



INSTITUTE FOR  
EDUCATION



# Teacher Assessment in Primary Science (TAPS)

Cambridge Primary Review

Nov 2016

Sarah Earle

@PriSciEarle

s.earle@bathspa.ac.uk

**Aiming to develop support for a valid, reliable and manageable system of science assessment which will have a positive impact on children's learning.**

# TAPS headlines so far

- Reports summarising of approaches
- Pyramid self-evaluation tool with examples
- Focused assessment database of plans and work samples



TAPS OVERVIEW | TAPS FILES | FOCUSED ASSESSMENT OVERVIEW | FOCUSED ASSESSMENT DATABASE

### FOCUSED ASSESSMENT DATABASE

[+ FILTER RESOURCES](#)

- Y1 PLANS & WORK SAMPLES [21 RESOURCES]
- Y2 PLANS & WORK SAMPLES [18 RESOURCES]
- Y3 PLANS & WORK SAMPLES [27 RESOURCES]
- Y4 PLANS & WORK SAMPLES [20 RESOURCES]
- Y5 PLANS & WORK SAMPLES [23 RESOURCES]
- Y6 PLANS & WORK SAMPLES [19 RESOURCES]

The screenshot also shows a preview of a resource titled 'Plan for Focused Assessment of Science' from Bath Spa University. It includes sections for 'Aims', 'Key Questions', 'Assessment Indicators', and 'Example' of a student's work on a polar bear.

