

## Module 16: Assessment for Learning – variety of strategies

### Aims of the Module

- Introduce participants to a range of assessment approaches and strategies to promote creativity in the early years science classroom
- Share strategies that will enable participants to value and be able to make use of varied forms of assessment evidence to inform teaching and longer term planning
- Increase awareness of assessment as an opportunity to promote creative learning, through reflection and discussion in science and mathematics
- Explore ways in which teachers can design and assess open-ended learning activities
- Enable participants to gain insights into children’s developing explorations and creativity based on their use of resources and varied modes of expression and representation.

### Links to the Content Design Principles and Outcomes

7. Teacher education should familiarise teachers with a range of formal and informal inquiry- and creativity-based learning, teaching and assessment approaches and strategies and their use in relation to authentic problems within the areas of science and mathematics.

7.1 Teachers should have knowledge of a range of formal, non-formal and informal learning, teaching and assessment approaches and strategies to promote creativity in their early years science and mathematics classroom.

7.4 Teachers should be able both to build in new and to make the most of existing opportunities for child-initiated play, recognising and capitalising on the potential of children’s explorations beyond the teacher’s original intentions.

7.10 Teachers should value and be able to make use of varied forms of assessment evidence (including children’s portfolios, individual or group records of activities), both to promote creative learning, through reflection and discussion in science and mathematics, and explicitly to inform teaching and longer term planning.

8. Teacher education should enable teachers to design and assess creativity-enabling inquiry-based activities, which are child-friendly and include both guided and open inquiries.

8.1 Teachers should be able to design and assess open-ended learning activities

9. Teacher education should enable teachers to make best use of and assess the various modes of expression and representation of science and mathematics learning to support inquiry and the development of creativity.

9.4 Teachers should be able to use the various modes of children’s expression and representation of science and mathematics ideas (e.g. pictures, graphs, gestures, physical activities) for assessment purposes.

17. Teacher education should address with teachers issues in ensuring rich provision, planning and use of resources (including digital resources) in and out of the classroom to support children’s inquiry and creativity.

17.6 Teachers should be able to gain insights into children’s developing explorations and creativity based on their use of resources.

## Rationale for the module

### *Central role of assessment in learning and teaching*

There is growing recognition internationally of the central role of assessment in learning and teaching. For example as noted in the Conceptual Framework adopted by the Creativity in Early Years Science Project (Creative Little Scientists, 2012: 64-65):

The last decade, particularly in England, has seen an increased focus on assessment (Gipps, 1994; Black, 2001; Black and Wiliam, 2006) this frames the over-arching ways in which assessment is approached in early mathematics and science. Two purposes need to be distinguished:

- formative assessment which directly informs learning and teaching (Black and Wiliam, 2003, 2009) and emphasises the trajectory of each learner; this is generally shared in the learning and teaching process thus may involve children themselves in self-assessment, peer-assessment and reflection and evaluation within a learning community, but not necessarily reported more widely,
- summative assessment, sometimes also framed as high stakes in itself (Taylor, Jones, Broadwell and Oppwal, 2008) which summarises performance at a particular point in time in order to compare children over time or to compare cohorts. This may be reported to parents or used for monitoring or accountability.

Attempting to meet both purposes in the classroom is complex, particularly when summative assessments or tests may need to be undertaken using context-free approaches, which can be a result of seeking to develop standardised approaches that allow comparison.

Perspectives on teaching and learning associated with creative, inquiry-based approaches to science underline the central role for formative assessment in a responsive approach to teaching. As highlighted in the Conceptual Framework, adopted by the CEYS project (Creative Little Scientists, 2012) this will involve:

- Identifying and building on the skills attitudes, knowledge and understandings children bring to school
- Supporting and encouraging children's active engagement in learning and fostering their awareness of their own thinking and progress.
- Recognising the key roles of feedback, sharing criteria with learners, questioning and self-assessment in promoting effective learning (Harrison and Howard, 2011). (The role of children in assessment is particularly significant when considering that evaluating ideas is an important learning process in science).
- Developing assessment approaches sensitive to the capabilities of young children (Robbins 2005) and to afford opportunities for children to express their ideas in different ways through for example speech, gestures or visualisations (Glauert 2009).

### *Issues in assessment policy and practice: Findings from the Creative Little Scientists Project*

The research carried out by the Creative Little Scientists Project also identified a range of key issues in policy and practice related to assessment in early years science that have informed the development of the Training Modules produced by the CEYS project.

