

# The National STEM Programme

Jenifer Burden, Director, National STEM Centre

*Supporting the delivery of the STEM Cohesion  
Programme on behalf of DCSF and BIS*

- ▶ Why STEM?
- ▶ Snapshot of STEM education
- ▶ Role of the National STEM Centre



“The nations that can thrive in a highly competitive global economy will be those that can compete on high technology and intellectual strength - attracting the highest-skilled people and the companies which have the potential to innovate and to turn innovation into commercial opportunity.

These are the sources of the new prosperity.”

Science &  
Innovation  
Investment  
Framework  
2004 - 2014



- ▶ SET for success: Roberts' Review (2002)
- ▶ Science & Innovation Investment Framework: 2004 – 2014 (2004)
- ▶ Race to the Top: Sainsbury Review (2007)
- ▶ STEM Programme Report (2006)

## An ongoing focus

- R&D
- responsiveness
- partnership
- public engagement
- education



“improving education in math and science is about producing engineers and researchers and scientists and innovators who are going to help transform our economy and our lives for the better”

“it’s (also) about expanding opportunity for all Americans in a world where education is the key to success”

“it’s about an informed citizenry in an era where many of the problems we face as a nation are, at root, scientific problems”

*Barack Obama*  
*23 November 2009*

## An international focus

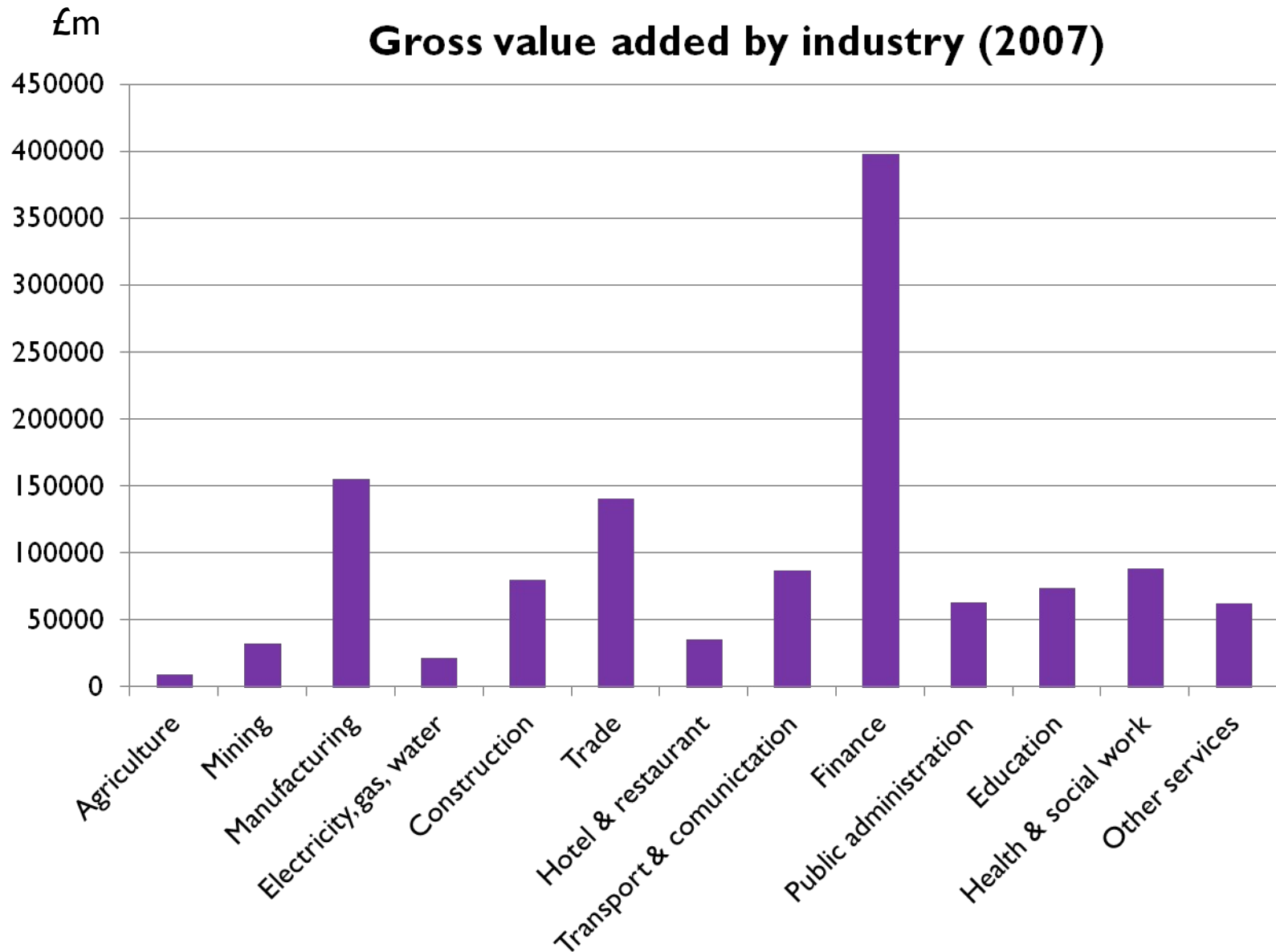


- ▶ In 2008 UK engineering business turnover was £799 billion pounds per year
- ▶ The UK is the world's sixth largest manufacturer, generating £150 billion for the economy, 55% of all exports, and employing three million people

*Source: Engineering UK 2009/10 Report*

## STEM in the UK





*Source: The Blue Book, 2009 (National Office for Statistics)*

- ▶ 66% of employers report difficulties recruiting STEM skilled staff, with particular concern at graduate and post-graduate level
- ▶ STEM graduates can expect to receive amongst the highest salaries of all new recruits

*Source: CBI Education and Skills survey 2009  
(over 350 employers)*

STEM skills  
are still in  
short supply





## Supply and demand in the process industries by 2022

Employee group	Forecast demand		
Higher level workers (Manager and professionals)	55,000		
Core workers (Technicians and operators)	72,000		

*Source: Cogent, 2008*



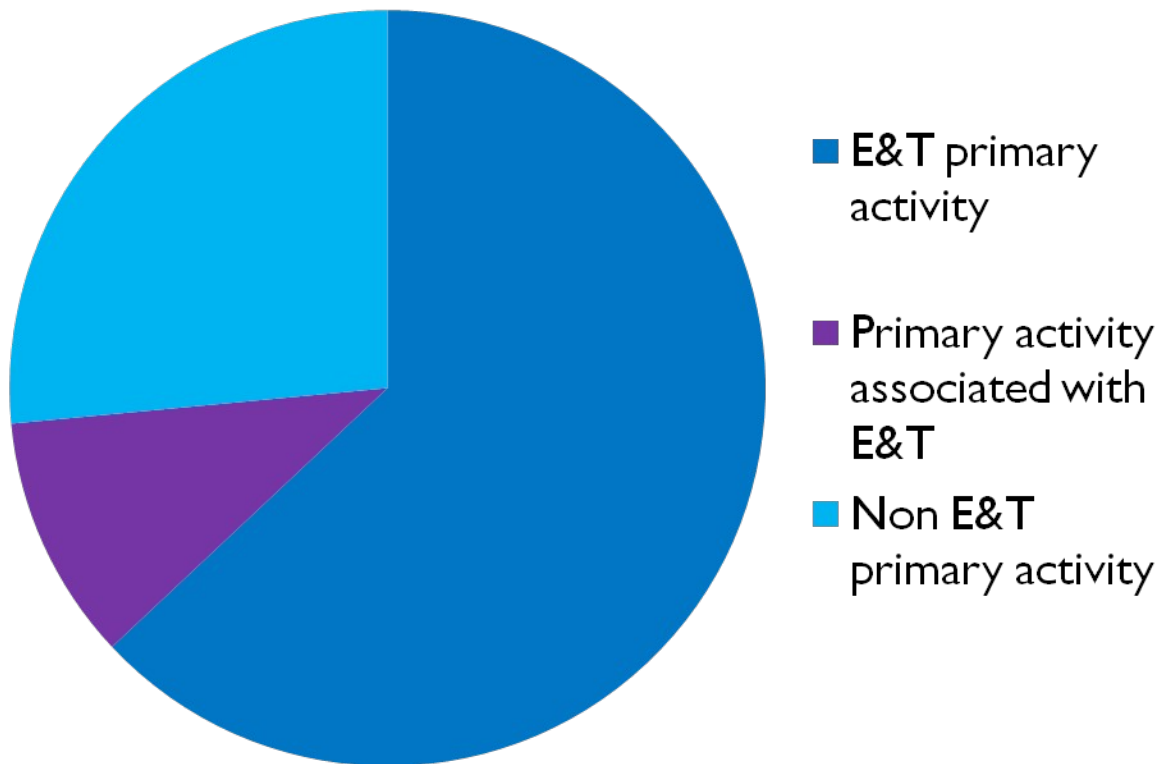
## Supply and demand in the process industries by 2022