# Teacher assessment of primary science

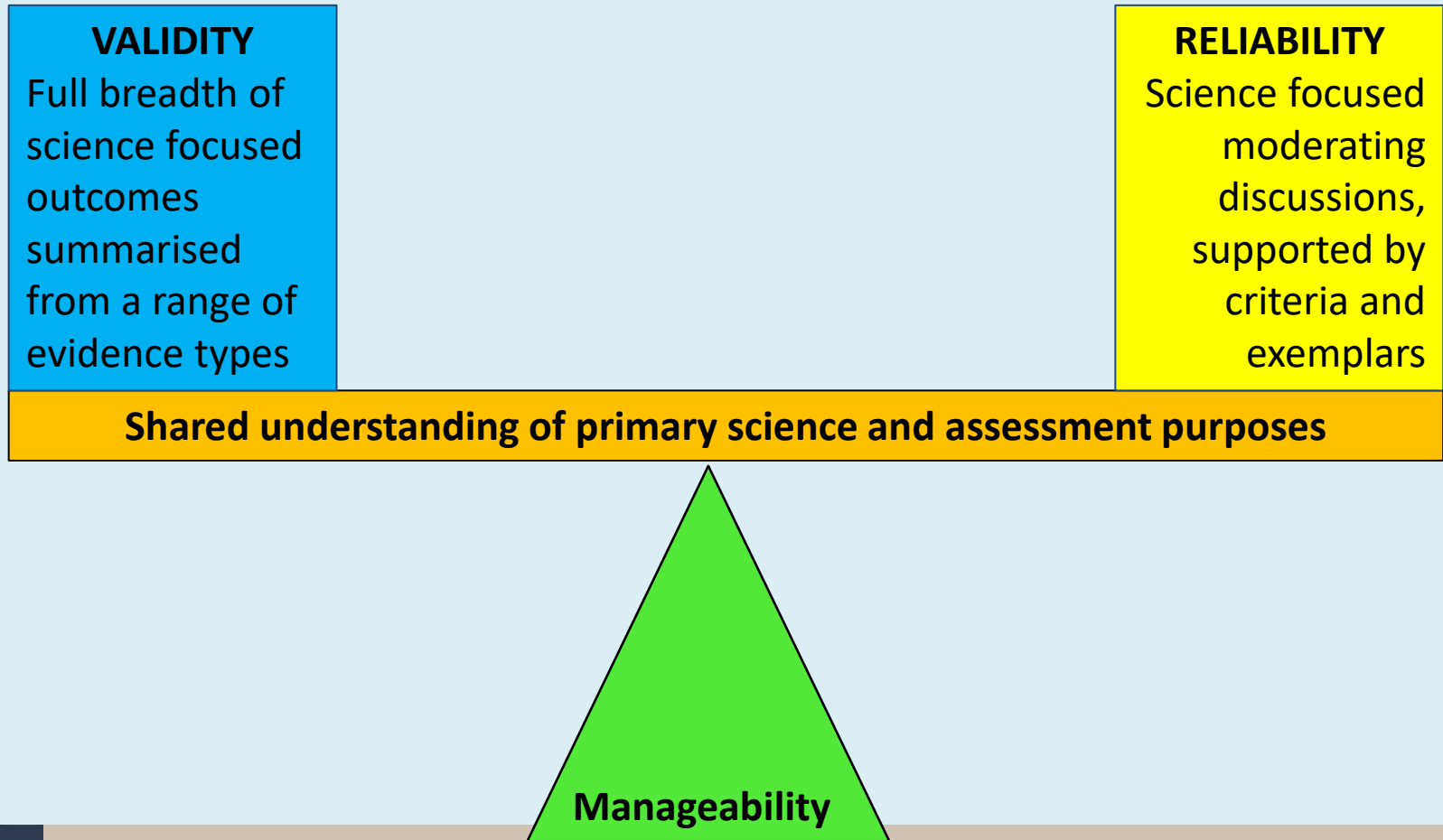
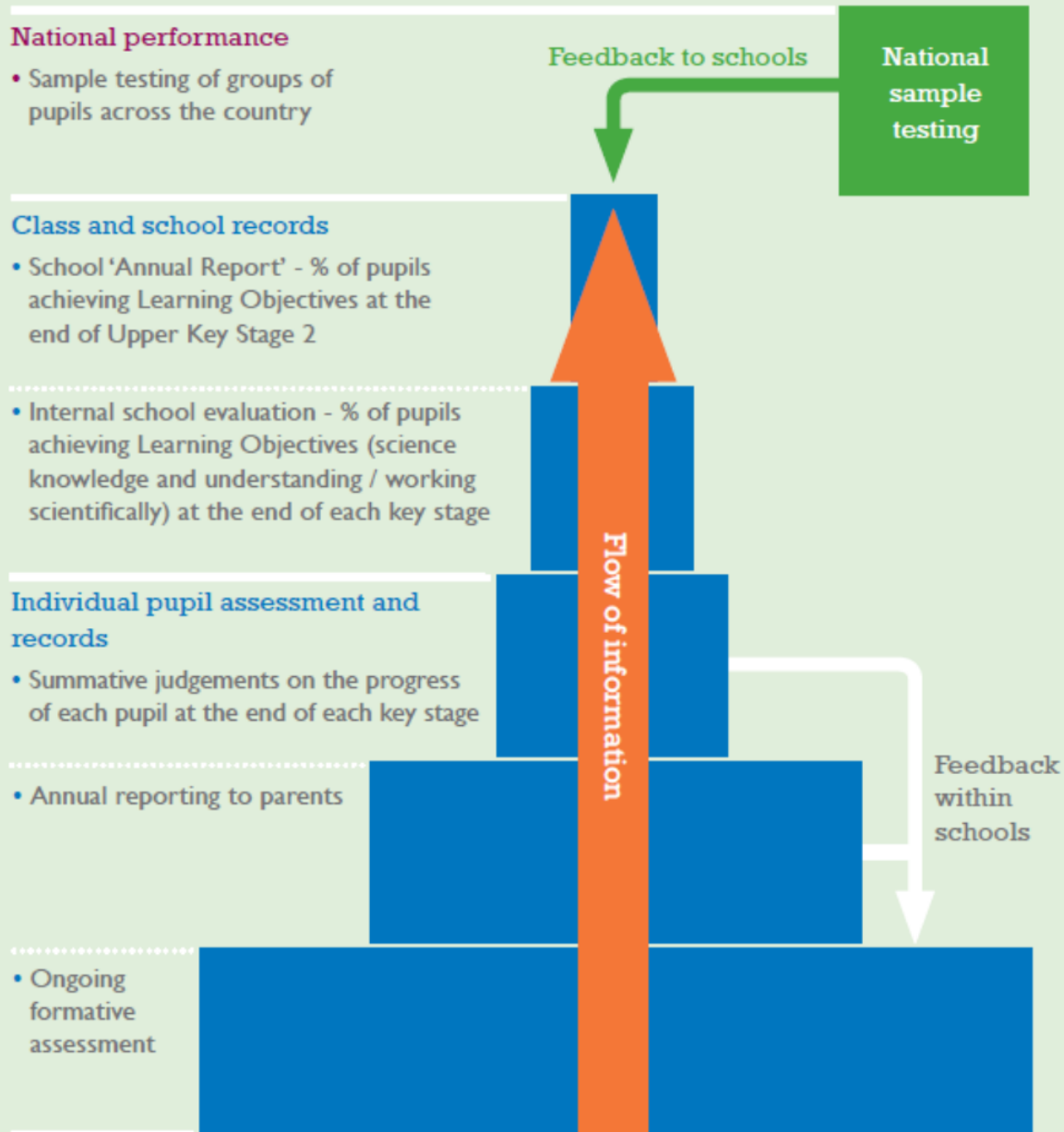