### *Findings from surveys of policy and teachers' views*

In the surveys carried out by the CLS project into policy and teachers' views in relation to early years science, assessment, especially formative assessment, was widely highlighted as a particular area for development in both preschool and primary phases. Key issues included:

*A lack of policy guidance* both in terms of both methods of assessment and criteria for assessing on-going progress, resulting in considerable variability in approaches adopted among partner countries. Areas highlighted for particular development included: the use of multimodal forms of assessment to give young children opportunities to show best what they understand and can do; ways of involving children in peer and self-assessment to support children's reflection on inquiry processes and outcomes; and criteria to assess progression in learning, particularly in relation to inquiry and the development of dispositions associated with creativity

*Challenges in assessment related to inquiry and creativity*, linked to a common tendency to focus on *product* rather than *process* in assessment requirements, allied with the pressures of statutory summative assessment processes in a number of partner countries.

*The need for a closer match between the aims and rationale for science education in policy and assessment priorities and approaches.* For example while assessment of *science ideas* is widely emphasised in policy, more limited attention is given to assessment of *inquiry processes and procedural understanding* and even less to *social and affective dimensions of learning*, although these dimensions are often highlighted in the rationale and aims set out for early science and mathematics education. Although it should be noted that in the survey of teachers views, the respondents overwhelmingly gave greatest priority to the assessment of affective dimensions of learning,

*Limited attention to creative attributes in policy.* The assessment of thinking skills featured most strongly, especially in the early primary age phase. The other creative attributes most commonly emphasised or mentioned as being assessed include curiosity (greater emphasis in preschool), ability to work together (greater emphasis in primary) and ability to make connections with learning in other subjects. Again there were differences between emphases in policy and teachers' views. A large majority of teacher respondents reported praising and rewarding creative dispositions in particular children's ability to work together and their curiosity and imagination.

### *Findings from fieldwork*

Findings from fieldwork conducted in the CLS project confirmed the picture gained from the policy and teacher surveys that policy and practice in relation to assessment is underdeveloped. A number of key features of science assessment were identified

- Assessment approaches were generally informal and formative based on observation and teacher questioning. Classroom observations provided evidence of ways in which teachers built on assessment information to inform their interventions and planning for future sessions.
- However it was noted that the potential for inquiry, based on young children's interests and questions or implicit in children's actions, was not always recognised.
- There was limited evidence of the involvement of children in assessment, although interviews with children conducted during fieldwork indicated their capabilities to

reflect on their learning and gave teachers new insights into their learning processes.

- Some differences were identified between practices in preschool and primary school settings. In preschool settings there was evidence of a more holistic approach to assessment involving cognitive, social and affective factors, drawing on varied forms of evidence such as gesture, talk, children’s recording or visual images. In a number of preschool settings children’s profiles provided a valuable record of progress. In some cases children actively contributed to the selection of material, offering opportunities for reflection on learning. More generous staffing levels in preschool often made this more possible than in primary settings.
- Overall there was limited evidence of summative assessment. there was greater focus on summative assessment in primary school in some cases involving the use of more formal approaches to assessment such as tests.

For further details, see or example the reports that can be found on the CLS website at <http://www.creative-little-scientists.eu/content/deliverables> such as D6.5 Final Report on Creativity and Science and Mathematics Education for Young Children EXECUTIVE SUMMARY D6.6 Recommendations to Policy Makers and Stakeholders on Creativity and Early Years Science EXECUTIVE SUMMARY alongside the more detailed reports from the surveys of policy and teacher’s views and the findings from fieldwork.

### *Summary points*

#### *Why is assessment for learning important?*

- It has a central role in a responsive approach to teaching - in identifying and building on the skills, attitudes, knowledge and understanding children bring to school, and in supporting and encouraging children’s active engagement in learning.
- Reflection on learning and the evaluation of ideas and strategies play important roles in creative, inquiry based approaches to science learning and teaching.

