary on such developments in its annual report. The UK Quality Code for Higher Education includes a range of references to higher education providers' engagement and collaboration with employers, including the provision of work placements and work-based learning. QAA Review reports include both commendations and recommendations about these matters, the preparation of students for employment and the employability of graduates, and institutions' action plans following reviews will address any recommendations.

Funding to develop the employability skills of postgraduates

Recommendation 19

We recommend that the Research Councils monitor the impact of embedding Roberts' Money into the standard funding mechanisms.

68. RCUK announced in 2011 that it would review the impact of the revised funding arrangements (for the Roberts Money) and their operation during 2013. In preparation for that, a baseline report on the impact of the Roberts investments has been produced and published <http://www.rcuk.ac.uk/documents/researchcareers/2011analysis.pdf>.

Quality of teaching

Recommendation 20

We considered whether the Government or HEFCE should play a greater role in improving the quality of teaching in HEIs. We concluded that they should not on the grounds that HEIs were primarily responsible for the quality of teaching. However, we look to HEFCE to take steps to ensure that the REF does not act as a disincentive to HEIs to promote quality in teaching.

We recommend that the number of lecturers that have received teacher training during the course of their careers should be set out in the Key Information Set (KIS), along with information about the training received, and we urge HEIs to offer an accredited course on teaching which all academic staff would be required to complete.

69. The higher education White Paper *Students at the Heart of the System* placed great emphasis on the importance of teaching excellence and called for a renewed focus on high-quality teaching in universities so that it has the same prestige as research. The Government has asked HEFCE, working with the higher education sector, to advise on the publication by HEIs of anonymised information for prospective and existing students about the teaching qualifications, fellowships and expertise of their teaching staff at all levels. HEFCE is working with the National Union of Students and higher education sector organisations to explore how this information might be used and presented in a way this is meaningful to students, and where it would be most appropriate to make that data available.

70. The Key Information Set (KIS) is designed to provide prospective students with key statistics about each undergraduate course, in a comparable format. The items included in the KIS are those which students themselves rated as important in detailed research carried out for HEFCE. KIS data, however, are only a subset of the information available on the new, revamped Unistats website, and Unistats is only part of the information which students will use when short-listing their applications. Unistats will link to the relevant university web pages, which will provide a range of additional, detailed information.

71. As autonomous institutions, HEIs are responsible for determining the training and qualifications of their own teaching staff. They are, however, supported by national agencies and initiatives. For example, the HE Academy operates a recognition scheme which contributes towards the professionalisation of teaching by conferring the status of Associate Fellow, Fellow, Senior Fellow or Principal Fellow. The HE Academy accredits initial and continuing professional development programmes, confirming that provision is aligned with the UK Professional Standards Framework for teaching and supporting learning in higher education. The annual National Teaching Fellowship Scheme makes

awards to recognise excellence in individuals, intended for their professional development in teaching and learning or aspects of pedagogy.

Recommendation 21

Student assessment of staff performance and teaching quality should be applied across all HEIs. We recommend that HEIs should have a robust system in place for assessing the quality of teaching including an anonymised and standardised assessment by students. The anonymised results of such assessments should be published in the KIS at a departmental level. QAA should be charged with reviewing whether HEIs have appropriate systems in place to achieve this and that the assessment of teaching quality is fit for purpose.

72. The higher education White Paper stated that the Government considers the publication and effective use of student surveys and other evaluations to be at the heart of a continuous process of improving teaching quality. It set out an expectation that all universities would publish summary reports of their student evaluation surveys on their websites by 2013/14. HEFCE is working with the NUS, QAA, HE Academy and other sector bodies to investigate good practice and then to make recommendations about what should be included in module summaries that would be placed in the public domain. As stated above in response to recommendation 20, the items included in the KIS are those which students themselves rated as important, in detailed research carried out for HEFCE. The KIS is only one part of the range of information that HEIs make available, and is not always the most appropriate source for all of the information provided for students.