Figure 1: The flow of assessment data through the school



What does this look like in practice?

A Design-Based Research approach

Ongoing formative assessment  
can be summarised

Range of info/contexts  
supports validity (all  
areas e.g. WS)

Shared understanding  
and moderation supports  
reliability (consistency)

Focus, clear purpose and  
examples support  
manageability

Whole sch  
processes

**Summative reporting**  
e.g. based on range of info

**Monitoring**  
e.g. moderation for shared understanding

**Responsive teaching**  
e.g. clear focus, Qs, feedback

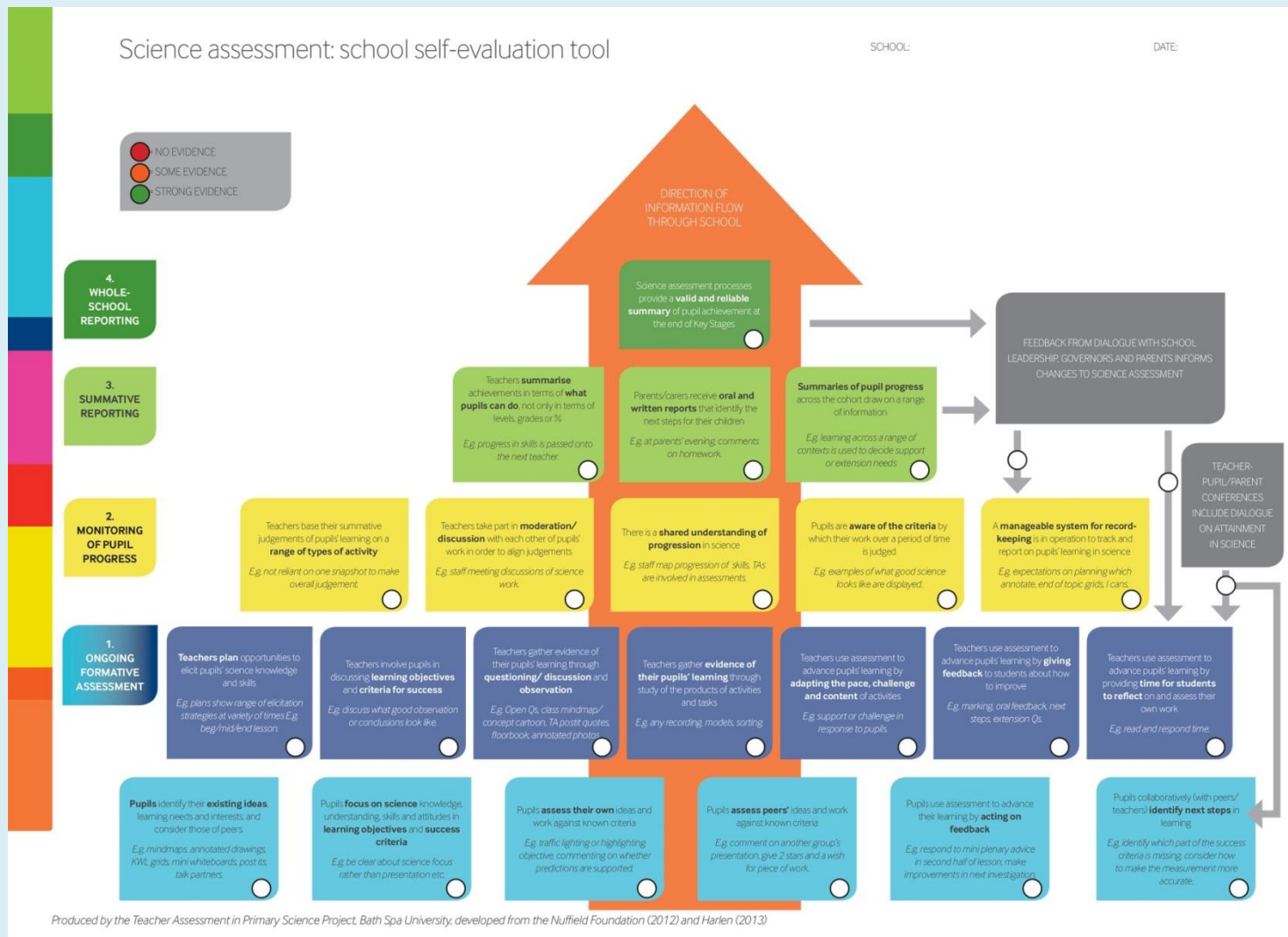
**Active pupil involvement**  
e.g. self/peer assessment

