

# Nurturing tomorrow's scientists

Science at Key Stage 4

department for  
children, schools and families



# Science is the future

**Science is the future. Economically, it will enable us to compete on the global stage. Environmentally, it will help us to combat climate change. At a social level it will help the UK to improve the quality of life for millions.**

Yet, if current trends continue, we face a serious shortage of scientifically literate and trained professionals in the future. Everyone – the Government, schools, teachers, parents and industry – needs to join forces to inspire today's young people to understand the importance of science and the vast choice of career possibilities it offers.

To rise to this challenge, the Government is setting stretching targets for the numbers of 16 to 18 year olds taking 'A' Levels in science and mathematics.

This leaflet explains how the Government is developing its education and training programme. It details resources for schools, the many Continuing Professional Development (CPD) opportunities for teachers and new cross-disciplinary initiatives.

**“Science is the bedrock of the UK’s economy. Without a secure supply of scientists, technologists, engineers and mathematicians, our position as a competitive global force could be quickly undermined”**

Jim Knight MP, the Minister of State for Schools and Learners.  
*Triple Science News* – Autumn 2007

Please consider the options, discuss them with your colleagues and take the necessary steps to comply with the new statutory entitlement.

### Read on to find out more about...

- The new Key Stage 4 statutory entitlement.
- The new science indicator.
- Inspiring young people exciting new initiatives such as STEMNET.
- Supporting teachers – high quality CPD opportunities and facilities to bring professionals together such as the Science Learning Centres.
- Working together – materials, resources and how schools can work together.
- Taking the next steps – how to find out more.

### The Government's targets – at a glance

1. To achieve year-on-year increases in the numbers of young people taking A levels in physics and chemistry, resulting in 35,000 entries to A level physics and 37,000 entries to A level chemistry by 2014. At the same time the Government wishes to maintain the same numbers taking biology.
2. To continually improve the number of pupils getting at least level 6 at the end of Key Stage 3.
3. To continually improve the number of pupils achieving A\*- B and A\*- C grades in two science GCSEs.
4. To step up recruitment, retraining and retention of physics and chemistry specialist teachers so that 25 per cent of science teachers have a physics specialism and 31 per cent of science teachers have a chemistry specialism by 2014.

# The new statutory entitlement

**Getting more young people to engage in science is part of a wide programme of educational reforms for 14-19 year olds. Those with ability, interest and potential in science are encouraged to learn for longer and gain qualifications that will help them to progress into higher education, further education or employment.**

This is why there is a new statutory entitlement for pupils, irrespective of their ability, at Key Stage 4 at all schools and colleges.

Maintained schools must offer:

- all pupils the opportunity to study core science GCSE and additional science GCSE; or
- all three science subjects – also called ‘triple science’ – which are physics, chemistry and biology.
- Schools can offer other science qualifications if they wish, in addition to the above.

From September 2008 there will be a new non-statutory entitlement to triple science teaching at GCSE for those who reach at least level 6 in science at Key Stage 3.

### **The Learning and Skills Network (LSN) Triple Science Community**

has developed a generic programme to help all schools plan, develop and implement triple science; it will provide more intensive support to a small number of schools in need of additional assistance. The Triple Science Community website allows practitioners to share ideas and resources, and to access knowledge and information.

### **School Achievement and Attainment tables**

The new science indicator will be based on the attainment of pupils at the end of Key Stage 4 and will only count pupils who have achieved grade A\*- C in:

- GCSE core science and GCSE additional science;
- GCSE core science and GCSE additional applied science;
- GCSE applied science double award; or
- GCSE science and GCSE environmental and land-based science.

It will also count pupils who have taken:

- GCSEs in physics, chemistry and biology (all three subjects must be taken), provided they have attained grades A\*- C in at least two subjects out of three;
- AS levels early, provided that they have taken physics, chemistry and biology (all three subjects must be taken) and gained A\*- C GCSE or grades A - E AS level in at least two subjects out of three;
- Level 2 BTEC First Certificates and First Diplomas in applied science at pass, merit and distinction; or
- OCR Level 2 National Awards and National Certificates in science at pass, merit and distinction.

# From 2011 – A new Science Diploma

**The Government recently announced that a new Science Diploma will be available from 2011. Introduced across all three levels – Foundation, Intermediate and Advanced – the new Diploma will be built from the best of existing GCSE and A level qualifications combined with new specially designed content, developed by a group of leading academics and employers.**

A Diploma Development Partnership (DDP) will be established to specify the content for the new Diploma, consulting with a wide range of partners and stakeholders. Schools and colleges will be represented on the Diploma Development Partnership and will be consulted fully in the development process.





# Inspiring young people

**To help young people achieve their potential the very best science teaching must be delivered at every stage.**

Initiatives to get pupils excited about science include:

- **Science and Engineering Clubs** – Many schools run after schools clubs focusing on science and engineering. To support this work the DCSF currently funds 250 clubs across the country. This number is expected to double in 2008.
- New careers **advice** for young people studying science.
- A **multi-media communications campaign** aimed at young people, parents and teachers to encourage more students to continue studying science post-16.
- National Science and Engineering Week – held every year in March.
- Competitions such as the BA Crest Awards and Young Engineer of the Year Award.

## **STEMNET (the Science, Technology, Engineering and Mathematics Network) – links with the business world**

STEMNET works with a range of partners, to ensure that all young people, regardless of their background, recognise the contribution of Science, Technology, Engineering and Maths (STEM) to their lives and that more of them to pursue STEM qualifications and careers. Through its national and regional networks of partner organisations acting as local SETPOINTS, STEMNET co-ordinates a variety of programmes which aim to enhance and enrich the STEM curriculum in schools and colleges, including the Science and Engineering Ambassadors (SEAs) programme.