The role of students in driving up quality of provision

Recommendation 22

The KIS is a good starting point to help to ensure that students have the information they need to make an informed decision about their courses. However, the value of some of the information offered is not clear or sufficient to enable a student to make an informed choice about the quality of provision delivered by their course. The Government should ensure that the information provided in the KIS gives students the information they need to make an informed choice about the quality of their course. We recommend that the KIS should contain more detailed information on destination data beyond six months, as well as career paths; other measures of quality (including teaching); and more information on outcomes (that is, the skills that students will acquire during their studies). A similar KIS should also be available to postgraduate students with equivalent information on postgraduate provision.

73. As stated above in response to Recommendation 20, the Key Information Set is designed to provide prospective students with key statistics about each undergraduate course, in a comparable format. Following its introduction in September 2012, HEFCE will undertake a full review of the KIS and the new Unistats website, beginning in the 2013/14 academic year. This will be the first opportunity to consider additions/changes to the items in the KIS (and Unistats as a whole) and HEFCE will want to focus primarily on feedback from students on what they found most useful and what is missing.

74. HEFCE is currently conducting two studies to inform provision for postgraduate students i) to understand the needs of prospective postgraduate students and ii) to determine the feasibility of running a survey of taught postgraduate students to help inform future applicants. As with the undergraduate initiatives, this will be focused on what information students say they would find useful. We need to be aware of the smaller

cohorts and complexities when comparing postgraduate taught provision between institutions and that the research may find that it is not feasible to run such a survey. The studies are due to report in December 2012 and will not apply to postgraduate research students.

Increasing industry involvement to ensure that graduates leave HEIs with the right employability skills

Recommendation 23

Given the limitations on the role that the QAA plays in sign-posting high quality provision, we believe that accreditation of courses by professional bodies would be a sensible way forward. Accreditation may not be possible for courses in areas where there are no professional bodies. However, for those that have professional bodies and do not already have an accreditation scheme, we would urge them to consider setting up such a scheme.

In our view, it would be overly burdensome for employers to kite-mark individually hundreds of courses in the UK. A better approach would be to involve industry through the accrediting bodies and for companies to state whether they supported the accreditation. Given the tension between accreditation and kite-marking, we invite the Government to explain the aim of kite-marking and what it is expected to achieve beyond that which accreditation by professional bodies already provides.

75. It is for professional bodies and their members to decide whether they wish to establish an accreditation scheme for their profession. However, the Government agrees that professional accreditation is an effective way of demonstrating that a course has met specific standards, as laid down by a professional or statutory body. The Government would like to see professional accreditation across a greater number of STEM sectors.

76. A successful QAA Institutional Review provides assurance that an institution has met UK expectations for threshold academic standards, and has at least met - or may even be commended for - the quality and the enhancement of students' learning opportunities and, from 2012/13, the quality of its public information. The QAA recently launched a new quality mark to assure students and the public of the quality and standards of UK higher education, comprising of the QAA logo and the date the institution was last reviewed.

77. Neither professional accreditation nor kite-marking are new concepts, but have been around for years under various approaches. The Department for Business Innovation and Skills treats them as different entities. Higher education courses that lead to a professional or vocational qualification, or exemption from a professional examination, are usually accredited by a professional, statutory or regulatory body (PSRB). For professions which are regulated by statute, only graduates of accredited courses will be able to practise in the professional area concerned.

78. Kite-marking is a mechanism that will allow employers (through Sector Skills Councils) to tell young people, employers, or educators which undergraduate courses best prepare students for employment in particular sectors or occupations. The focus is less on academic content, and more on employability skills. Three Sector Skills Councils (SEMTA, COGENT and e-skills UK) are currently developing an employability framework to assist in this process. This framework is likely to cover areas such as employer involvement in course design and delivery, availability of work placements, and employability skills. In order to avoid duplication, where information is already available in

these categories through the professional accreditation process, SSCs will work with professional bodies to reflect this in the framework.

Recommendation 24

We recommend that professional bodies, such as the Institute of Physics or the Institute of Mechanical Engineers, should make further efforts to provide accreditation of different STEM subject areas to ensure that students have confidence in the quality of their chosen course and that they will achieve high quality outcomes in terms of skills and knowledge. For those courses where there is less of a clear link with a profession, we recommend that the Science Council consider whether it would be possible to develop a broader system of accreditation to ensure that graduates have the core skill set required of a STEM graduate. We further recommend that the Government should provide support for such activities in the early stages of development until they are fully established.

