



The changing curriculum for STEM providers

Summary of a series of three professional development events organised by SCORE
in collaboration with the British Interactive Group, February 2010.

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This is a report based on three SCORE professional development events held in February 2010 at Science Learning Centres in England. The report summarises information delivered at the events and provides direction for STEM providers, who enrich and enhance the curriculum through their activities, with regard to the national curriculum for science and mathematics.

1 Background

In 2008 the Qualifications and Curriculum Development Agency (QCDA) began to implement changes to the National Curriculum in England at secondary level. Changes to the primary curriculum were also expected following the recommendations from the independent primary review by Sir Jim Rose (Rose Review, April 2009).

While STEM providers have an interest in working within the curriculum framework to best serve schools, many remain outside the circles which would keep their knowledge current. Consequently they often find it difficult to incorporate curriculum change into their new and existing schemes.

In response to this, SCORE collaborated with the British Interactive Group (BIG) to develop and deliver professional development events designed to respond to STEM providers' needs. SCORE's intentions were to provide interactive sessions which would inform providers of recent changes and give them the tools to implement the changes.

2 The events

2.1 Collaboration with BIG

BIG is a society of individuals working in the STEM communication field with a membership of around 250 and wider email group membership of 800. Administration of the events was carried out by BIG in order to ensure access to a suitable range of STEM providers, with particular emphasis on ensuring delegate involvement from the smaller companies and freelance providers. Advertising and recruitment of delegates was done as part of BIG's existing calendar of professional development activities for providers.

2.2 Delegates

A total of 70 STEM providers from throughout the UK attended, representing a range of provider types: freelance STEM providers and STEM companies, STEMPoint brokers and Education Business Partnerships, higher education and research institutes, scientific societies and trusts, teachers, science centres, museums and zoos.

2.3 Venues

12 Feb National STEM Centre, York
15 Feb Science Learning Centre SW, Bristol
19 Feb Science Learning Centre NW, Manchester

2.4 Aims

Primary aims of the events were:

- To inform STEM providers that the national curriculum for England has changed and give an outline of the relevant changes;
- To illustrate how these changes can be incorporated into STEM provision;
- To start providers thinking about how they might implement the changes.

Secondary aims:

- To create dialogue between curriculum development experts and STEM providers;
- To create opportunities for STEM providers to share skills and experiences;
- To reinforce the network of STEM providers.

2.5 Format and contributors

One primary and two secondary science and mathematics events were delivered, with each following the same format.

The events were chaired by a representative of SCORE with an introductory session by the chair detailing the aims of the days and the intentions of SCORE in providing them.

A presentation by a QCDA representative outlined changes (and motivations for change) to the national curriculum in the areas of Science Enquiry (Key Stage 1-2), How Science Works (Key Stage 3-6) and Mathematics (Key Stage 1-6).

QCDA representatives: Rebecca Edwards, primary science advisor; David Harrison, secondary science advisor.

A short presentation was given which described the work and aims of STEMNET and the STEM Cohesion Programme in addressing issues of negative attitudes towards studying science and poor progression into STEM careers. Various representatives of the two bodies attended.

Two workshops – one science, one mathematics – followed, giving context and relevance to the QCDA information. These workshops took the form of a short presentation followed by an interactive session from education staff at science centres who were incorporating new curriculum methods and guidelines into their STEM enhancement provision for schools. Each presenter brought along activities which illustrated their work which delegates then had the opportunity to explore. Delegates were encouraged to consider their own activities at this point and begin to develop ideas for inclusion of the curriculum change.

Workshop presenters: Bridget Holligan, Head of Learning at Science Oxford (science workshop); Noel Jackson, Head of Education, and Dr Nicola Stock, Education Officer at the Centre for Life, Newcastle (mathematics workshop).

A plenary session from Rachel Mason (BIG) concluded each event. This was designed to provide opportunities to reflect on the day's activities and to ensure delegates made the most of the meeting to develop beneficial relationships with others.

3 What are the changes?

3.1 Overview of changes

The English national curriculum has evolved to meet the changing needs of pupils and teachers with respect to the use and application of technology, increased expectations on schools and the need to place the child at the heart of learning, in support of the Government's *Every Child Matters* agenda. It follows the Rose Report's central requirement to reduce prescription and overload so that schools have greater flexibility to meet pupils' individual needs and build on their prior learning.

The changes are not to content but are intended to promote *Essentials for Learning and Life*¹: approaches to learning which each school can develop for itself to tailor to the needs of its individuals and to the school as a whole. The directives now invite schools to develop their own curriculum, rather than follow a one-size-fits-all system.

