

Does it work?
Better evaluation: better STEM



Who is this for?

This document is for anyone interested in improving the provision for STEM education for young people – including organisations involved with

- STEM teacher training and CPD
- STEM enhancement and enrichment activities, and careers advice
- developing the STEM curriculum.

They may be from the public, private, charity and academic sectors; and may range from multi-national organisations to individual providers.

Why read about evaluation?

Because...

- you want to be more sure that what you set out to do is actually being achieved
- you want to improve what you do – by learning and adapting
- you want evidence to show the effect your work may be having on teachers and learners in STEM
- you want to justify your approach to those who pay for it.



Introduction

The term 'STEM' groups together the subjects of Science, Technology, Engineering and Mathematics – all closely interlinked in solving many of the challenges facing modern society.

In recent years the UK has seen an unprecedented rise in the interest of Government, industry and others in the successful uptake of STEM subjects in schools and colleges. This is driven by the need to improve understanding of STEM-related topics in the general public, and to raise the skills and aspirations of learners towards a lifetime of contribution to the scientific and technological base of the UK.

Many organisations are working to engage young people with STEM. The scope of initiatives is broad, and includes hundreds of varied enrichment and enhancement opportunities for use by schools and colleges, collaboration with providers of professional development for teachers, and the development of curriculum resources.

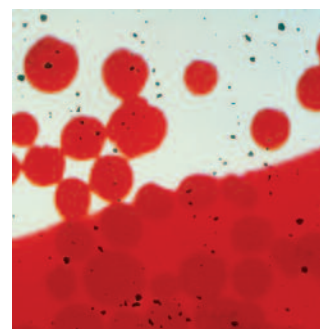
Using evaluation

Evaluation is a systematic determination of merit, worth or significance. *Formative* evaluation is carried out during the activity or programme – to provide feedback about whether things are going as planned, and whether expected progress is likely to be made. It guides ongoing improvements in the activity or programme. *Summative* evaluation is carried out towards the end of an activity or programme – to give providers and decision-makers judgements about whether or not the original objectives have been achieved. It guides decisions about the possible future of an activity or programme.

The value of evaluating STEM initiatives is widely appreciated. Good evaluation provides insight into an activity's impact on young people. This may inform modification of an initiative to improve its effectiveness in the future, or where evaluation is planned formatively, perhaps during a programme of activity. Meaningful evaluation helps to ensure that funding is well-used, and when findings are shared with teachers evaluation can help them to select appropriate initiatives for their pupils.

The role of the STEM Cohesion Programme

The DCSF STEM Cohesion Programme is designed to encourage collaboration between STEM partner organisations with similar aspirations for STEM education. A framework of eleven Action Programmes (APs) has been established, within which STEM partner organisations can work. Each AP has a Lead Organisation to act both as a point of contact for other STEM partners, and help coordinate the promotion of the AP with schools, colleges and others. The table overleaf outlines the eleven APs.



Getting and training the right teachers and lecturers of STEM subjects in the first place

Action Programme	Lead Organisation	Contact
AP1 Improving the recruitment of teachers and lecturers in shortage subjects	Training and Development Agency for Schools (TDA)	020 7023 8000 corporatecomms@tda.gov.uk www.tda.gov.uk

Providing the right continuing professional development for teachers of STEM subjects

Action Programme	Lead Organisation	Contact
AP2 Improving teaching and learning through CPD for mathematics teachers	National Centre for Excellence in the Teaching of Mathematics (NCETM)	Colin Matthews, Executive Director 07920 591 270 colin.matthews@ncetm.org.uk www.ncetm.org.uk
AP3 Improving teaching and learning through CPD for science teachers	National Science Learning Centre (NSLC)	Caroline Hurren, Programme Director 01763 852188 c.hurren@slcs.ac.uk www.slcs.ac.uk
AP4 Improving teaching and learning by engaging teachers with engineering and technology	Royal Academy of Engineering (RAEng)	Professor Matthew Harrison, Director, Education Programmes 020 7766 0608 matthew.harrison@raeng.org.uk www.raeng.org.uk