Employee group	Forecast demand	Forecast supply	Balance
Higher level workers (Manager and professionals)	55,000	68,000	Over supply +13,000
Core workers (Technicians and operators)	72,000	31,600	Short fall -40,400

*Source: Cogent, 2008*



## Primary activity of employers of E&T graduates who entered employment



*Source: Higher Education Statistics Agency*

**STEM – not  
just for STEM  
careers**



## ***Two-thirds of employers who express a preference prefer STEM degrees***

- ▶ No specific preference 42%
- ▶ Science, technology, engineering, maths 40%
- ▶ Business 13%
- ▶ Social sciences 3%
- ▶ Humanities 1%

*CBI Education and Skills survey 2009*

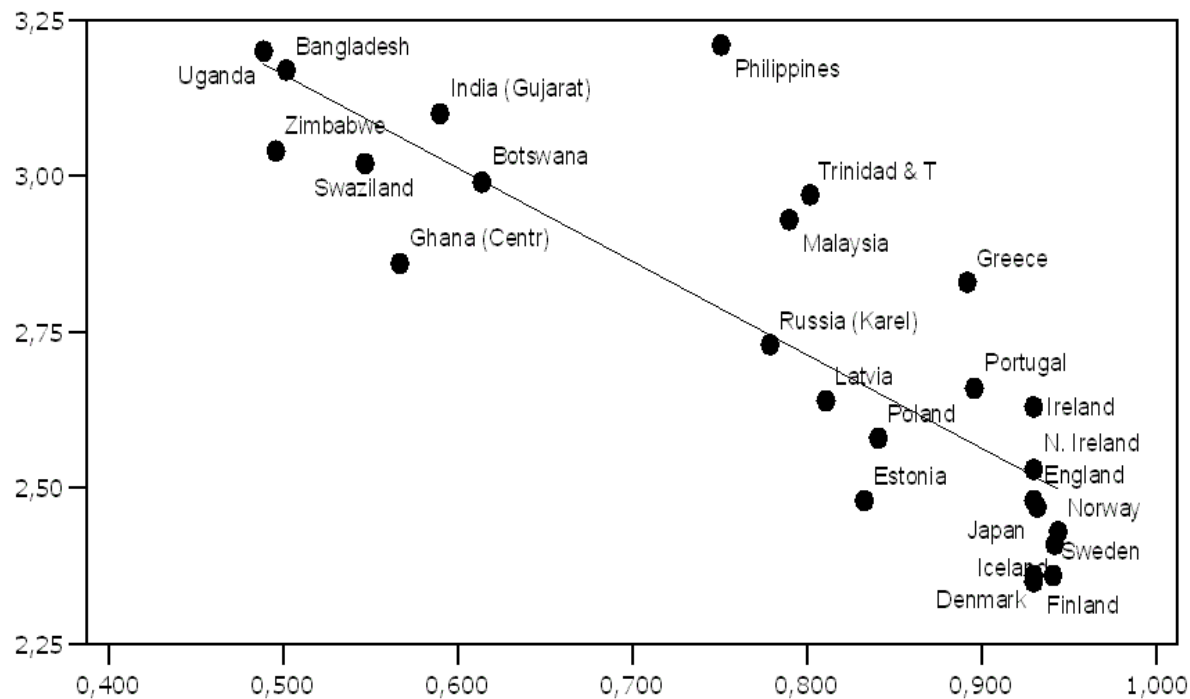
**STEM skills  
are valued  
regardless of  
career choice**