The SEAs programme enables people with STEM skills to act as role-models and support teachers in schools and colleges, bringing real-life experiences to young people and exciting them about the role STEM plays in our lives. As role-models they actively inspire young people to consider the vast range of rewarding careers to which STEM qualifications can lead.

**“The SEAs programme gave my school links with some brilliant companies. Once you see the final product of science and engineering it changes your opinion completely. At first I was interested. Now I’m addicted.”**

Peter Jones, A-Level student

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# Supporting teachers

**Science teachers play a key role in engaging young people with science. In the UK there is a shortage of physics and chemistry teachers. To attract, develop and retain more great teachers, the Government is introducing a range of high-quality CPD opportunities and encouraging schools to urge their teachers to take advantage of them.**

## **Sharing ideas with other professionals**

The national network of **Science Learning Centres** acts as a hub for science teaching activity for teachers, lecturers, technicians and teaching assistants from around the UK. The centres deliver CPD which enables participants to refresh and extend their skills, bringing exciting contemporary science into the classroom. Science Learning Centres also allow for the dynamic exchange of ideas between peers, provide venues for inspirational events and give easy access to the latest science resources and are a hub for regional activities.

Although the number of future science teachers entering training rose by 30 per cent between 1998 and 2005, there is still a shortage of chemistry and physics teachers.

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From April 2008 the Government will be offering targeted bursaries for teachers to attend Science Learning Centres.

### Teachers who want to gain a new specialism

The **Training and Development Agency for Schools** (TDA), in collaboration with the Institute of Physics and the Royal Society of Chemistry, has developed **new accredited training course** for science teachers who don't already have a physics or chemistry specialism. They are being piloted by Keele, Brighton and Edge Hill universities. During the first year of the pilot, the Government is paying for supply cover for the teachers attending.

Places are fully funded by the TDA and offered in a variety of study modes. Participants should have a first degree in a science subject and already be teaching some physics or chemistry at Key Stage 3, Key Stage 4 or post-16.

### Science graduates new to teaching

**Incentives and career opportunities** are being offered to encourage science graduates to enter teaching.

- Eligible trainees are entitled to a bursary of £9,000: and
- Golden Hellos of £5,000 are payable to eligible NQTs.

### Support for teachers in the classroom

The TDA is currently developing a process which will allow all secondary schools to recruit a science-specialist Higher Level Teaching Assistant. Funding will be available from TDA via Local Authorities to support the training and assessment of suitable candidates.

# Working together

**In addition to providing a number of new CPD opportunities for teachers, additional help and support are available through the following.**

The **Secondary National Strategy** (SNS) provides support and guidance on the teaching and learning of science. Your science subject leaders will receive support, guidance and CPD materials needed to implement the new GCSEs at Key Stage 4. This includes self-study packs and DVDs, which extend the range of teaching approaches. These Materials are used at, and are available through, the termly subject leader development meetings held in local authorities by secondary science consultants. All subject leaders are encouraged to attend these meetings.

To offer your pupils the separate science subjects, you may need to **join forces with other schools, colleges and universities**. Your local authority strategy consultants may be able to coordinate network meetings for schools following the same GCSE syllabus. They will also:

- circulate and share resources and information to support teaching and learning; and
- provide school-based professional development to targeted schools, particularly those where pupil under-performance has been identified.

The **Specialist Schools and Academies Trust** (SSAT) will be working with specialist science colleges in your region to support local schools by focusing on different aspects of teaching and learning at GCSE. Leading practice specialist schools will develop and disseminate approaches to learning and teaching in areas such as how science works, contemporary science and practical learning approaches. A resource will be created to enable all schools to disseminate successful practice and materials developed by teachers.

# Taking the next step

**Increasing the number of scientists is one of the most important challenges facing us. The consequences of our work today will be far-reaching in the future.**

If you need advice and support to implement the changes in your school or college, please contact your Secondary National Strategy consultant in the local authority or your local consultant in the LSN.



## Contact details for further information

**School science:** [www.teachernet.gov.uk/schoolscience](http://www.teachernet.gov.uk/schoolscience)

**STEMNET:** [www.stemnet.org.uk](http://www.stemnet.org.uk)

**New accredited training courses:** [www.tda.gov.uk/teachers/continuingprofessionaldevelopment/science\\_cpd.aspx](http://www.tda.gov.uk/teachers/continuingprofessionaldevelopment/science_cpd.aspx).

**Science Learning Centres (SLCs):** [www.sciencelearningcentres.org.uk](http://www.sciencelearningcentres.org.uk)

Materials for subject leaders to implement the new GCSEs at Key Stage 4.  
DCSF Standards website [www.standards.dcsf.gov.uk](http://www.standards.dcsf.gov.uk)

**Specialist Schools and Academies Trust (SSAT):**

[www.specialistschools.org.uk](http://www.specialistschools.org.uk)

**Learning and Skills Network (LSN):** [www.triplescience.org.uk](http://www.triplescience.org.uk) or  
email [triplescience@LSNeducation.org.uk](mailto:triplescience@LSNeducation.org.uk)

## What next?

Give the entitlement to study two sciences and triple science serious consideration and think about how you can best deliver them to your pupils.

Enable science subject leaders to attend termly subject leader development meetings in the local authority so as to access guidance and CPD material.

Explore the range of CPD opportunities and incentives available.

Find out more about STEMNET.

Get pupils engaged – start a Science and Engineering Club.

Speak to your local authority and other schools, colleges and universities in your region.

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