Providing the right activities and careers advice that bring real world context and applications of STEM into the classroom

Action Programme	Lead Organisation	Contact
AP5 Enhancing and enriching the science curriculum	SCORE ¹	Dr Rosalind Mist, SCORE Manager 020 7451 2205 score@score-education.org www.score-education.org.uk
AP6 Enhancing and enriching the teaching of engineering and technology across the curriculum	Royal Academy of Engineering (RAEng)	Professor Matthew Harrison, Director, Education Programmes 020 7766 0608 matthew.harrison@raeng.org.uk www.raeng.org.uk
AP7 Enhancing and enriching the teaching of mathematics	Advisory Committee on Mathematics Education (ACME)	Dr Nick Bowes Head of Secretariat, 020 7451 2206 acme@royalsociety.org www.acme-uk.org
AP8 Improving the quality of advice and guidance for students (and their teachers and parents) about STEM careers, to inform subject choice	The National STEM Careers Co-ordinator (at Sheffield Hallam University)	Kate Bellingham The National STEM Careers Co-ordinator stem@katebellingham.com

The STEM Enhancement & Enrichment Strategic Management Group, chaired by STEMNET, has a co-ordinating role across AP 5-7. Contact Yvonne Baker, Chief Executive, 0203 206 0450, Yvonne.Baker@stemnet.org.uk, www.stemnet.org.uk

Getting the STEM curriculum in the classroom right

Action Programme	Lead Organisation	Contact
AP9 Widening access to the formal science and mathematics curriculum for all students, including access to triple science GCSE	Department for Children, Schools and Families (DCSF)	STEM Implementation Team, 2nd Floor, Sanctuary Buildings, Great Smith St, London, SW1P 3BT
AP10 Improving the quality of practical work in science	SCORE	Dr Rosalind Mist, SCORE Manager 020 7451 2205 score@score-education.org www.score-education.org.uk

Getting the STEM education support infrastructure right

Action Programme	Lead Organisation	Contact
AP11 Programme to build capacity of the national, regional and local infrastructure	DCSF	STEM Implementation Team, 2nd Floor, Sanctuary Buildings, Great Smith St, London, SW1P 3BT

¹ SCORE – Science Community Representing Education is convened by the Royal Society. The other founding partners are the Institute of Physics, the Royal Society of Chemistry, the Institute of Biology, the Biosciences Federation, the Science Council and the Association for Science Education.

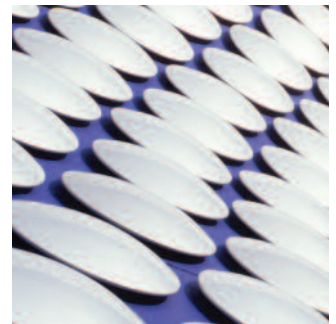
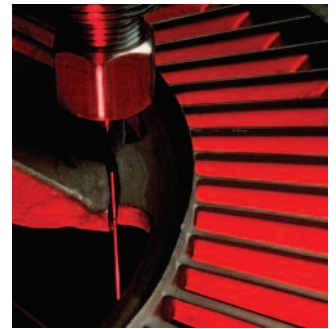
The STEM Cohesion Programme – supporting better evaluation

The DCSF STEM Cohesion programme is committed to working with STEM Lead Organisations and their partners to disseminate useful evaluation guidance. By sharing good practice of what good evaluation might look like, the intention is to support them in getting the most from their work with schools, colleges and young people.