- ▶ ‘Pupils are doing well in science (*and maths*)’. (*TIMSS, 2007*)
- ▶ 1999 to 2007: Proportion of 15 year-olds in England with a high positive attitude has dropped from 76% to 55% in science, and from 65% to 40% in maths (*TIMSS, 2007*)

TIMSS 2007  
(Trends in  
International  
Maths and  
Science Study)  
36 countries  
including 16 OECD  
nations





*Svein Sjoberg, University of Oslo*

## Project ROSE

**Horizontal axis:** Human Development Index

**Vertical axis:** Scores on questions designed to measure positive attitudes towards studying science



- ▶ 2008: Undergraduate numbers increased by 10.4% on previous year
- ▶ Maths 7.8%
- ▶ Biology 3.3%
- ▶ Chemistry 4.5%
- ▶ Physics 3.2%
- ▶ Electronic & electrical engineering -2.7%
- ▶ Production and manufacturing engineering -2.9%
- ▶ Mechanical engineering 12.4%
- ▶ Chemical, process, and energy engineering 12.7%
- ▶ Combinations business/admin 21.9%
- ▶ Economics 19.8%
- ▶ Hospitality, leisure, tourism, transport 18.4%

There are  
highly able  
young people  
not entering  
STEM fields



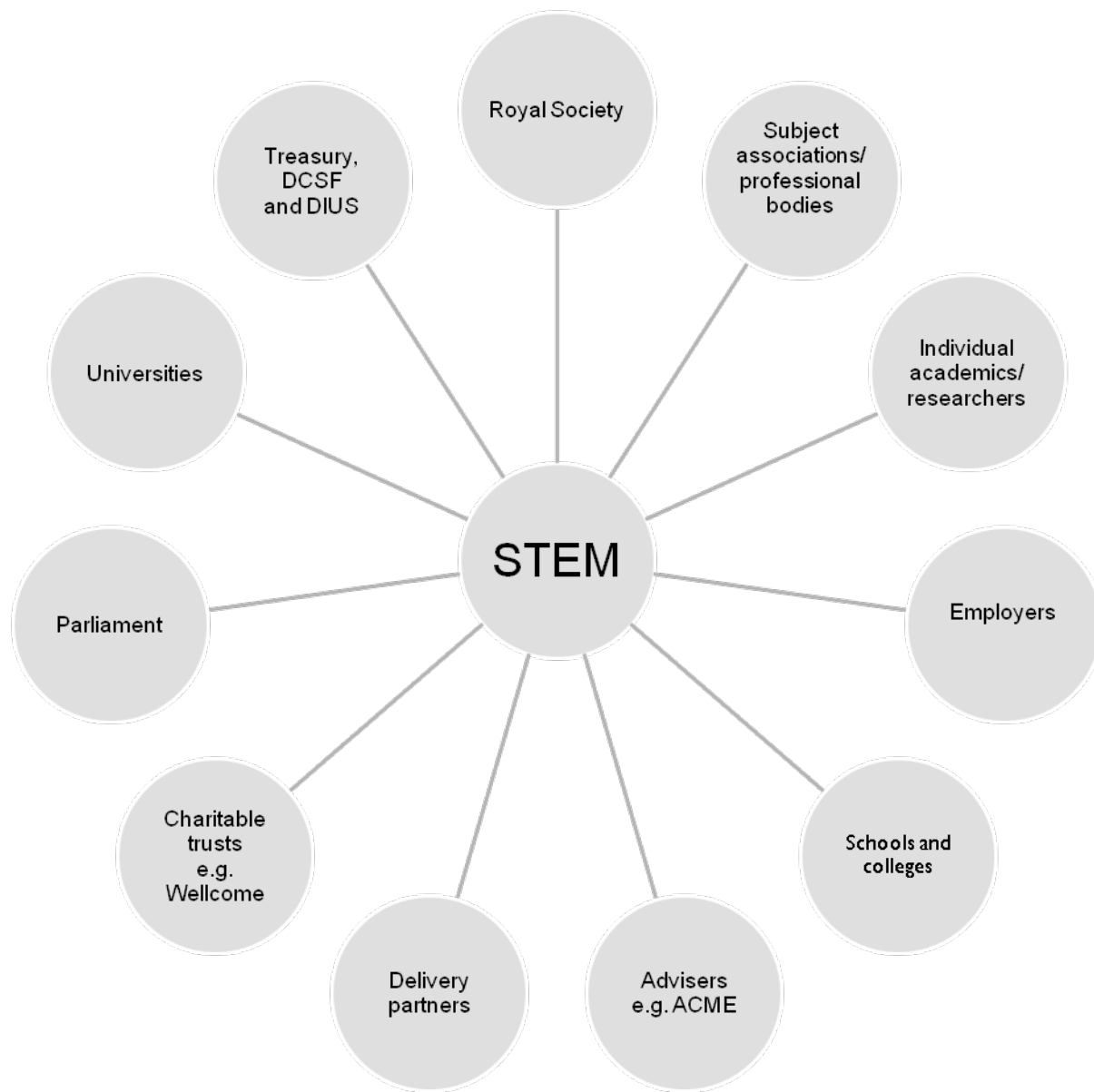
- ▶ 13 year olds were asked whether they expected to enter a science based career by the age of 30
- ▶ Those who said they expected to enter such a career turned out to be 3.4 times more likely to earn a physical science or engineering degree than those who did not expect such a career.

*Tai et al, **Science** May 2006*

Careers  
guidance:  
  
well-  
informed,  
regularly  
provided &  
from an early  
age







The very good news:

STEM teaching has many supporters



- ▶ Integrating the teaching of S, T, E and M within schools and colleges
- ▶ Integrating STEM teaching in schools and colleges with the world outside
- ▶ Integrating the efforts of partners



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## STEM Programme