The implemented and proposed changes to the national curriculum aim to enable all children to become:

- Successful learners;
- Confident individuals;
- Responsible citizens.

The changes pertain to a learning and teaching framework across all subject areas rather than any changes specifically in the areas of science and mathematics. The new curriculum supports rich tasks which STEM providers would be advised to consider when developing and marketing activities.

Rich tasks should:

- Allow learners to make decisions;
- Involve learners in testing, proving, explaining, reflecting and interpreting;
- Encourage deeper thinking;
- Promote discussion and communication;
- Encourage originality and invention;
- Encourage 'what if' and 'what if not' questions.

3.2 The secondary curriculum

The secondary curriculum provides:

- Greater flexibility and coherence;
- New focus on aims, skills, key concepts and key processes;
- Less prescriptive content;

¹ Essentials for Learning and Life (ELL)

ELL describes the skills, attitudes and dispositions that children need to become well-rounded individuals and lifelong learners. They include literacy, numeracy and ICT capability, learning and thinking skills, and personal, social and emotional skills. The design of the new primary curriculum prioritises these skills and offers teachers scope to teach them well.

- New curriculum opportunities;
- Personalised assessment, e.g. Assessing Pupils Progress (APP).²

3.3 The primary curriculum

The recommendations from the Rose Review set the curriculum out in three phases – early, middle and later primary. The phases are intended to help schools plan learning that supports and challenges all learners in a flexible way, and not as age-related stages. Although non-compulsory, an element of APP² has also been introduced in primary schools.

The proposed recommendation for the primary curriculum:

- Secures essential literacy and numeracy;
- Aids transition from early years, and into secondary;
- Ensures a broad and balanced learning experience;
- Is integrated with teaching, learning and assessment;
- Reflects increased expectations of children's ICT capability;
- Meets the needs of and promotes good progress for all learners;
- Ensures wellbeing alongside academic achievement.

4 STEM providers: how does this affect them?

4.1 Existing STEM activities

Many STEM providers will find that their current activities already complement the new curriculum changes and will not need to significantly change their programme. The changes instead give

² Assessing Pupils' Progress (APP)

APP is a national approach to assessment at secondary level that equips teachers to make judgements on pupils' progress. Developed by QCDA, in partnership with the National Strategies, APP helps teachers to fine-tune their understanding of pupils' needs and tailor their planning and teaching accordingly, by enabling them to:

- track pupils' progress;
- use diagnostic information about pupils' strengths and weaknesses to improve teaching, learning and pupils' progress;
- make reliable judgements related to national standards drawing on a wide range of evidence.

permission to explore things that STEM providers consider important but were unable to give priority to with the previous curriculum.

4.2 New STEM activities: subject focus

There is scope to develop activities which are not confined to one topic (e.g. forces) but rather develop activities which embrace the nature of experimentation, tools for scientific enquiry, health and safety, careers and cross curricular aspects. While these have always been part of many STEM providers' work, the curriculum changes offer more opportunity to STEM providers in their role as supporters to teachers.

4.3 Communication with schools

The issue of how STEM activities are marketed to schools was considered important. The new curriculum invites teachers to consider STEM providers more as supporters than as salespeople with a product. Marketing may now need to better reflect the nature of the curriculum themes, rather than concentrating on the science/mathematics subject content (although that is still present).

4.4 How can STEM providers support schools with these changes?

STEM providers' particular expertise and presentation techniques lend themselves well to helping teachers to incorporate new aspects of the curriculum they may be finding new and unfamiliar, e.g. APP and cross-curriculum dimensions such as creativity and critical thinking.

5 Ensuring STEM providers remain up to date on changes in education

These events highlighted the need to ensure there is a mechanism in place to inform STEM providers on changes to the curriculum and changes to government policy that are likely to affect providers' work. SCORE will work with the relevant stakeholders to ensure that such information is communicated to the STEM provider community through organisations such as BIG.

Case study: mathematics provider

Bubblz Ainslie, mathematics provider

“As a Maths Clown my objective as a STEM communicator is to leave teachers inspired and children (and their parents) enthusiastic about mathematics and its learning.

I am keen to be up-to-date about the new curriculum and I so eagerly attended the primary day in York. I was expecting to have a stimulating day but I didn't realise that I'd also be visiting one of the best STEM resource centres in the UK, which welcomes STEM communicators with open arms (including onsite accommodation for library users).

Representatives from science centres gave very useful workshops on science and maths, illustrating the kind of best practice which would enable students and teachers to achieve the desired understanding, such as using good pedagogy. It was great to have the methods I have been using re-affirmed by both the curriculum and my peers.