#### *What are the issues for teachers? Issues in research, policy and practice*

- Lack of policy guidance in terms of both methods of assessment and criteria for assessing on-going progress
- Mismatch between aims and assessment priorities in policy – for example while science ideas are widely emphasised in policy, more limited attention is often given to inquiry processes, creative dispositions and social and affective dimensions of learning.
- Developing holistic approaches to assessment sensitive to the capabilities of young children
- Identifying strategies and criteria for assessing inquiry skills and creative dispositions
- Capturing learning processes in informal contexts and open-ended inquiry-based activities
- Developing a more strategic and systematic approach to formative assessment to inform learning and teaching – approaches are often implicit.

## Overview of the module

The module consists of the following activities:

- 1. What do you hope to gain from the module?** Participants are encouraged to share their ideas and any particular questions and issues they would like to be addressed.
- 2. Introduction to the aims and rationale for the session.** Introduction to different purposes of assessment and distinctions between formative and summative purposes. Why is assessment for learning important? Assessing inquiry and creativity – What are we trying to assess? How might we assess? Presentation of issues identified in the Creative Little Scientists project and characteristics of inquiry and creativity.
- 3. Sharing approaches to assessment** – range of approaches used, ways in which children are involved. Introduction to the Teacher Assessment in Primary Science School Self Assessment tool – mapping approaches in relation to this framework.
- 4. Assessment of open-ended inquiry based activities.** Participants work in groups of 4 with 2 carrying a brief inquiry-based activity and 2 observing – they then swap roles. This provides the basis for discussing issues associated with formative assessment of inquiry skills and creative dispositions and their implications for practice. Observers are provided with different recording sheets – some blank, some with prompts of inquiry skills and creative dispositions. Participants share experiences as doers and observers.
- 5. What opportunities did the activities provide for assessing creativity?** Introduction to CLS definitions of creativity in science and creative dispositions, followed by discussion including: What evidence of these was provided in your activities? What might be the role of the teacher in fostering creativity? Making links to synergies between creative and inquiry-based approaches.
- 6. Opportunities for assessment in classroom activities** – Participants review and discuss classroom examples with a focus on the following: What *kinds of evidence* does the example provide of children’s inquiry skills and creative dispositions? What assessment approaches are used by the teacher? In what ways does the teacher build on assessment information? How might you gain further insights into children’s learning?
- 7. Implications for planning and assessment.** Take a common science activity from your setting. How could you build in and extend opportunities for assessment at different points in the activity?
- 8. Reflections on what has been gained from the module.** Participants reflect on what they have gained from the module, both content and process. They refer back to the aims of the module and the issues and questions raised at the start. How far have they been addressed?

## Module at a glance

Time	Task	Materials	Grouping
00.00	<p><b>1. What do you hope to gain from the workshop?</b> <b>What are the issues in your setting?</b> <i>As an individual –</i></p> <ul style="list-style-type: none"> <li>• What do you hope to gain from the module?</li> <li>• Do you have any particular questions?</li> <li>• What are the key issues related to assessment in your setting?</li> </ul> <p>Note down 2/3 ideas in relation to each question Record each idea on a separate post it (one for each idea)</p> <p><i>As a group</i> See if you can sort these into groups – any common themes/differences?</p>	<p>Powerpoint slides</p> <ul style="list-style-type: none"> <li>• Task</li> <li>• Issues for practitioners</li> <li>• Outline of the session</li> </ul> <p>Post its A3 paper for groups to collate their responses</p> <p>A1 Flip chart Marker pens Blutak to display the chart for review at the end of the session.</p>	<p>Individual reflection</p> <p>Groups of 4</p> <p>Followed with feedback with whole group</p>