- ▶ Get the right people to be teachers and lecturers
- ▶ Providing the right continuing professional development
- ▶ Bringing real world context and applications of STEM into schools and colleges
- ▶ Showing young people the rich range of career opportunities that STEM study opens up
- ▶ Getting the STEM curriculum and infrastructure right

## Priorities



- ▶ Get the right people to be teachers and lecturers
- ▶ API: Improving the recruitment of teachers and lecturers in shortage subjects (TDA)
- ▶ Providing the right continuing professional development
- ▶ Bringing real world context and applications of STEM into schools and colleges
- ▶ Showing young people the rich range of career opportunities that STEM study opens up
- ▶ Getting the STEM curriculum and infrastructure right



- ▶ Get the right people to be teachers and lecturers
- ▶ Providing the right continuing professional development
- ▶ AP2: Improving teaching and learning through CPD for maths teachers & lecturers (NCETM)
- ▶ AP3: Improving teaching & learning through CPD for science teachers & lecturers (NSLC)
- ▶ AP4: Improving teaching and learning by engaging teachers with T&E (RAEng)
- ▶ Bringing real world context and applications of STEM into schools and colleges
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- ▶ Get the right people to be teachers and lecturers
- ▶ Providing the right continuing professional development
- ▶ Bringing real world context and applications of STEM into schools and colleges (*co-ordinated by STEMNET*)
- ▶ AP5: Enhancing and enriching the science curriculum (SCORE)
- ▶ AP6: Enhancing and enriching the teaching of T&E across the curriculum (RAEng)
- ▶ AP7: Enhancing and enriching the maths curriculum (ACME)
- ▶ Showing young people the rich range of career opportunities that STEM study opens up
- ▶ Getting the STEM curriculum and infrastructure right