79. It is for professional bodies such as the Institute of Physics and the Institute of Mechanical Engineers to decide which STEM subject areas they professionally accredit. It is anticipated that kite-marking should provide more information on which STEM courses employers value in terms of employability skills.

Placements and internships for undergraduates and postgraduates

Recommendation 25

We recommend that the Government, employers and HEIs find a way to incentivise employers, particularly SMEs, to offer more work placements, and encourage more students to take them up.

80. The Government will continue to promote to HEIs and employers the benefits of working together to provide students and new graduates with work experience opportunities. HEIs are themselves increasingly recognising the value of practical work experience for their students, both in preparing them for the workplace and in demonstrating to employers the benefits of graduate skills and knowledge. Many employers also recognise the need to get involved with HEIs to help prepare young people for work and the Government is doing all it can to encourage the process.

81. The Department for Business, Innovation and Skills (BIS) recently announced, in its response to the Wilson review, that funding is to be provided to the Council for Industry and Higher Education (CIHE) to develop a National Centre for Universities and Business. This will gather evidence; bring together university and business leaders, and support engagement between stakeholders. It will also enable HEIs and employers to share good practice in encouraging the provision and take-up of work experience placements.

82. BIS continues to fund and to promote the Graduate Talent Pool which aims to make it easy for employers, especially SMEs, to offer graduate internships. Over 47,000 vacancies have appeared on the website over the last three years. BIS introduced a quality assurance process for all new vacancy postings on the site from October 2011. As a result of the QA process over 90% of live vacancies on Graduate Talent Pool are now for paid internships.

Recommendation 26

In order to assist HEIs in engaging with employers and in securing placements for their undergraduate and postgraduate students, we further recommend that a central database should be established to post opportunities for placements for

undergraduates and postgraduates. We recommend that the Government extend the remit of the Graduate Talent Pool service to include undergraduates and postgraduate placement opportunities.

83. There are already several not for profit and private sector agencies which offer placements on a regional and national basis. In addition, HEI Careers and Employability centres, individual schools within the institutions and individual courses have such databases at a local level to meet their work experience needs. However, such organisations are often unwilling to share the contacts and opportunities which have been developed over many years, so a comprehensive national database would be difficult to establish.

84. Expanding the Graduate Talent Pool as recommended is not a practical solution. The site exists to aid unemployed graduates to gain practical work experience with employers and to adopt this proposal would dilute the existing brand and have knock on effects on the existing 'internship' market. The costs, bureaucracy and administration associated with developing a national database of the sort described are in any case prohibitive in the current financial climate.

85. We believe that it is best left to individual institutions to make such collaborative arrangements with other organisations where they have identified a need.

The role of the research councils and HEFCE in the quality assurance of postgraduate provision

Recommendation 27

Based on the evidence we have received, we find it difficult to judge the processes used for the assessment of quality in postgraduate provision. Our impression is, however, that the quality of postgraduate provision is measured in an inconsistent way across funding bodies and warrants further scrutiny.

We recommend that the expert group established to look at postgraduate provision should examine how the quality of postgraduate teaching provision is assessed to ensure quality and consistency of approach across funding bodies, and consider how measures of quality of postgraduate education that go beyond research excellence might be developed. In particular, we would urge the Research Councils and other postgraduate funding bodies to expand the quality principles that underpin the DTC model to other types of postgraduate funding provision.

86. Although HEFCE and the Research Councils have different approaches to supporting postgraduate research students, these are complementary and consistent with the dual support approach to research funding. HEFCE provides a basic level of funding for all UK/EU students based in units with the highest research quality, thereby ensuring that publically funded students are located in the most excellent research environments. Research Councils and other funders, such as charities and industry, provide further funding to cover costs such as fees, maintenance and travel for a smaller group of students; this funding will generally be focused on achieving the strategic priorities of the sponsor, which in the case of a Research Council will commonly include the interests of industry and other employers of postgraduate researchers.

87. This is undertaken in the context of a QAA code of practice for research degrees, which sets expectations for the environment and support institutions will provide². The key

² <http://www.qaa.ac.uk/Publications/InformationAndGuidance/Pages/quality-code-B11.aspx>

expectation identified in the Code is that: 'Research degrees are awarded in a research environment that provides secure academic standards for doing research and learning about research approaches, methods, procedures and protocols. This environment offers students quality of opportunities and the support they need to achieve successful academic, personal and professional outcomes from their research degrees.' HEFCE requires that institutions receiving its funding for postgraduate research students meet the code and this is a matter addressed in the judgements reached by independent reviewers when institutions are subject to Institutional Audit.