Summarise ongoing  
formative  
assessment for  
different reporting  
purposes

Principles and  
examples of  
AfL = most  
impact on  
learning

## TAPS pyramid model

# TAPS pyramid for school self-evaluation



Produced by the Teacher Assessment in Primary Science Project, Bath Spa University, developed from the Nuffield Foundation (2012) and Harlen (2013)



Pupils identify their **existing ideas**, learning needs and interests, and consider those of peers.

E.g. mindmaps, annotated drawings, KWL grids, mini whiteboards, post its, talk partners.

Pupils **focus on science** knowledge, understanding, skills and attitudes in **learning objectives** and **success criteria**.

E.g. be clear about science focus rather than presentation etc.

Pupils **assess their own** ideas and work against known criteria.

E.g. traffic lighting or highlighting objective, commenting on whether predictions are supported.

Pupils **assess peers'** ideas and work against known criteria.

E.g. comment on another group's presentation, give 2 stars and a wish for piece of work.

Pupils use assessment to advance their learning by **acting on feedback**.

E.g. respond to mini plenary advice in second half of lesson, make improvements in next investigation.

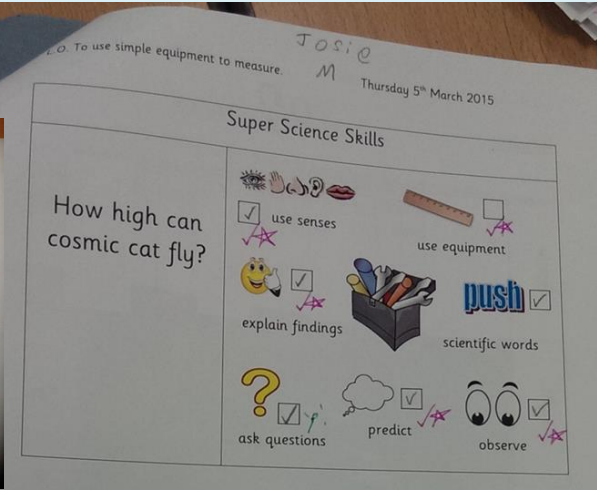
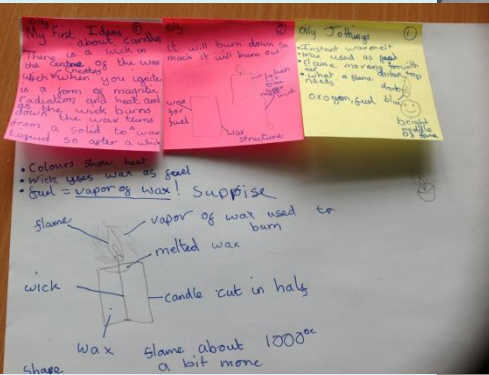
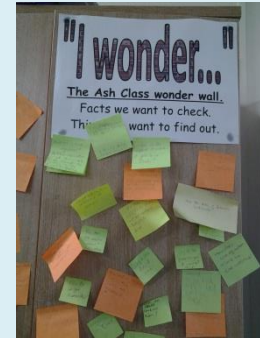
Pupils collaboratively (with peers/teachers) **identify next steps** in learning.