- ▶ Get the right people to be teachers and lecturers
- ▶ Providing the right continuing professional development
- ▶ Bringing real world context and applications of STEM into schools and colleges
- ▶ Showing young people the rich range of career opportunities that STEM study opens up
- ▶ AP8 Improving the quality of advice and guidance about STEM careers (National STEM Careers Co-ordinator at SHU)
- ▶ Getting the STEM curriculum and infrastructure right





- ▶ Get the right people to be teachers and lecturers
  - ▶ Providing the right continuing professional development
  - ▶ Bringing real world context and applications of STEM into schools and colleges
  - ▶ Showing young people the rich range of career opportunities that STEM study opens up
- 
- ▶ Getting the STEM curriculum and infrastructure right
  - ▶ AP9: Widening access to the formal science and mathematics curriculum for all (DCSF)
  - ▶ API0: Improving the quality of practical work in science (SCORE)
  - ▶ API1: Building capacity of the national, regional and local infrastructure (DCSF)




*Supporting the delivery  
of the STEM Programme  
on behalf of the DCSF*

- ▶ Encouraging collaboration between many STEM organisations working to support STEM education
- ▶ Supporting teachers & lecturers through resource collections and information
- ▶ Signposting to sources of STEM support



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**The National STEM Centre in York is building the largest collections of resources for teachers of Science, Technology, Engineering and Mathematics in the UK.**

You are already welcome to visit the resource collections in person. From 2010 onwards many of the resources will be made available online.

We also offer support to schools, colleges, and STEM partner organisations who wish to make use of the onsite facilities to enhance their STEM education activity.

If you would like to be notified about news and events from the National STEM Centre, please [register your email address here](#). For further information on visiting, or any aspect of our work, please [contact us](#).

**Features**

**Are STEM subjects harder?**  
05 | 01 | 10 posted by John Holman at 10:23pm

Are some A levels harder than others? In particular, are mathematics, physics, chemistry and biology harder to get high grades in than, say, sociology and business studies? Yes, according to the Centre for Evaluation and Monitoring at the University of Durham and a number of

**Find out more**

- Teachers
- STEM Associates
- Employers

**Latest news** [RSS Feed](#)

Opportunities at the National STEM Centre

- ▶ STEM Directories: high quality enhancement & enrichment opportunities for schools and colleges
- ▶ <http://www.stemdirectories.org.uk>
- ▶ Future Morph & Mathscareers sites:
- ▶ [www.futuremorph.org](http://www.futuremorph.org)
- ▶ [www.mathscareers.org.uk](http://www.mathscareers.org.uk)





## Resource collections:

- Contemporary curriculum materials (e.g. print, multimedia, practical resources)
- Themes showcasing several decades of curriculum development
- Research collection, linking curriculum development to evidence base