88. The Research Councils have statements covering their quality expectations for postgraduate research training which apply across their postgraduate portfolio (the STFC is currently developing a new statement). These may take the form of Statements of Expectation, Success Criteria, or Portfolio Agreements.

89. The Government does not propose commissioning an independent expert group to advise the Research Councils or HEFCE further on these points.

Doctoral provision models

Recommendation 28

We recommend that the Government encourage the Research Councils to preserve a variety of PhD delivery models to ensure that the UK's current breadth of expertise in science is maintained and that new areas of science are able to grow. We also recommend that the expert group set up to consider the supply and demand for STEM postgraduate provision considers whether the current provision of funding for doctoral study across funding bodies is sufficient to cover the breadth of excellent research across the UK.

90. The Government and RCUK welcome the acknowledgement in the Report that postgraduate provision through the Doctoral Training Centres approaches have improved the standards of PhD training for students. RCUK intend to preserve the range of modes of delivery of postgraduate research training needed to address research capacity, the requirements of specific disciplines, and the needs of users and beneficiaries of research. For example Doctoral Training Grants, CASE and Industrial CASE, and capacity building calls in particular subject areas. Fundamental to these are the quality PhD training provision and allocation according to evidence about the excellence of the research environment or in response to peer-reviewed proposals including a business case.

91. Research Council Strategic Planning is informed by wide engagement with the research community, policy and industrial end-users of our science, and the wider public; and by reviews and evaluations of scientific areas and funding mechanisms e.g. the Biotechnology and Biological Sciences Research Council Quota doctoral training grant competition evaluation in March 2011; the Natural Environment Research Council led Review of Skills Needs in the Environment Sector; and the Economic and Social Research Council (ESRC) quantitative methods initiative (co-funded with HEFCE and in collaboration with other interested stakeholders) and the ESRC advanced training consultation.

92. The detailed allocation of resources across the breadth of strategic priorities for science and research funding, including provision for doctoral study and to maintain a substantial flow of new researchers, is determined by Research Councils and HEFCE. This is already informed by extensive interaction with the research community and other stakeholders. The Research Councils and HEFCE will continue to monitor provision. The

Government does not propose commissioning an independent expert group to advise the Research Councils or HEFCE further on this.

Policy reforms

Higher education reforms

Recommendation 29

The recent adjustments to the core and margin system may allay some of the concerns about the effect of the HE reforms on STEM provision. However, we invite the Government to explain in their reply to this report on what evidence this change of policy was based and the timescale in which it was implemented.

We recommend that HEFCE publish the quantitative evidence on which they base their funding model for public subsidies of STEM subjects with a view to reassuring stakeholders that these subsidies in conjunction with students' fees are sufficient to cover the cost of STEM provision.

It is too early to assess the impact of HE reforms on the sector. We recommend that the Government have particular regard to the effect of the reforms on STEM provision. We support the role that the Government have given to HEFCE to monitor unintended consequences and to intervene, as appropriate, to protect strategic or vulnerable provision that will not be supported by the market. However, we have some concern that HEFCE may not have sufficient funds to intervene should it be necessary and recommend that the Government ensures that HEFCE will have the necessary resources should these circumstances arise.

93. The higher education White Paper *Students at the Heart of the system* made clear that our reforms to free up student numbers in 2012/13 represented a starting point and that we wanted to ensure the share of places liberated from number controls altogether rose year on year. The Government's proposals for 2013/14 broaden the group free from number controls to those students with ABB+ (or equivalent). It is currently estimated that would free up around 120,000 places from controls on recruitment. That estimate will be revised by HEFCE nearer the time of the 2013/14 allocations. This means very many more students will have the opportunity to go to their first choice institution if that university wishes to take them.

94. In addition, we will run a further core and margin exercise in 2013/14, making a further 5,000 places available. We have responded to representations that setting the upper fee limit for bidding at £7,500 net of waivers created a "cliff edge" for institutions. We have also taken steps to support established higher education/further education partnerships, again in response to representations from the sector.