	<p>Display as a poster. Keep for later reference.</p> <p>Feedback and discuss key themes with the whole group</p>		
00.20	<p><b>2. Introduction:</b> aims and rationale for the module. Different purposes of assessment. Why is assessment for learning important? Links to the synergies between inquiry-based and creative approaches in early years science. What are the issues for teachers? What are we seeking to assess in fostering creativity in Early Years Science? Introduction to definition of creativity used in the CEYS project. Assessment important foundation for fostering creative inquiry based approaches to early years science.</p>	<p>Powerpoint presentation</p> <ul style="list-style-type: none"> <li>• Aims</li> <li>• Links to Content Design Principles and Outcomes</li> <li>• Purposes of assessment</li> <li>• Session rationale</li> <li>• Synergies between inquiry based and creative approaches</li> <li>• Issues for teachers</li> <li>• Definitions of creativity in early years science</li> </ul>	Whole group
0.30	<p><b>3. What strategies have you found helpful in science assessment?</b> <b>As an individual</b> What approaches do you use?</p> <ul style="list-style-type: none"> <li>• Brainstorm as many approaches you can think of in 2 minutes.</li> <li>• Record each approach on a post it.</li> </ul> <p><b>In groups</b> Review the range of approaches</p> <ul style="list-style-type: none"> <li>• Which approaches have you found most helpful in supporting learning and teaching and why?</li> <li>• In what ways are children involved in assessment processes?</li> </ul> <p><b>Whole group</b></p> <ul style="list-style-type: none"> <li>• Exchange ideas</li> <li>• Consider match to the TAPS pyramid model.</li> </ul>	<p>Powerpoint slides Task TAPS grid – see module resources and slide for links to the TAPS website.</p> <p>Post its and pens Hard copies of TAPS grid of actions teachers and children can take to support assessment - for all participants</p> <p>A1 flip chart and pens for recording whole group discussion</p>	<p>Individual</p> <p>Groups 4/5</p> <p>Whole group</p>
00.50	<p><b>4. Assessment of inquiry skills and creative dispositions in open-ended inquiry activities</b></p> <p><i>In groups of 4. Divide into two pairs.</i></p> <ul style="list-style-type: none"> <li>• One pair does the activity</li> <li>• Other pair observe <b>separately</b> – observers do not communicate with doers or each other</li> <li>• Observers record observations on the recording sheets provided.</li> </ul> <p>Some observers are provided with blank recording sheets, others with a sheet listing features of inquiry and creative dispositions as prompts.</p> <p><i>At end of the activity</i></p> <ul style="list-style-type: none"> <li>• DOERS list what they did and OBSERVERS share observations</li> <li>• Group of 4 share perceptions/feedback</li> </ul> <p>If time repeat and swap roles.</p> <p><i>Finally</i> Discussion of issues that emerging from this process for example:</p> <ul style="list-style-type: none"> <li>• What was easy/difficult to observe? Did this differ between the activities? Why might this be?</li> <li>• Comparing assessment between/within investigators/observers.</li> <li>• How did it feel?</li> </ul>	<p>Powerpoint slides Instructions for the task Questions to discuss</p> <p>Questions and resources for investigations for example: Which is the strongest magnet? Blooming paper flowers</p> <p>Recording sheets – blank and with prompts</p> <p>A1 flip chart and pens for recording whole group discussion.</p>	<p>Groups 4</p> <p>Followed by whole group discussion</p>

	<ul style="list-style-type: none"> <li>What were the advantages/disadvantages of the different recording sheets?</li> </ul> <p><i>As a whole group</i></p> <ul style="list-style-type: none"> <li>What are the implications?</li> </ul>		
1.20	<p><b>4. What opportunities did the activities provide for assessment of creative dispositions?</b></p> <p>Reminder of Creative dispositions</p> <p><i>Pair and share</i></p> <ul style="list-style-type: none"> <li>Refer back to your observations – what evidence of these was provided in your activities? Annotate your observations.</li> <li>What might be the role of the teacher in fostering creativity?</li> <li>Consider links to the synergies between inquiry based and creative approaches</li> </ul> <p><i>As a whole group</i></p> <ul style="list-style-type: none"> <li>Feedback reflections</li> <li>Consider links with the synergies identified in CEYS conceptual framework</li> </ul>	<p>Power point slides</p> <ul style="list-style-type: none"> <li>Definitions of creativity</li> <li>Creative dispositions</li> <li>Task – opportunities for creativity</li> <li>Synergies between creative and inquiry based approaches</li> </ul> <p>A1 flip chart and pens for recording whole group discussion</p>	<p>Whole group</p> <p>Groups of 4</p> <p>Whole group</p>
1.30	<b>Break</b>		
1.50	<p><b>5. Opportunities for assessment in classroom examples</b></p> <p><i>Work in groups of 4</i></p> <p>Each group has a copy of all the examples. Start in pairs with different examples, then swap.</p> <p><b>1. Read through first to gain an overview of the learning journey.</b></p> <p><b>2. Then consider the following questions:</b></p> <ul style="list-style-type: none"> <li>What kinds of evidence does the example provide of children’s inquiry skills and creative dispositions?</li> <li>What assessment approaches are used by the teacher?</li> <li>In what ways does the teacher build on assessment information?</li> <li>How might you gain further insights into children’s learning?</li> </ul> <p><b>Whole group discussion</b></p> <ul style="list-style-type: none"> <li>Sharing responses</li> <li>Reflection on implications for planning and assessment</li> </ul> <p>Positive actions to aid the process of assessment (Harlen, 1999)</p> <p>Principles of Assessment for Learning (Assessment Reform Group, 2002)</p>	<p>Powerpoint slides :</p> <p>The task</p> <p>Key details from the Curriculum Materials selected</p> <p>Positive actions to aid the processes of assessment</p> <p>Principles of Assessment</p> <p>Copies of Curriculum Materials from the CEYS project for example:</p> <p>An icy adventure</p> <p>On the go</p> <p>Floating boats</p> <p>A3 recording sheets with prompts</p>	<p>Groups of 4 divided into 2 pairs.</p> <p>Followed by whole group discussion.</p>
2.20	<p><b>7. Implications for planning and assessment</b></p> <ul style="list-style-type: none"> <li>Take a favourite science activity you carry out in your setting.</li> <li>How could you build in and extend opportunities for assessment at different points in the activity?</li> </ul>	<p>Powerpoint slides</p> <p>Flip chart and pens to record feedback</p>	<p>Individual reflection followed by Whole group</p>
2.45	<p><b>8. Reflections on what has been gained from the module</b></p> <ul style="list-style-type: none"> <li><i>In groups 2/3s</i> Look back at your original ideas and questions. Anything you might add or change? Add in any additional comments or issues in another colour (pen/post it).</li> <li>Note and record 2 actions you will take</li> </ul>	<p>Powerpoint slides of activity and aims</p> <p>Original recording</p> <p>Pens, post its</p> <p>Flip chart</p>	<p>Groups of 4/5 for activities</p> <p>Sharing with the whole group</p>

