HOUSE OF LORDS SCIENCE AND TECHNOLOGY SUB-COMMITTEE 1
Inquiry into higher education in STEM subjects
Medical Schools Council response

16 December 2011

The Medical Schools Council represents the interests and ambitions of UK medical schools as they relate to the generation of national health, wealth and knowledge through biomedical research and the profession of medicine. The membership of the Medical Schools Council is made up of the Heads or Deans of the 31 UK undergraduate medical schools, plus the postgraduate London School of Hygiene and Tropical Medicine.

We welcome the opportunity to submit evidence to the House of Lords Science and Technology Sub-Committee inquiry into higher education in STEM subjects. The Medical Schools Council response focuses on undergraduate medical education and research. We understand that other organisations, such as the Academy of Medical Sciences (AMS) will address aspects of postgraduate biomedical training and that Universities UK will address wider STEM issues for higher education institutions. We have liaised with both organisations in preparing our response.

Our key concerns are that:

- The definition of STEM should be expanded to include an extra 'M' for medicine
- There is a risk that HE reforms will damage efforts to widen participation in STEM subjects and dissuade STEM graduates from going on to study medicine
- Research must inform teaching of STEM subjects
- Interdisciplinary focus needs to be a core part of STEM teaching and research to help develop the teams needed to deliver complex modern healthcare

General questions

What is the definition of a STEM subject, and a STEM job?

We believe that STEM as it is currently defined refers to Science, Technology, Engineering and Mathematics. We would argue that an extra 'M' should be added to include medicine, which is clearly a distinct discipline that is strategically important and vulnerable.

Our view of a STEM job is that it is one for which a qualification in a STEM subject to at least A-Level standard is required.

Do we understand demand for STEM graduates and how this could be used to influence supply?

No comment.

16-18 supply

Are schools and colleges supplying the right numbers of STEM students and do they have the right skills to study STEM first degrees?

It is our understanding that the evidence suggests that schools and colleges are not supplying sufficient numbers of STEM students. However, demand for medicine remains high with sufficient numbers of STEM students applying to and entering medical schools. We anticipate little change, and certainly no decrease in numbers of applicants for medicine.

Members have expressed concerns about the basic numeracy skills of some entrants. We would note that there is a significant jump from GCSE to A Level STEM subjects, which is a challenge for some students.

What have been the effects of earlier government initiatives on the uptake of STEM subjects at advanced level?

There has been no discernable effect for medicine.

What effect, if any, will the English Baccalaureate have on the study of STEM subjects in higher education?

We believe there will be no discernable effect for medicine; members of Medical Schools Council (MSC) accept applications at the appropriate level.

Graduate supply

Is the current number of STEM students and graduates (from the UK, EU and overseas) sufficient to meet the needs of industry, the research base, and other sectors not directly connected with STEM?

Yes, for medicine. Closer links with industry are required to ensure that expectations of both students and industry are met.

Is the quality of STEM graduates emerging from higher education sufficiently high, and if not, why not?

Though the quality of STEM graduates is usually sufficiently high, some members of MSC have concerns regarding relatively basic numeracy skills in some of the STEM graduate entrants to medical schools.

Do STEM graduates have the right skills for their next career move, be it research, industry or more broadly within the economy?

Medicine is unusual in that there is a direct route into the next natural career step, with the outcomes, as defined in the GMC's *Tomorrow's Doctors (*2009), of the curriculum being designed to prepare medical students to practise.

For other subjects, not all graduates will end up in a career that reflects their first degree. Whilst clearly this will often be down to personal choice, the evidence also indicates that this is often occurring because employers do not feel that students have sufficient 'understanding of work'. For example, CBI (2011) state that 43% of employers have difficulty recruiting STEM staff, reporting a lack of applications and a shortage of STEM graduates as significant factors. Employers in the report suggested that applicants lack employability skills (36%) and workplace experience (37%)[1]. Additionally, analysis by BIS (2011) suggested that many STEM graduates are attracted to other areas, often due to a lack of knowledge of what STEM work and careers entail and also due to perception of other areas being of more interest[2]. This would suggest that shortages in STEM graduates, employability and perceptions of STEM careers are issues that need to be addressed.

What effect will higher education reforms have on the quality of teaching, the quality of degrees and the supply of STEM courses in higher education institutions?

The increase in student fees in England is designed to replace the reductions in HEFCE-T grant. Therefore, provided the 'cross-subsidy' between subjects that has previously existed is retained (i.e. expensive subjects receive a greater proportion of fees than less expensive subjects) there should be no impact on the quality of teaching. However, if this cross-subsidy is not maintained there is a risk to the quality of teaching in STEM subjects.

Within medicine in particular, unless there is some continuing (and, preferably, increasing) subsidy to student fees (e.g. through the NHS Bursary scheme), there is a major risk that the increased fees will result in a worsening of access to medicine by traditionally under-represented groups. We would note that the position for the NHS Bursary scheme post 2012/13 has not been confirmed. Establishing the support packages that will be available as soon as possible is important for maintaining supply.

Members of MSC value their graduate entrants, who participate in both specific graduate entry medical degrees and also in standard entry medical degrees. The prospect of entering a medical programme after completing a first STEM degree should not be discouraged through fears of debt.

In other STEM subjects - for some students the increased potential debt may encourage them to apply for subjects for which there is employer-demand – so may improve recruitment. However for some students this will be seen as too distant so may not have an impact. It is therefore difficult to predict the impact on student demand for these subjects. It is important that employers clearly state expectations of STEM graduates to ensure students are informed about their courses will prepare them for. The impact of higher education reforms must be monitored closely.