E.g. identify which part of the success criteria is missing, consider how to make the measurement more accurate.

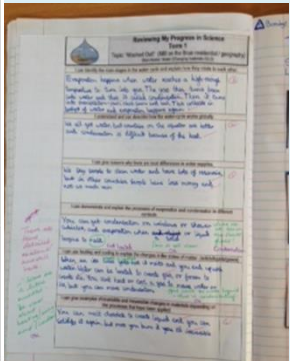
Pupils identify their existing ideas

Pupils assess peers' ideas and work

Pupils assess their own ideas



<p><b>Safety!</b></p> <ul style="list-style-type: none"> <li>Understand the reasons for safety warnings for particular activities.</li> <li>Work sensibly and safely to protect <b>others and objects</b>.</li> <li>Can relate our safe practice instructions to laboratories and other places of work/life.</li> <li>Know what to do if there is an accident.</li> </ul>	<p><b>Questions</b></p> <ul style="list-style-type: none"> <li>Notice and describe a lot of detail, using all senses, as appropriate.</li> <li>Describe in detail: changes, properties, reactions, cause.</li> <li>Consider cause and effect of what I observe.</li> <li>Use observed detail to consider explanations.</li> <li>Use observation equip. with understanding of magnification.</li> </ul>	<p><b>Questions</b></p> <ul style="list-style-type: none"> <li>Ask, raise questions for scientific enquiry.</li> <li>Ask questions to further my understanding.</li> <li>Question information and its sources.</li> <li>Refine my questions to make them precise in order to get the answer I need.</li> <li>Can construct a testable question.</li> <li>Respectfully question the ideas of others.</li> </ul>
<p><b>Use measuring equipment</b> accurately and precisely to collect data, including:</p> <ul style="list-style-type: none"> <li>Stop watches/stop clocks</li> <li>Ruler/tapes</li> <li>Weighs/scales</li> <li>Force-meters</li> <li>Light/colour sensors</li> <li>Thermometers</li> <li>Data-loggers</li> </ul> <p>I do repeat readings to check accuracy = validity</p> <p>Other people make sense of my data.</p>	<p><b>Collect, record and present data in an organised way.</b></p> <ul style="list-style-type: none"> <li>Bar graphs</li> <li>Line graphs</li> <li>Scatter graphs</li> <li>Carol diagrams</li> <li>Venn diagrams</li> <li>Labelled diagrams</li> <li>Tables</li> <li>Classification keys</li> <li>Pie charts</li> </ul> <p>I can independently construct my own scientific graphs.</p> <p>I can use the data to make comparisons/predictions and raise further questions.</p> <p>I can use the data to justify a conclusion.</p>	<p>I can relate what we are learning in science to events in real life.</p> <p>I know some global and local challenges that science is trying to improve.</p> <p>I can discuss some positive and negative consequences of science in my life and others.</p> <p>I recognise the role science has in trying to understand our world.</p> <p>I recognise there are different kinds of sciences.</p> <p>I know some jobs that use science.</p>
<p><b>Types of enquiry</b></p> <p>I can decide what kind of enquiry would be appropriate.</p> <p>I can identify use secondary sources - books, internet, people, TV to find out 'facts'.</p> <p>I know when to do an experiment.</p> <p>I identify variables when I need to do a controlled test.</p> <p>I can set up a comparative tests.</p>	<p><b>The Scientific Method as an Ongoing Process</b></p>	<p><b>Green for Growth Ticked Pink</b></p> <ul style="list-style-type: none"> <li>I've made a start but... need support.</li> <li>I'm getting there - need a little more practice / thought.</li> <li>I feel confident with this.</li> </ul>





**Joe**  
The screw will stick to the magnet because I tried it before.  
I think the measuring jug will not stick to the magnet because it is plastic.