	<p>building on module content.</p> <ul style="list-style-type: none"> <li>• In what ways did the different activities support your developing thinking?</li> <li>• How far have the aims of the module been met?</li> </ul>		
3.00	<b>End</b>		



## Teacher education pedagogy

These module activities are designed to encourage participants to reflect on issues and questions associated with assessment in science in their contexts. Important considerations include: What are we looking for? What strategies can we use? How will children be involved? How will the assessment be used to inform teaching and learning?

### 1. What do you hope to gain from the module? What are the issues in your setting?

This activity is designed to encourage participants to reflect on what they hope to gain from the module and any particular issues/questions they would like the module to address. This provides a useful starting point for discussion across the session, as well as a reference point for reflection at the end. Starting points in relation to assessment can vary considerably, so participants' responses can help pitch comments and the management of activities appropriate to the audience.

**2. Introduction** - This introduces the outline, aims and rationale for the session. It sets out to highlight different purposes of assessment and the key role of assessment FOR learning in creative, inquiry based approaches to science (as one of the synergies identified) and some of the key issues for teachers.

It introduces the questions: What are we looking for? How might we assess? - that run across the module. Participants are introduced to the definitions of creativity in early years science used in the CEYS project

### 3. What strategies have you found helpful in science assessment?

This is a chance to build on participants' experiences in thinking about the wide range of different ways teachers might gain information for assessment - involving both teachers and children, and then how this might be used to inform school policy and practice. The *Teacher Assessment in Primary Science project: School self evaluation tool* can be used by schools and teachers to reflect on the range of approaches they employ. This draws on the work of the Nuffield Foundation (2012) that set out to provide a framework for teacher assessment in primary science. The bottom two rows of the framework focus on formative assessment and can be helpful in making explicit all the different informal ways teachers assess but also ways in which children can be involved. You will need to consider whether this is appropriate to use or not in your setting. Other publications from the ongoing TAPS project are also useful including free access to some of the articles they have written for both professional and academic publications.

### 4. Assessment of inquiry skills and creative dispositions in open-ended inquiry activities: opportunities and challenges.

This practical activity is designed to foster discussion of issues associated with assessing inquiry skills and creative dispositions through observation. It is important to make sure participants are clear about the procedure.

This is not meant to model classroom activity – it is a vehicle for thinking through issues of observations (*you would not work like this with children!*)

Observers do not talk to each other and do not interact with the investigators. They note observations of each investigator in a separate column on their recording sheet.