95. HEFCE's approach to implementing core and margin in 2013/14 is set out at:

<http://www.hefce.ac.uk/media/hefce/content/pubs/2012/201217/2012-17%20Main%20report.pdf>

96. To protect maths, physics, chemistry and engineering for 2012-13 HEFCE will exclude numbers associated with these subjects from the calculation to create the margin, on condition that institutions maintain at least their entrant levels to SIVS courses. The same approach will be taken for 2013-14.

97. HEFCE analysis of HESA data that showed the number of entrants each year that fall under different grade thresholds fed into the decision making process for the formation of the core and margin policy and the tariff policy.

98. Data that has been published relating to these decisions:

- HEFCE published analysis of the number of entrants in the AAB category in Annex D of their June 2011 publication '*Teaching funding and student number controls*' <http://www.hefce.ac.uk/pubs/year/2011/201120/>
- The higher education White Paper Impact Assessment included evidence on the impact of removing student number controls on high-achieving students: <http://c561635.r35.cf2.rackcdn.com/11-1050-students-at-heart-of-system-impact-assessment.pdf>. This analysis has been updated with new data by HEFCE more recently.

99. Following its teaching funding consultation, the HEFCE Board has agreed that funding for high cost subjects such as STEM should be provided as a fee supplement for groups of subjects, based on the evidence available from institutions using their Transparent Approach to Costing for Teaching (TRAC(T)) data returns on the cost of teaching these subjects.

100. In the context of the SIVS work, it has also agreed to provide a further supplement to the highest cost STEM subjects. The document, published on HEFCE's web site here <http://www.hefce.ac.uk/data/year/2012/highcostsubjectsanalysisusingtractdatadetailedcommentary/>, provides the evidence, derived from three years of TRAC(T) returns, that has been used to calculate a weighted average cost for each subject, and thereby determine its grouping and the level of the fee supplement to be provided, given the funding available to HEFCE.

101. HEFCE intends to provide advice on the impact of the higher education reforms on STEM subjects within its overall advice to Government on the impact of the reforms, which the Government requested in HEFCE's January 2012 grant letter.

102. The higher education sector will continue to receive substantial direct public funding via HEFCE, both for teaching and research. Putting together HEFCE teaching, research and capital grants and the BIS upfront costs of graduate contributions, total BIS investment in HEIs in England could rise from around £9.7bn in 2010-11 to around £10.3bn in 2014-15, while broadly maintaining existing levels of participation.

Immigration reforms

We are concerned that changes to the immigration rules may reduce the number of overseas students coming to study to the UK and, therefore, the income that HEIs derive from these students to support other activities. This may result in a general reduction of provision of STEM courses that rely on this income to make them viable.

103. It is absolutely right that we have introduced reforms to eradicate abuse of the student visa route. Only legitimate international students should be able to study at reputable institutions. The Government's reforms of the student visa system aimed to

ensure adequate minimum standards, on the part of both education providers and students, so as to increase public confidence that international students were coming to study and not for other reasons. As the report states, bogus colleges and students give the UK's HE system a bad name and it is right that we have taken action to remove them.

104. The Government has consistently said that we welcome and indeed encourage legitimate international students to come to study in the UK. International students provide an important revenue stream for UK HEIs, the further education sector, and the country as a whole. They made up ~12% of the UK HE student population in 2010/11 but contributed 35% of total HE course fees. Students from outside the EU are not in direct competition for places with British students.

105. International students improve the research capacity of UK HEIs, add to their intellectual and cultural vitality, and provide an opportunity to establish long-lasting and productive relationships across international borders and academic disciplines. There are very important long-term benefits to the UK of future leaders and policymakers of other countries studying in the UK.

106. We acknowledge the Committee's concern that an unintended consequence of the reforms to the student route could be a fall in legitimate student numbers and that some disciplines - particularly STEM postgraduate taught courses – may rely on international students for viability. The Government will be closely monitoring the impact of the reforms and look for any unintended consequences, as is good policy making practice. As the Committee notes (paragraph 225), institutions must ensure that their business models are truly sustainable and not become over-dependent on international students.