Good tidings were given about the curriculum changes from my perspective, with Every Child Matters now at the core of the curriculum and the emphasis placed on children taking responsibility for their learning. Real life also appears to be an integral part of the curriculum, which includes continual evaluations leading to improvements to processes and outcomes (i.e. real life learning style). Cross-curricular requirements are broader, enhancing the real life connections between literacy, numeracy and science.

I have re-vamped my presentations and workshops to be more hands-on with some very pleasing results, which have given many teachers new insights into what their students are capable of.

I found it to be altogether a more intuitive curriculum and one that gives freedom for my and schools' creativity to blossom.”

6 Summary

The overall message from the day offered good news for STEM providers:

The new direction of the curriculum, regardless of the particular programme of learning, now more closely acknowledges the general philosophy behind most of the work for schools by science engagement practitioners. Providers' activities place value on embracing varied learning styles (and therefore delivery techniques), practical work, stretching pupils intellectually and a holistic approach to learning through cross curricular linking. These values are more clearly set out as aims for the new curriculum.

In the light of changes, STEM providers may find that they need not make alterations to their activities in terms of science content.

Points for consideration in adapting existing STEM activities and developing new ones include ensuring the inclusion of:

- Discussion and communication;
- Nature of scientific experimentation;
- Careers information;
- Cross curricular links;
- Opportunities for pupils to reflect;
- Critical thinking.

The curriculum's structure gives STEM providers freedom to explore new activity approaches, such as the nature of scientific thinking, science/mathematics with history, or with health and wellbeing.

STEM providers may find it useful to reflect on their correspondence with schools - their marketing materials and their discussions with teachers when in schools. The new curriculum follows a new framework with new terminology; it may be advantageous for STEM providers to make themselves familiar with this.

SCORE and BIG will continue to engage with one another to maintain a link between the policy and practise of STEM enrichment and enhancement (E&E) of the curriculum. SCORE recommends that such relationships are encouraged throughout the wider STEM community and will work with relevant policy stakeholders to ensure STEM providers

remain informed on changes to the primary and secondary curriculum.

7 Further information

The National Curriculum

QCDA has published a number of documents (including shorter excerpts) which STEM providers may find useful when developing new activities or strategies for creating useful relationships with schools. These documents can be downloaded from www.qcda.gov.uk/curriculum

The website includes a short guide explaining the proposed primary curriculum and the benefits for children and schools.

<http://curriculum.qcda.gov.uk/new-primary-curriculum>

SCORE

SCORE is a partnership of six organisations, which aims to improve science education in UK schools and colleges by influencing government and policy-makers and supporting the development and implementation of effective policy and projects. The SCORE partnership comprises the Association for Science Education, Institute of Physics, Royal Society, Royal Society of Chemistry, Science Council and Society of Biology.

www.score-education.org

ACME

The Advisory Committee on Mathematics Education (ACME) is an independent committee, based at the Royal Society and operating under its auspices, that aims to influence Government strategy and policies with a view to improving the outcomes of mathematics teaching and learning in England and so secure a mathematically enabled population.

www.acme-uk.org

National STEM Centre

The National STEM Centre is building the UK's largest open collection of science, technology engineering and mathematics teaching and learning resources. The collections include print, multimedia and practical classroom resources, research publications and STEM policy documentation. Also available at the Centre are meeting rooms, video

The SCORE partnership, working together on science education; Association for Science Education; Institute of Physics; Royal Society; Royal Society of Chemistry; Science Council; and Society of Biology.

conferencing facilities, hot-desking and residential accommodation.

www.nationalstemcentre.org.uk

Useful publications from the National STEM Centre:

STEM Cohesion: towards sustainable partnerships

Does it work? Better evaluation: better STEM Working Together: STEM associates at the National STEM Centre, York

STEM Directories

STEM Online Directories have been created in direct response to teachers needs. They comprise a collection of schemes and activities provided by organisations from across the UK that aim to enhance and enrich the curriculum. STEM providers are encouraged to include their schemes on the online STEM Directories and thereby be promoted FREE to teachers across the UK.

www.stemdirectories.org.uk

British Interactive Group

BIG is the skills sharing network for individuals involved in the communication of science, technology, engineering and maths. It is a not-for-profit, unincorporated association for people involved in STEM E&E projects in the UK. BIG runs a number of events annually for its members to promote best practice and to share skills in effective STEM communication, including professional development days and an annual summer conference.

www.big.uk.com