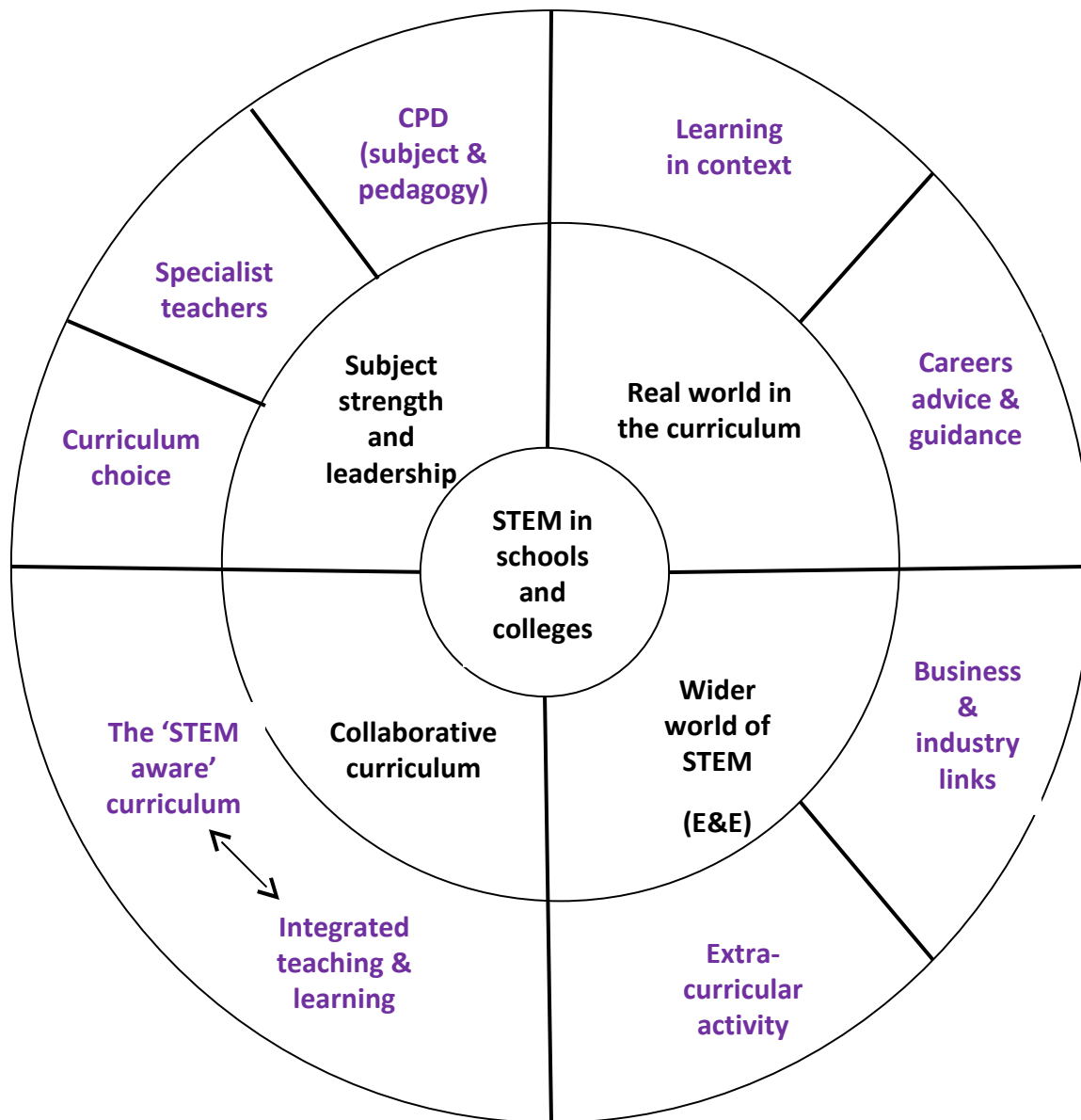
- ▶ Treasure chests of ideas – from past to present
- ▶ Growing Themes, e.g.:
  - ▶ ICT in mathematics teaching
  - ▶ How Science Works
  - ▶ Subject development
- ▶ Share ideas through the eLibrary community areas



## Direct support for APs:

- ▶ In collaboration with NCETM for 2010/11 pilot funding for STEM knowledge networks
- ▶ Guidelines for evaluation of STEM activity – big and small
- ▶ Working with Royal Academy of Engineering to build resource bank for the Engineering Diploma





A framework for  
STEM in schools  
and colleges?







STEM education  
may not be an  
easy thing to  
grapple with

There is excellent  
practice to be  
fostered and  
shared