Recommendation 30

The Government have replaced the PSW route with more selective arrangements under Tier 2, notably making a job offer paying more than £20,000 a year a requirement for a visa. The UK Border Agency (UKBA) told us that the limit was set following guidance from the Migration Advisory Committee. It is not, however, clear if this guidance was intended specifically for graduates. We would ask the Migration Advisory Committee to reconsider its advice. We would further ask the Committee to monitor the impact of the changes on both the number of graduates who stay on to work in the UK and on the number who decide not to study here, due to the real or perceived barriers created by the closure of the PSW route.

107. The Government is committed to enabling the best international graduates to access the UK labour market, which is why we allow them to switch from Tier 4 to Tier 2 of the Points-Based System at the end of their studies, provided they have found suitable employment. Those entering Tier 2 in this way do not count against the annual Tier 2 limit of 20,700 places, and as noted above, we have waived the requirement on employers to test whether a suitable British worker is available.

108. The minimum £20,000 threshold was introduced for Tier 2 - not specifically with graduate recruitment in mind - by the previous Government following a recommendation in a 2009 Migration Advisory Committee (MAC) review into Tier 2 of the Points-Based System

109. The Government has asked the MAC to review the Tier 2 Codes of Practice which set minimum appropriate pay rates by occupation above the general minimum level of £20k. As part of that review the MAC will consider the position of new entrants to an occupation

and has called for evidence from employers on appropriate rates. This will enable the Committee to consider any issues relating to the employment of new graduates. We expect the MAC to report this autumn.

110. The Government will monitor the numbers switching from Tier 4 to Tier 2 on completion of their studies. We do not believe it will be possible to easily identify those students who have decided not to study in the UK because of the reforms to PSW. There are many reasons that international students will consider when choosing where to study. However, as well as closely monitoring the impact of our immigration reforms, the Government will be looking closely at the experience of other countries and the measures they are taking to attract international students.

Recommendation 31

HE is a global market and the UK has to compete with other countries that are positioning themselves to attract international students. The perception that the UK does not welcome students may be having a detrimental effect on recruitment from some countries such as India. The UK must be seen to welcome the brightest and the best and the Government must increase their efforts to dispel perceptions that the UK does not welcome students. We recommend that the Government develop a strategy to send out a more positive message through the UKBA website, immigration agencies and the British Council.

111. The Government has consistently said it welcomes genuine students to the UK. UKBA, British Council, FCO and sectoral organisations such as UUK work together – for example in outreach activities such as student fairs overseas or attendance at conferences in the UK - to ensure prospective overseas students understand the visa rules during and after study, and the visa application process. The raising of standards in the private FE and HE sector as a result of the visa reforms will give prospective students greater confidence in the UK's offer, and more information on colleges is now available – for example the results of Tier 4 college inspections by the Independent Schools Inspectorate and the QAA are available on their websites.

112. The British Council are important partners in the promotion of UK education overseas. The 'Education UK' programme aims to inspire international students to choose a UK education and to protect the UK's reputation as a welcoming, responsible host. Education UK is also working on producing an interactive online tool to guide prospective international students through the process of planning and applying to study in the UK, and this will include information on the visa requirements.

113. At the time of writing, the decision has been taken by UKBA to revoke the Highly Trusted Sponsor status of London Metropolitan University. The Government's first priority is to ensure that the University's legitimate students are given the help and advice they need to continue their studies. We recognise that this may have an impact on perceptions of the UK education overseas. We will be working across Government and with other stakeholders to identify any lessons to be learned from this occurrence.

Recommendation 32

The lack of reliable statistical data is a concern because the Government are not able to identify problems with their visa system soon enough to put in place a mitigation plan. Data from HESA is more accurate but by the time it is published it is 18 months out of date. This problem is particularly acute for the HEIs that we spoke

to who are reporting that the HE reforms are having a significant impact upon their recruitment of overseas students already.

We recommend that the Government working with HEIs, as a matter of urgency, make further efforts to co-ordinate data collection and ensure that data is shared between UKBA and HEIs. In addition, the Government should collect real-time data on the effects of changes to immigration policies in HEIs with a view to setting up a mitigation plan, if necessary, and to enable policy decisions to be based on the latest information. This should be achieved by September 2014.