Important issues to be considered include:

- Important insights can be gained from observation of talk and action – but further strategies may be needed to draw out children's thinking.
- The need to clarify what you are looking for (for both teachers and learners)
- The importance of participants' perspectives and feelings to gain insights into their ideas and reasoning. They may differ from those of their observers!

- Recognition that different activities offer different assessment opportunities (cannot assess if opportunities not provided).
- Complexity of assessment (observers may also differ) therefore the importance of dialogue and developing sharing understanding.

The examples or activities listed are just suggestions. Many other examples could be used - they just need to be activities that can be tackled quite quickly and where participants need to make decisions and solve problems.

### **5. What opportunities did the activities provide for assessment of creative dispositions?**

This provides space for specific focus on creative dispositions – What kinds of evidence might be provided? What kinds of activities provide opportunities for creativity? What support might be needed to foster these dispositions? This provides a context for discussion of the synergies between creative and inquiry-based approaches developed by the CLS project and their roles in fostering creativity. This has the potential to support discussion in the activity following.

### **6. Opportunities for assessment in classroom examples**

It is important to emphasise that the focus of this task is on evidence of *children's* inquiry and creativity. The classroom examples have considerable potential to foster interest and encourage debate. However participants may need support initially in engaging with the evidence shown in the classroom examples. It is helpful if the module facilitators introduce the materials and participants are encouraged to read them through to get a sense of the sequence of events before analysing the evidence in detail. We have found it helpful if participants work in pairs to study one example in detail and then look more briefly at the others distributed. To support the feedback all tables will benefit from having at least one copy of all the examples to be discussed.

As a link to the next activity you may find it helpful to share the 10 Principles of Assessment for Learning produced by the Assessment Reform Group (2002) available at <http://www.aiaa.org.uk/content/uploads/2010/06/Assessment-for-Learning-10-principles.pdf> - again if appropriate.

**7. Implications for planning and assessment.** This activity is designed to encourage participants to reflect on the implications of module content for their own contexts by reflecting on a practical everyday example.

**8. Reflections on what has been gained from the workshop.** A reminder of the aims and structure of the module and reflection on initial ideas provide helpful starting points for evaluation. It is valuable if you have the time to encourage participants not just to reflect on content but on module *processes*.

## **Background reading**

### ***Defining creativity in early years science***

This module draws on both the definition of creativity in early years science developed in the Creative Little Scientists project and adopted by the CEYS project and key features of inquiry-based approaches to science education. You may find it useful to provide opportunities for participants to become familiar with these prior to the workshop. The executive summaries of the Final Reports of the Creative little Scientists project D6.5 Final Report on Creativity and Science and Mathematics Education for Young Children EXECUTIVE SUMMARY

## D6.6 Recommendations to Policy Makers and Stakeholders on Creativity and Early Years Science EXECUTIVE SUMMARY

provide an accessible introduction to the definitions of creativity and inquiry used during the session, with illustrations from the classroom. These documents can be found on the CLS website at <http://www.creative-little-scientists.eu/content/deliverables>.

### *Synergies between creative and inquiry based approaches to learning*

The following article, built on the work of the Creative Little Scientists Project provides a useful introduction to the pedagogical synergies identified by the project between IBSE and CA to science learning and teaching, including Assessment for Learning.

Cremin, T. et al (2015) Creative Little Scientists: exploring pedagogical synergies between inquiry-based and creative approaches in early years science. *Education 3-13*, 43(4), 404-419.

### *Conceptual Framework for CEYS*

Creative Little Scientists (2012) Conceptual Framework available at [http://www.creative-little-scientists.eu/sites/default/files/CLS\\_Conceptual\\_Framework\\_FINAL.pdf](http://www.creative-little-scientists.eu/sites/default/files/CLS_Conceptual_Framework_FINAL.pdf)

### *Assessment for Learning in science*

Assessment Reform Group (2002). Ten Principles of Assessment for Learning available at <http://www.aaia.org.uk/content/uploads/2010/06/Assessment-for-Learning-10-principles.pdf>

This group has been at the forefront of challenging and developing thinking and practices in relation to assessment for learning. The poster provides a useful overview of key principles that underpin Assessment for Learning.

Earle, S. (2014). Formative and summative assessment of science in English primary schools: evidence from the Primary Science Quality Mark. *Research in Science and Technological Education*, 32(2), 216-228.