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[1] CBI (2011) *Building for growth: business priorities for education and skills*, p.7
http://www.cbi.org.uk/media/1051530/cbi__edi_education___skills_survey_2011.pdf

[2] BIS (2011) *STEM Graduates in non STEM jobs*, p. 9
http://www.bis.gov.uk/assets/biscore/further-education-skills/docs/s/11-771-stem-graduates-in-non-stem-jobs.pdf

What effect does "research assessment" have upon the ability to develop new and cross-disciplinary STEM degrees?

We see the development of interdisciplinary teams in healthcare as crucial, and developing new cross-disciplinary STEM degrees is therefore important. Research assessment has the potential to be positive – particularly with the focus on innovation and impact.

What is the relationship between teaching and research? Is it necessary for all universities to teach undergraduates and post graduates and conduct research? What other delivery model should be considered?

The relationship between teaching and research is critical and symbiotic. Teaching must be research based to avoid the risk of teaching becoming 'out of date' (particularly important for STEM subjects with fast moving knowledge bases) and to ensure that students develop skills and attitudes associated with research, namely asking appropriate questions, developing hypotheses, designing ways to test hypotheses, critical analysis, synthesising information from a range of sources and communicating information effectively. The long-term effects of disaggregating teaching and research are very uncertain and could undermine the supply of researchers. As outlined in the AMS report, *Redressing the balance*[3], ensuring a balance of incentives for both teaching and research is essential.

All STEM courses should have a significant research-based component.

Models for delivery could include increased partnership between higher education institutions to allow them to draw on different strengths. An additional model to learn from could be Academic Health Science Systems. These NHS-university partnerships provide research opportunities and the potential for NHS research and practice to increasingly inform teaching in medical schools. This model could be investigated for other disciplines and sectors.

Does the UK have a sufficient geographical spread of higher education institutions offering STEM courses?

Yes, for medicine.

What is being done and what ought to be done to increase the diversity of STEM graduates in terms of gender, ethnic origin and socio-economic background?

UK medical schools are committed to increasing the diversity of their student population. In their admissions processes medical schools seek to select the students who will make the best doctors, and many schools provide extra support in the application process for applicants from low participation groups. In addition, a number employ adjusted entry criteria so that those from less advantaged backgrounds who perform better than their peers have the opportunity to study medicine with lower grades than those usually required. About a third of UK medical schools run a 'Foundation' or 'Pre-Clinical' year for those wishing to study medicine but who might not be eligible for the standard five year

[3] AMS (2011) *Redressing the balance: the status and valuation of teaching in academic careers* http://www.acmedsci.ac.uk/p48prid59.html

programmes. These programmes may be run as a stand-alone course or as part of an extended medical degree programme (more information can be found here: http://www.medschools.ac.uk/Students/Courses/Pages/FoundationPre-clinicalyear.aspx). Additionally, work with schools and using medical students from under-represented backgrounds as ambassadors are important parts of outreach work. Some of the wide range of activities being conducted by medical schools to widen participation in medicine can be found here, in a guide produced jointly with the BMA: http://www.medschools.ac.uk/Publications/Pages/Widening-Access-Guide.aspx

We see the priorities for increasing the diversity of STEM graduates as:

- Helping parents and students from under-represented groups understand that STEM subjects are a realistic option
- Ensuring students are not discouraged from taking STEM subjects at early stages
- Increasing teaching in STEM subjects in school education
- Targeting specific fees support to STEM subjects.

Post-graduate supply

Is the current training of PhD students sensitive to the range of careers they subsequently undertake?

We believe that there is variation in this between higher education institutions.

Are we currently supporting the right number of PhD studentships to maintain the research base and are they of sufficient quality?

It is our view that current numbers are insufficient to allow the UK to remain globally competitive. If numbers were to increase supervisors and HEIs would need to recognise that a significant proportion of their graduates would not continue with an academic career and would need to be supported to develop work related skills. We are concerned that changes to the immigration system may act as a disincentive for attracting world class researchers.

What impact have Doctoral Training Centres had on the quality and number of PhD students? Are there alternative delivery models?

We believe that they have improved the quality of PhD students and increased the number in the subject areas targeted. The impact on overall numbers of PhD students is unclear.

Should state funding be used to promote Masters degrees and is the balance right between the number of Masters degree students and PhD students?

In STEM subjects, Masters degrees provide training in research methods and this is especially the case in Public Health. Some medical schools are converting their intercalated BSc or BMedSci degree to a MSc or MRes. Protecting intercalated degrees in medicine by funding is vital to preserve the supply of future clinical academics.

What impact will higher education reforms have on the willingness of graduates to pursue a research career?

We believe that the level of debt will discourage significant numbers of students from pursuing a research career. For medicine this would be hugely detrimental to our nation's health and wealth. Close links between industry and the NHS will be crucial for exposing students to research and potential career paths.

Industry

What incentives should industry offer to STEM graduates in order to attract them?

Movement between industry, academia, health services and charities should be improved. Ensuring parity with NHS pay scales is an important mechanism for achieving this.

What steps are industry and universities taking together to ensure that demand for STEM graduates matches supply in terms of numbers, skills and quality of graduates?

No comment.

International comparisons

What lessons can be learnt from the provision of higher education in STEM subjects in other countries? Which countries provide the most helpful examples of best practice?

No comment.