114. The Home Office publishes quarterly data on visa statistics which includes student visas. This covers the whole of Tier 4 but does not give information specifically on university enrolments. Home Office is currently considering whether UKBA internal data collected from Certificates of Acceptance of Studies issued by Tier 4 sponsors can be broken down by type of institution in a way which, if published quarterly with the visa statistics, would give useful additional information about the UK student visa population. However UKBA systems are not set up to collect information specifically about courses or institutions, and moreover the grant of a visa does not guarantee that the holder will actually enter the UK and start a course of study. In the longer term it is hoped that more granular data can be leveraged from attendance reports returned by universities and colleges.

115. HESA collect data specifically about enrolments at universities and publish information showing the number of non-EEA students at UK HEIs, by level of course, subject matter and by institution. It is a statutory requirement for HESA to collect a single, annual, academic year-end, comprehensive student record. An in-year collection was ceased by the funding bodies and Government in 2002 to reduce burdens. The possibility of re-instating an in-year collection or developing other ways to access more real time higher education data is a key element of the current Information Landscape initiative. Developing systems to make better use of the attendance reports already provided by institutions could provide more information without an increase in burdens.

116. To fill the current gap in data on entrants from non-EEA countries, HEFCE will be piloting the collection of additional data within its regular in year (1 December) count of students at an institution level. This will cover publically funded higher education providers in 2012-13 and would establish how many students who pay overseas fees are starting courses each year according to the institution they are registered with and level of study.

117. The Government shares the Committee's desire for prompt access to information about non-EEA students attending HEIs. However it will take some time for the full impact of the visa reforms to become apparent as they were implemented over a period of a year, may affect different sectors differently and behaviours may change as the reforms take root.

Recommendation 33

Given the significant contribution that overseas students make to the economy and that the majority leave the UK following their studies and do not therefore contribute significantly to net migration, we recommend, therefore, that the Government make a distinction in the immigration statistics between HE students and other immigrants and uses only the latter category to calculate net migration for policy-making purposes.

118. Our education system boasts many of the leading academic institutions in the world. Every year, countries around the world send their best and brightest here to learn. The Government has always been very clear that it recognises the important contribution that international students make to the UK economy, and there is no visa limit on the number of overseas students who are eligible to attend institutions in the UK. However, we have put systems in place to tackle immigration abuse. For example, by requiring all institutions to become 'Highly Trusted Sponsors' and meeting the standards demanded by Educational Oversight before they can accept students from abroad, we are allowing no opportunity for bogus colleges to operate in the UK.

119. Transparency in the immigration statistics is vital. The independent Office for National Statistics (ONS) is responsible for producing net migration statistics, based on the International Passenger Survey (IPS), which it runs. The ONS is planning improvements in its methodology so that in future it will be possible to better identify students in the emigration flows. In due course this will allow the contribution of students to overall net migration to be identified more accurately in the ONS statistics and contribute to policy development.

120. The Government is committed to reducing net migration. Eliminating the abuse of the student migration route which has occurred in recent years is a key part of that programme. It is also committed to the sustainable growth of a sector in which the UK excels. This is why it has been identified as key sector in the Government's Industrial Strategy. To support this the Government welcomes all genuine students, coming to attend any university or college that meet our requirements.

Table 1: Graduates entering employment 6 months after leaving by STEM/non-STEM, level of study and degree classification 2010/11

Qualification obtained	Classification (if applicable)	STEM graduates		Non-STEM graduates	
		% employed at 6 months	Of which % in STEM jobs	% employed at 6 months	Of which % in STEM jobs
Doctorate degrees		89%	56%	85%	8%
Other Postgraduate		79%	50%	81%	14%
First degree	First class honours	67%	48%	68%	13%
	Upper second class honours	71%	34%	71%	8%
	Lower second class honours	72%	24%	72%	5%
	Third class honours / Pass	70%	21%	72%	5%
	Unclassified	91%	75%	70%	11%
	Classification not applicable	85%	..	n/a	n/a
	Total	73%	40%	71%	8%

Source: Higher Education Statistics Agency (HESA) Destinations of Leavers from Higher Education (DLHE) survey

Employed includes those who are employed and in further study

Definition of STEM graduates is based on JACS subject codes A-K

Definition of STEM jobs is based on Standard-Occupational Classification (SOC) codes 2000 definitions (following the classification used in the 2009 DIUS report '*The Demand for STEM Skills*')