This article explores the background to the current context for assessment in primary science and summarises findings from a review of practices in 91 schools working towards the Primary Science Quality Mark April 2012 – March 2013.

Exploratorium workshops: Assessing for Learning

<https://www.exploratorium.edu/education/ifi/workshops/facilitators-guides>

The Exploratorium's Institute of Inquiry has developed a series of workshops available online entitled *Assessing for Learning* designed to introduce teachers to formative assessment

Based on the work of noted British educator Wynne Harlen, these workshops introduce the Formative Assessment Cycle, a process by which teachers gather evidence of students' thinking and use this evidence to decide next steps for teaching. These would offer a useful supplement or introduction to this module.

Hodson, C. (2010). *Assessment for Learning in Primary Science: Practices and Benefits*.

National Foundation for Educational Research. Available at

[http://www.nfer.ac.uk/publications/aas02/aas02\\_home.cfm](http://www.nfer.ac.uk/publications/aas02/aas02_home.cfm)

This provides an accessible and practical summary for schools of their review of research evidence on Assessment for Learning to inform school policy.

Hodson, C. and Pyle, K. (2010). *A Literature review of Assessment for Learning in science*.

National Foundation for Educational Research. Available at

[http://www.nfer.ac.uk/publications/AAS01/AAS01\\_home.cfm](http://www.nfer.ac.uk/publications/AAS01/AAS01_home.cfm).

This literature review stemmed from a project funded by NFER that undertook research in the field of

Assessment for Learning (AfL) in science with a focus on the primary age phase. It provided the basis for the summary above by Hodson.

Nuffield Foundation (2012). *Developing policy, principles and practice in primary school science assessment*. Nuffield Foundation. Available at [http://www.nuffieldfoundation.org/sites/default/files/files/Developing\\_policy\\_principles\\_and\\_practice\\_in\\_primary\\_school\\_science\\_assessment\\_Nuffield\\_Foundation\\_v\\_FINAL.pdf](http://www.nuffieldfoundation.org/sites/default/files/files/Developing_policy_principles_and_practice_in_primary_school_science_assessment_Nuffield_Foundation_v_FINAL.pdf). This is the report of a working group led by Wynne Harlen to address the question 'Is it possible to design assessment for the science curriculum that is fit for purpose?' It produced a framework for assessment of primary science that informed the Teacher Assessment in Primary Science Project detailed below.

The Teacher Assessment in Primary Science (TAPS) Project (2014). *Approaches to Science Assessment in English Primary Schools, Teachers' Summary*. Centre for Research in Early Scientific Learning, Bath Spa University. <http://www.bathspa.ac.uk/schools/education/research-in-education/research-projects/cresl-teacher-assessment-in-primary-years>

The focus for the work of the TAPS project with the Primary Science Teaching Trust (PSTT) is the development of an approach to teacher assessment in science to meet the requirements of the revised national curriculum in England, and to define 'best practice' across the UK. Their work so far provides a useful overview of characteristics of current practice and some cases studies of typical approaches to science assessment. The [executive summary for teachers](#) outlines recommendations for future development and offers a framework for analyzing and evaluating assessment approaches used across your school. This also includes examples to illustrate the various features of the model.

### Suggested classroom examples for use during the module

The following Curriculum materials from the *Creativity in Early Years Science Project* at <http://www.ceys-project.eu> act as useful starting points for discussion

Title	Age group	Country
Life cycle of a frog	4-5	England
An icy adventure	3-4	England
Electricity	4-5	England
Skeletons	7-8	England
Living things and their habitats	6-7	England
Bath bombs	3-5	England
On the go	4-7	England
Floating boats	5-6	Greece
The sounds around us	6-7	Greece

### Module resources

The following documents are provided as separate files in the Module folder for adaptation and use as appropriate during the module:

- Powerpoint presentation
- Task 4 Practical activities with list of resources – Which is the strongest magnet?  
Blooming Paper Flowers
- Recording sheets for the different activities:

- Task 4: Observation sheets for recording assessment information: one blank, the other with prompts (features of inquiry and creative dispositions)
- Task 5 recording sheet: Opportunities for assessment within everyday classroom activities
- Handouts
  - Definitions of creativity in early years science, features of inquiry and creative dispositions, synergies between inquiry based and creative approaches – for use across the session
  - Task 3 TAPS pyramid model: Teacher assessment in primary science: School self-evaluation tool.

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