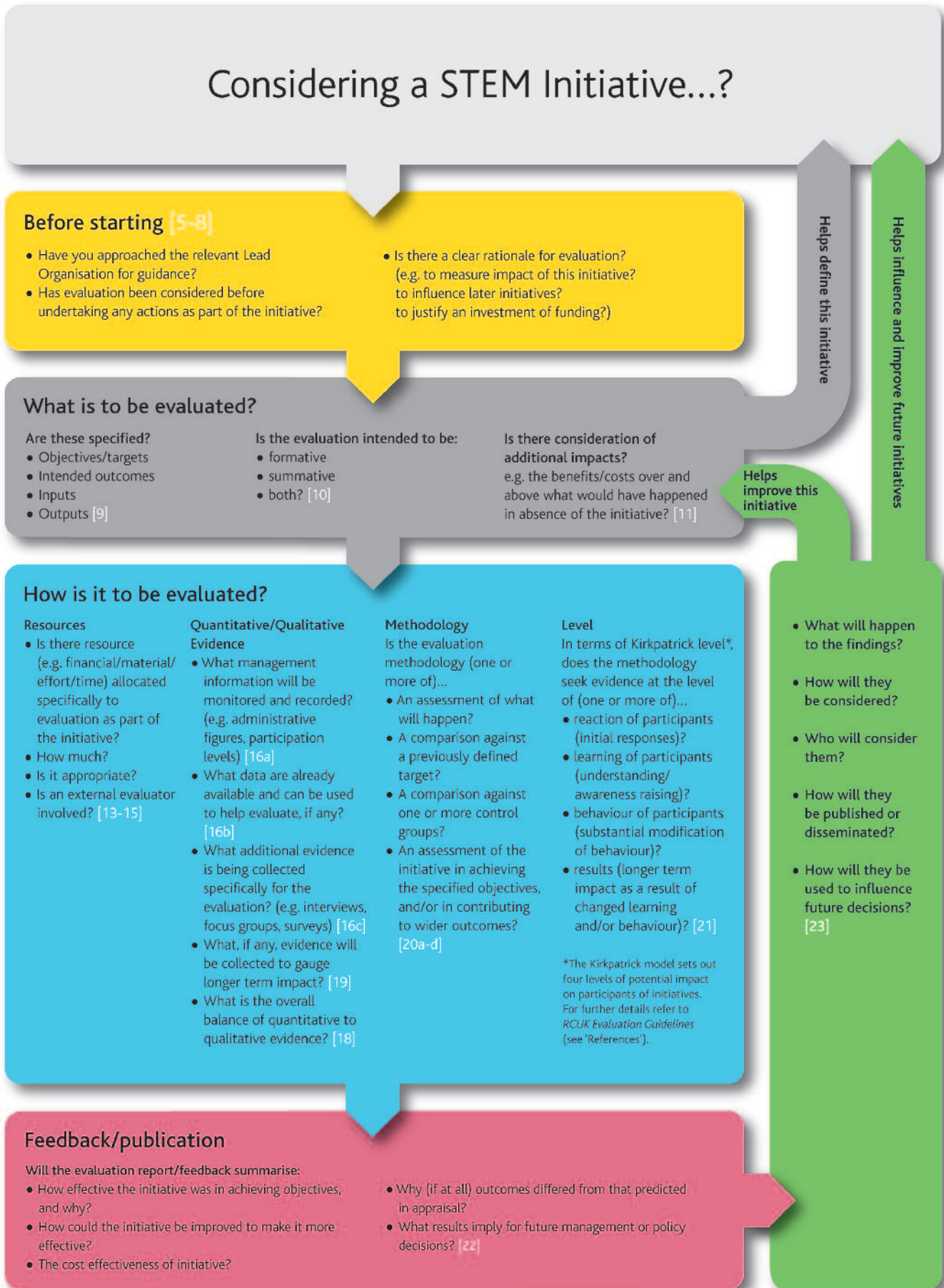
The STEM Programme published evaluation guidance for STEM initiatives in September 2008, based on evaluation procedures used in government departments (see 'References' on the back cover). Each Lead Organisation has been consulted and the guidance considered alongside their existing procedures for evaluation. Some common themes emerged from Lead Organisations' feedback:

- The term 'initiative' was loosely defined as projects, programmes, schemes, and activities planned by Lead Organisations as part of the work on their STEM Action Programme, and the wide range of initiatives developed by many STEM partner organisations.
- All STEM Lead Organisations are committed to improving the evaluation of STEM initiatives, so that evaluation can help 'raise the bar' of quality and impact of provision.
- There is a huge range of experience amongst the STEM community regarding evaluation. A concise digest of good practice could be useful to partner organisations, as a tool for future planning of STEM education initiatives.
- Any evaluation guidance should be updated and improved as Lead Organisations continue to learn and share good practice.

