Science and Mathematics Education for the 21st Century

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Background

- Set up in April 2009 as one of 5 Expert Groups to develop the UK's 'Science and Society' strategy
- Reporting jointly to DCSF and BIS
- Membership:
  - Mark Walport (Chair)
  - Prof. Julia Goodfellow
  - Frank McLoughlin
  - Martin Post
  - Joan Sjøvoll
  - Sir Martin Taylor
  - David Waboso
- Focus on 14-19 science and mathematics learning and stretch and challenge for able learners

Consultation

- Written consultation - 129 responses from school, FE, HE, employer and other stakeholders
- Series of one-to-one meetings with key stakeholders
- Focus groups with teachers/lecturers, technicians and young people
- School and college visits
- Workshops to ‘road-test’ recommendations with over eighty stakeholders

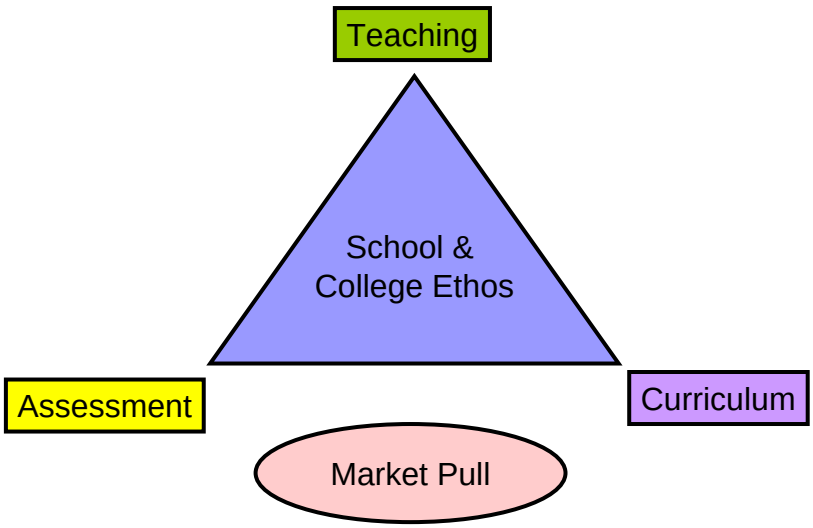
Where are we now?

- Sustained central investment and commitment to science and mathematics education
- Strongly rising participation and achievement in most science and mathematics subjects at GCSE and A level
- Overall applications to study science and engineering in HE are growing
- Broadly positive performance in science and maths education compared to other similar countries

But…

- The need for well educated and highly qualified workforce can only grow
- Persistent concerns that even highly qualified young people are not prepared effectively for the demands of STEM degrees
- Quality of teaching affected by shortage of specialist teachers
- Governance and accountability systems do not sufficiently incentivise schools to focus on CPD

Priority areas



Teaching

- Strong links between subject expertise and teaching quality:
  - Subject specialist teaching: recruit, train & retain specialist teachers & technicians & take full advantage of the current recruitment 'spike'
- DCSF data suggests >40% of science & maths teachers who qualified in 1999 were not practising 5 years later:
  - Retention: make better use of existing pay flexibilities to reward and retain specialist teachers
- CPD undervalued and unrewarded – provide better levers:
  - Career progression: Link professional development to career progression
  - Accountability: embed accountability for CPD in the school governance framework

Curriculum

- Partnership, ownership accountability: Ensure that the higher education sector and other stakeholders are engaged in the design and development of qualifications and assessment
- Expert groups: Standing STEM expert groups should be established to advise on the development of 5-19 curricula and GCSE and A level criteria
- Mathematics: Mathematics content should be boosted substantially within 14-19 science education
- Depth: Scope for in-depth learning increased
- Extended Project: Provide encouragement and guidance to schools and colleges on use

Assessment

- Reducing exam burden: Restricting modular examinations to a single period in Summer term
- Better exams and examiners: Examination style rebalanced towards assessment of students' in-depth problem solving and deeper understanding of subject concepts
- Accuracy: Greater emphasis on the accurate use of the English language in answers to examination questions
- Regulation: Awarding bodies regulated to prevent competition that results in lower standards
- Governance: The practice of awarding bodies endorsing textbooks should be stopped

Market Pull

- Information, advice and guidance: provide high quality, consistent information, advice and guidance about STEM subjects and careers
- Classroom delivery: subject specialist teachers should receive training and resources to integrate careers guidance into subject lessons
- Links with HE: maximise the contribution which HE and employers can make to science engineering and mathematics education in schools and colleges

School and college ethos

- Governance: support schools' and colleges' commitment to science and mathematics by:
  - strengthening the capacity of governing bodies to provide support and challenge
  - developing a new, robust framework for school reporting and public accountability for all important aspects of performance, including uptake of CPD, local collaboration and the availability of guidance and enrichment
- Subject leadership: develop national and local level subject leadership and expertise in science and mathematics underpinned by collaborative networks to share this expertise

Conclusion: overarching themes

- Empower teachers and the wider science and mathematics communities to use their professional judgement
- Secure subject content and standards
- Embed governance and accountability for performance at all levels in the system
- Better pull mechanisms