'**Other Postgraduate**' excludes PGCE. **Unclassified** degrees include certain degree subjects (eg. Medicine, Dentistry, Vet) where the degree is awarded a pass/fail i.e. is not classified.. Denotes cases where the base population is 52 or less

Table 2: Graduates in employment 3.5 years after leaving by STEM/non-STEM, level of study and degree classification 2006/07 leavers

Qualification obtained	Classification (if applicable)	STEM graduates		Non-STEM graduates	
		% employed at 3.5 years	Of which % in STEM jobs	% employed at 3.5 years	Of which % in STEM jobs
Doctorate		92%	51%	88%	8%
Other postgraduate		86%	49%	87%	13%
First Degree	First class honours	74%	54%	83%	14%
	Upper second class honours	83%	42%	87%	10%
	Lower second class honours	86%	36%	86%	8%
	Third class honours/Pass	85%	35%	85%	8%
	Unclassified	92%	62%	84%	10%
	Total	84%	44%	86%	10%

Source: Higher Education Statistics Agency (HESA) Longitudinal Destinations of Leavers from Higher Education (long DLHE) survey

Employed includes those who are employed and in further study

Definition of STEM graduates is based on JACS subject codes A-K

Definition of STEM jobs is based on Standard-Occupational Classification (SOC) codes 2000 definitions

(following the classification used in the 2009 DIUS report *'The Demand for STEM Skills'*)

'Other Postgraduate' excludes PGCE

Annex 2: Occupational categories (SOC) used to define STEM jobs

		SOC 2000
STEM Finance	Financial Institution Managers	1151
	Chartered and Certified Accountants	2421
	Management Accountants	2422
	Management Consultants, Actuaries, economists & Statisticians	2423
	Finance and Investment Analysts	3534
	Taxation Experts	3535
	Financial and Accounting Technicians	3537
STEM Management	Managers in Construction	1122
	IT	1136
	R&D	1137
	Pharmacy	1182
	Health Care Practice	1183
	Farming	1211
	Natural Environment	1212
	Health Services	1181
STEM Scientific	Chemists	2111
	Biologists	2112
	Physicists/Mathematicians	2113
	Civil Engineers	2121
	Mechanical Engineers	2122
	Electrical Engineers	2123
	Electronics Engineers	2124
	Chemical Engineers	2125
	Design and Development Engineers	2126
	Production and Process Engineers	2127
	Planning and Quality Control Engineers	2128
	Engineering Professionals n.e.c	2129
	IT Professionals	2131
	Software Professionals	2132
	Medical Occupations	2211
	Other Medical Occupations	2212
	Pharmacist	2213
	Opticians	2214
	Dentists	2215
	Veterinarians	2216
Scientific Researchers	2321	
Statisticians	2423	
Architects	2431	
STEM Technicians	Laboratory Technicians	3111
	Electrical & Electronic Technicians	3112
	Engineering Technicians	3113
	Build & Civil Engineering Technicians	3114
	Quality Assurance Technicians	3115
	Science & Engineering Technicians	3119
	Archt technols & Town plans Technicians	3121
	Medical Radiographer	3214
	Chiropodists	3215
	Pharmaceutical Dispensers	3216

	Medical & Dental Technicians	3218
	Physiotherapists	3221
	Occupational Therapists	3222
	Speech & Language Therapists	3223
	Therapists n.e.c.	3229

These are based on SOC2000 definitions provided by the DIUS 2009 Report: *The Demand for STEM Skills*. In this report it broke down the STEM occupations into four groups: STEM Finance; STEM Management (note that all occupations within these occupations are management occupations ie. R&D are managers within R&D); STEM Science; and STEM Technicians.

It only considers the first 3 broad (1 digit) SOC groups, which are those often used as a proxy for “graduate jobs”, ie.

1. Managers and Senior Officials
2. Professional Occupations
3. Associate Professional and Technical Occupations

(There will also be ‘STEM jobs’ within the other broad SOC groups, though generally these will be at a lower skill level).

See Table 19 (page 56) of the report:

http://www.dius.gov.uk/assets/biscore/corporate/migratedd/publications/d/demand_for_stem_skills.pdf