On the following page is a flow chart developed in response to the above consultation. It is intended to be generic enough for use across the diverse range of work that STEM partner organisations undertake.



STEM Evaluation Flow Chart



Figures in brackets refer to *Summary of Public Sector Guidance for Evaluations with respect to STEM Initiatives* (see 'References').

What can I do?

Use the flow chart as a simple series of prompts to consider how evaluation has been integrated into the initiative, if at all.

For new STEM initiatives this process can assist in setting achievable objectives and including plans for meaningful evaluation from the outset.

For existing STEM initiatives:

- If a formal evaluation or any other evidence of impact is already available, the flow chart can help when considering the robustness of this evidence.
- If no evaluation has been undertaken, or if only limited evidence of impact is available, the flow chart can prompt actions to improve this situation.

Refer to the STEM Programme Guidance itself (Reference 1) for greater detail, and if you are less familiar with overall evaluation methodology refer to the Research Councils UK (RCUK) Evaluation Guidelines and the documents cited in Reference One.

Contact the Lead Organisation for your area of STEM to learn more about evaluation and other ways in which you can benefit. Lead Organisations may also be able to discuss with you the scale of evaluation appropriate for particular STEM initiatives. Contact details for Lead Organisations are provided on page 2.

Contribute – If you have particular expertise or experience and would like to contribute to this work, please contact the relevant Lead Organisation, or alternatively, John Holman, National STEM Director (see 'Feedback' on the back cover).

Future developments

A seminar to share a draft of this publication was held in early summer 2009, and further feedback was obtained at the 2009 STEM Partnership Conference. The evaluation guidance was very much welcomed by colleagues at both events and, as a result of feedback, improvements have been made to this publication. In addition, the STEM Cohesion Programme requested suggestions for how the Programme could further support evaluation work of Lead Organisations and other STEM partners. Many helpful ideas emerged including:

- The collection and study of STEM evaluations which have already been undertaken, to identify common themes and findings.
- STEM partners clearly identifying in future STEM evaluations any implications for participants, providers and funders, and sharing these using any report's Executive Summary.
- The development of further guidance on the scale and approach to evaluation that is appropriate for different types of initiative. This could be enhanced by identifying how best to draw on existing expertise in STEM and its evaluation, to the benefit of all STEM partners.

These ideas, and other feedback, will be considered by the STEM Cohesion Programme during 2010.



Feedback

If you have any queries regarding the DCSF's STEM Cohesion Programme, please contact John Holman, National STEM Director, j.holman@slcs.ac.uk. To comment on this publication, and to find out more about the work of the National STEM Centre, please contact the Centre's Director, Jenifer Burden, j.burden@nationalstemcentre.org.uk.

References

1. *Summary of Public Sector Guidance for Evaluation with respect to STEM Initiatives* is available at www.nationalstemcentre.org.uk
2. *RCUK Evaluation Guidelines*, which provide an accessible introduction to evaluation in general is available at <http://www.rcuk.ac.uk/aboutrcuk/publications/corporate/evaluationguide.htm>

Acknowledgments

The STEM Cohesion Programme team are grateful to Lead Organisations, and others, for their time and experience in this process and in compiling this document. Amongst others, those consulted include:

- National Centre for Excellence in the Teaching of Mathematics (NCETM)
- National Network of Science Learning Centres (NNSLC)
- Royal Academy of Engineering (RAEng)
- SCORE
- Advisory Committee on Mathematics Education (ACME)
- STEMNET
- Centre for Science Education (at Sheffield Hallam University)

