# The challenge to support a legacy for STEM subjects

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The summer of 2012 has seen the largest sporting events ever held within the United Kingdom. Britain has, and is being, captivated by gold medal success and sporting achievement during the London 2012 Olympic and Paralympic Games. The phenomenal success of British athletes has generated intense discussion and debate within government, the media and all areas of society, and has raised many important questions. How can the Games form a legacy for Britain? How do we attract and support the next generation of athletes? How do we continue to invest to realise sporting success?

You might wonder how this relates to Science, Technology, Engineering and Mathematics (STEM), but such an analogy is timely. This week, at the University of Birmingham, almost 300 participants gathered for the concluding conference of the **National HE STEM Programme (http://www.hestem.ac.uk/)** . The Programme formed a three–year initiative that commenced in 2009, and aimed to enhance the way universities recruit students and deliver programmes of study within the Science, Technology, Engineering and Mathematics (STEM) disciplines.

A range of initiatives, established during the previous government, have collectively contributed to the enormous growth witnessed within the STEM disciplines today. Comparing the period 2005/06 to 2009/10, overall full–time student enrolments within higher education increased by over 11%, but growth in the STEM disciplines has, on the whole, greatly exceeded this. Mathematics increased by over 26%, physical sciences by 16%, and engineering and technology by 18%. Growth hasn't only been restricted to higher education; participation in STEM A–levels continues to increase year on year, and the STEM disciplines feature significantly in the top 10 most popular A–levels.

Much as is the case with Team GB, we can celebrate success within STEM, but the approach now must be pro–active and sustained. While STEM remains strategically important, some of the STEM disciplines are perhaps no longer vulnerable, but this does not mean we should withdraw additional support. Richard Noble, leader of the exciting **Bloodhound initiative (http://www.bloodhoundssc.com/)** , which also has a major educational component, first introduced me to what he calls the 'Apollo effect': a year on year increase in Physics PhD conferments within the United States during the Apollo Moon Programme, but a sharp and sudden decline once it concluded. If we are not careful, there is a risk this may happen within STEM; ongoing investment is therefore essential if we are to avoid a return to the decline witnessed previously, particularly in a changed economic and educational landscape.

The coalition government has continued to invest, quite rightly, in existing successful STEM initiatives, such as STEMNET and Science and Engineering Week. Yet a clearer, and more integrated vision and strategy for the future of STEM education and skills within the UK is now required, particularly with many organisations and initiatives coming to the end of their activities. Changes to university funding have forced universities to reflect upon, and indeed better articulate their efforts to increase and widen participation, but there is a need to think carefully about the broader approach. The skills required within business and industry for growth will not be realised by more new graduates of traditional age alone; there is a need to focus upon those already in the workplace. Additionally, we need to think carefully following the recent review of STEM subjects within higher education by the House of Lords which highlighted particular concerns and matters requiring attention by universities; this is especially true as we enter an era where a greater proportion of the costs of higher education are placed upon the individual student.

There are positive opportunities on the horizon. The announcement by Michael Gove to reform A–levels is much needed. For too long, and through no fault of the students themselves or their teachers, many students have been arriving to study the STEM disciplines at university inadequately prepared. This is a great chance for the education and employer sectors to work together. But for the reforms to stand any chance of yielding success, revisions must be undertaken in an inclusive manner with participation not restricted only to certain sectors or universities.

So where is the National HE STEM Programme in relation to these issues, and what have we learned? Since the Programme commenced its activities in 2009 there has been great change: a new government and a somewhat less clear STEM agenda, economic and financial concerns across the UK as a whole, the introduction of increased student fees and, as a consequence, an increased emphasis upon widening access. Despite these challenges, the statistics of the Programme are impressive: almost 90 higher education institutions actively participating in the Programme through a framework that allowed them to address their individual needs and priorities, and over 300 projects established, many of which are collaborative in nature. The programme was particularly tasked with ensuring sustainability of its activities, and as such adopted an approach which has yielded visible results.

The National HE STEM Programme has been one of a national series of activities that have contributed to success in STEM. There are many worthy of mention, but in particular the National STEM Centre and its associated Science Learning Centres have been critical in enhancing the teaching of STEM within schools and co–ordinating a vast range of STEM initiatives to great effect. A particular success is how the Programme has worked with existing STEM initiatives and organisations to bring added value. Working with STEMNET has seen a range of innovative activities established: universities 'adopting' STEMNET STEM clubs to enable delivery of sustained activities with local schools, and STEM students designing and delivering outreach activities to aid their own skills development are just two examples.

Perhaps however, the most significant success of the Programme is that the conference that took place in Birmingham this week does not mark the conclusion of its activities. While it marks the conclusion of the public funding that initiated it, its work and legacy will continue within those organisations who have participated. The Programme has sought to bring together the higher education STEM community, much in the way the National STEM Centre has with the school and college sectors. It is therefore a great success that the University of Birmingham will be continuing to work with the National STEM Centre to the benefit of the higher education sector through its recently established STEM Education Centre. This is just the start of a series of collaborations that the University will lead that will further ensure a legacy for the work of the Programme.

This week, there has been a real buzz around Birmingham as all aspects of teaching, learning, recruitment, progression and skills are discussed and debated. Ideas have been shared and collaborations developed; STEM has received the attention it rightly deserves. It may not quite be on the scale of the Olympics, but it is equally important. The question now is how can government not only sustain the success and maintain momentum, but also ensure we remain a world leader for our STEM skills? Much like the debate as our sportsmen and women prepare for Rio 2016.

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*From the 4–6 September 2012, the National HE STEM Programme, a 21 million, 3–year initiative established by the Higher Education Funding Councils for England and Wales, held a major conference at the University of Birmingham, showcasing and disseminating the learning from its work within England and Wales.*



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