**Jack M**  
I think a spring is magnetic because I tried it before and it stuck to my magnet.  
A stone is not magnetic because it's not metal.  
I was surprised the peg was magnetic.

**Maja M**  
I think the spring is magnetic because it is made of steel.

**James**  
The screw is magnetic because it is metal. The funnel is not magnetic because it's plastic. Wood, plastic and glass are not magnetic.

**Libby**  
The marble is magnetic because it is shiny.  
The peg is not magnetic because there's nothing magnetic on it. James said there's a metal on it so it will be magnetic.

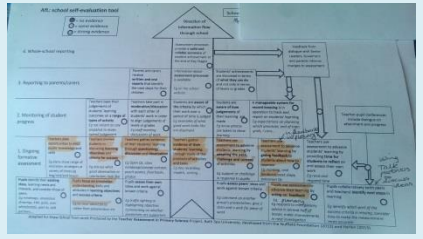
**Which material is magnetic?**

**Any**  
The washer is magnetic because it is metal.  
The balloon is made of elastic so not magnetic.

Teachers adapt pace and give pupils time to reflect

Teachers plan opportunities to elicit through discussion

Teachers involve pupils in discussing criteria for success



Teachers plan opportunities to elicit pupils' science knowledge and skills  
E.g. plans show range of elicitation strategies at variety of times E.g. beg/mid/end lesson.

Teachers involve pupils in discussing learning objectives and criteria for success  
E.g. discuss what good observation or conclusions look like.

Teachers gather evidence of their pupils' learning through questioning/discussion and observation  
E.g. Open Qs, class mind map/concept cartoon, TA posit quotes, floorbook, annotated photos.

Teachers gather evidence of their pupils' learning through study of the products of activities and tasks  
E.g. any recording, models, sorting.

Teachers use assessment to advance pupils' learning by adapting the pace, challenge and content of activities  
E.g. support or challenge in response to pupils.

Teachers use assessment to advance pupils' learning by giving feedback to students about how to improve  
E.g. marking, oral feedback, next steps, extension Qs.

Teachers use assessment to advance pupils' learning by providing time for students to reflect on and assess their own work  
E.g. read and respond time.



Teachers base their summative judgements of pupils' learning on a **range of types of activity**  
E.g. not reliant on one snapshot to make overall judgement.

Teachers take part in **moderation/discussion** with each other of pupils' work in order to align judgements  
E.g. staff meeting discussions of science work.

There is a **shared understanding of progression** in science  
E.g. staff map progression of skills. TAs are involved in assessments.

Pupils are **aware of the criteria** by which their work over a period of time is judged  
E.g. examples of what good science looks like are displayed.

A **manageable system for record-keeping** is in operation to track and report on pupils' learning in science  
E.g. expectations on planning which annotate, end of topic grids, I cans.

'We discussed assessments: we found tracking every child on every objective was unmanageable.'

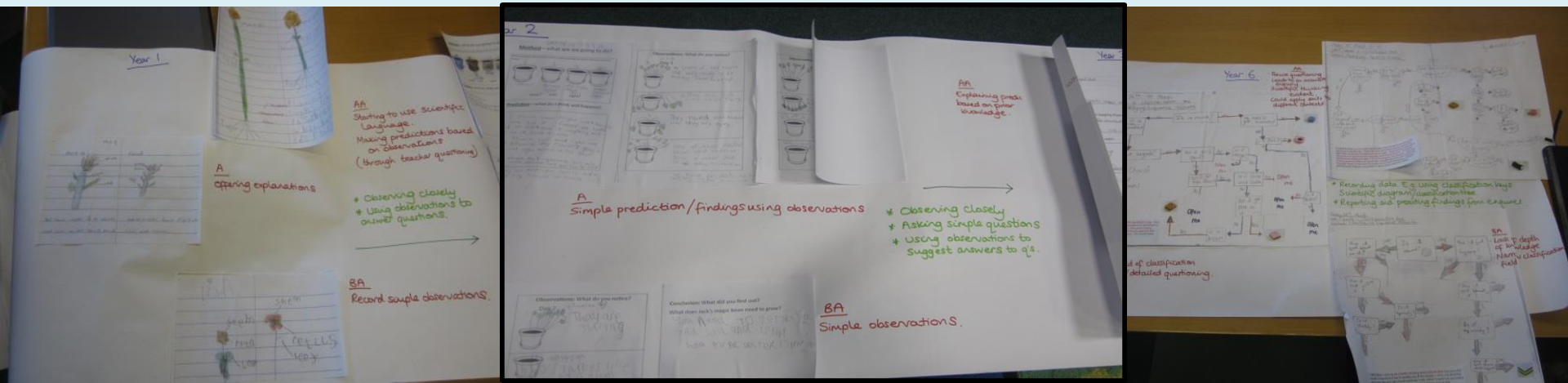


Moderation discussions

'We tried a best fit model, but it was not really picking up the scientific thinking. We are now using Focused Assessments to look closely at one area of science at a time.'

SCL Science Enquiry Assessment  
Key Stage One  
Learning Theme

Year Group: One	Term(s)	
<p><b>Children working on ELO Scale points 2 and 3</b></p> <p><b>KUW 8</b> - The child independently makes thoughtful choices about the selection of resources, the tools and techniques employed in his or her construction work. The child will change what has not served its purpose in order to make improvements.</p> <p><b>KUW 9</b> - The child will confidently and independently plan, record and evaluate her or his work. He or she is able to select resources, describe why they are needed and use appropriate vocabulary to effectively explain the thinking behind what is being planned and done. The child will reflect upon personal experiences of belonging to different groups in the wider community.</p>	<p><b>Children working within Level 1</b></p> <p>Pupils describe or respond appropriately to simple features of objects, living things and events they observe, communicating their findings in simple ways for example, talking about their work, through drawings, simple charts.</p>	<p><b>Children working within Level 2</b></p> <p>Pupils respond to suggestions about how to find things out and, with help, make their own suggestions about how to collect data to answer questions. They use simple facts with help, to find information. They use simple equipment provided and make observations related to their task. They observe and compare objects, living things and events. They describe their observations using scientific vocabulary and record them, using simple tables when appropriate. They say whether what happened was what they expected.</p>



Teachers base their summative judgements of pupils' learning on a **range of types of activity**

*E.g. not reliant on one snapshot to make overall judgement.*

Teachers take part in **moderation/discussion** with each other of pupils' work in order to align judgements

*E.g. staff meeting discussions of science work.*

There is a **shared understanding of progression** in science

*E.g. staff map progression of skills. TAs are involved in assessments.*

Pupils are **aware of the criteria** by which their work over a period of time is judged

*E.g. examples of what good science looks like are displayed.*

A **manageable system for record-keeping** is in operation to track and report on pupils' learning in science

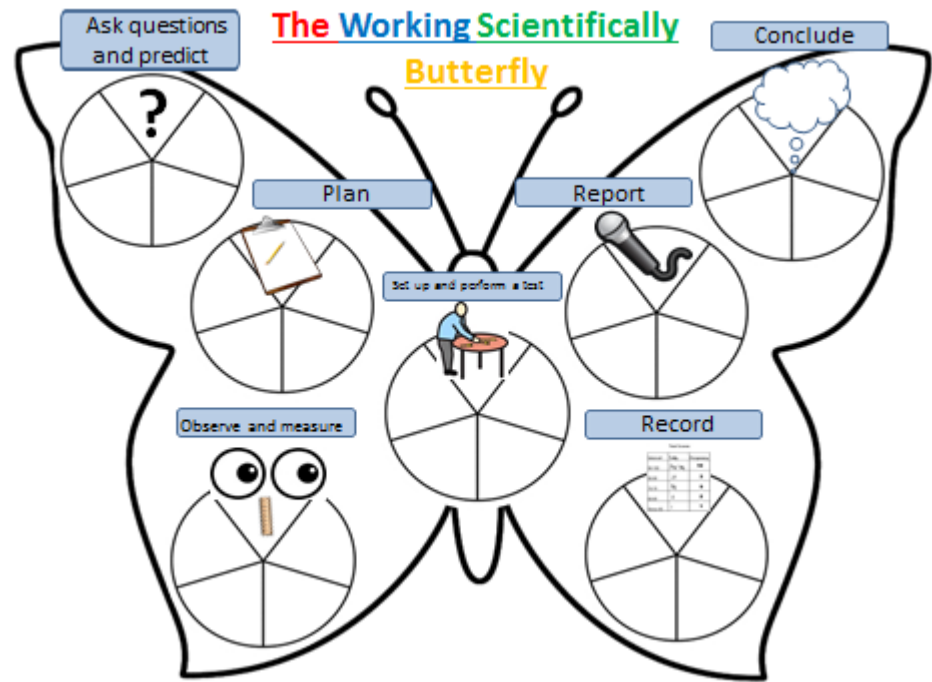
*E.g. expectations on planning which annotate, end of topic grids, I cans.*



## Shared understanding of progression

	Plan	Do	Review
<b>Support for coverage and progression of Working Scientifically</b>	(NC objectives, guidance to support progression in italics)	DRAFTS S.Earle Dec2014	
	<b>Ask Qs + Predict</b>	<b>Observe + Measure</b>	<b>Interpret + Report</b>
<b>Support for progress</b>	Provide time for pupils to explore. Provide experiences of different enquiries	Set up enquiry which will enable comparisons. Ask pupils to describe, draw and compare.	Prepare a range of formats to support pupils to record. Create a science word bank with pupils.
<b>KS1 Develop close obs</b>	Ask simple questions. Begin to predict. Recognise that Qs can be answered in different ways.	Perform simple tests. Observe closely, using simple equipment.	Communicate what they found out using simple scientific language. Use their observations and ideas to suggest answers to questions.
<b>Support for progress</b>	Provide question stems. Ask pupils to explain their predictions.	Provide access to a range of equipment. Discuss how to make increasingly accurate measurements.	Support pupils to identify key findings, noting patterns and relationships. Ask pupils to use their observations to make new predictions.
<b>Lower KS2 Develop systematic approach</b>	Ask relevant questions. Make predictions using previous experience. Use different types of scientific enquiries to answer questions.	Set up simple practical enquiries, comparative and fair tests. Make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.	Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. Identify differences, similarities or changes related to simple scientific ideas and processes. Use straightforward scientific evidence to answer questions or to support their findings.
<b>Support for progress</b>	Challenge pupils to ask a range of questions. Ask trouble questions.	Ask pupils to identify variables. Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.	Ask pupils to identify patterns and relationships in data. Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.
<b>Upper KS2 Develop independence</b>	Plan different types of scientific enquiries. Recognise and control variables where necessary.	Ask pupils to take repeat readings. Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.	Ask pupils to explain conclusions in terms of scientific concepts. Use test results to make predictions to set up further comparative and fair tests. Identify scientific relationships that has been used to support or refute ideas or arguments.
<b>Support for progress</b>	Ask pupils to sort questions raised into types of enquiry. Ask pupils to plan independently. Ask pupils to identify which are key or cannot be controlled.	Ask pupils to explain the need for repeat readings. Ask pupils to select how data is analysed e.g. averages and graph type.	Ask pupils to evaluate their own and others' evidence, recognising limitations. Ask pupils to identify and suggest reasons for outlying results and spread of repeated measures.

*Types of enquiry: observing changes over time, noticing patterns, grouping and classifying, comparative and fair tests, using secondary sources.*



# We welcome feedback and further ideas

- Questions?
- Feedback?
- Please do share with your networks and invite them to help us to expand the database with their own eggs.

[s.earle@bathspa.ac.uk](mailto:s.earle@bathspa.ac.uk)

@PriSciEarle



TAPS OVERVIEW	TAPS FILES	FOCUSED ASSESSMENT OVERVIEW	FOCUSED ASSESSMENT DATABASE
FOCUSED ASSESSMENT DATABASE			
FILTER RESOURCES			
Y1 PLANS & WORK SAMPLES [21 RESOURCES]			
Y2 PLANS & WORK SAMPLES [18 RESOURCES]			
Y3 PLANS & WORK SAMPLES [27 RESOURCES]			
Y4 PLANS & WORK SAMPLES [20 RESOURCES]			
Y5 PLANS & WORK SAMPLES [23 RESOURCES]			
Y6 PLANS & WORK SAMPLES [19 RESOURCES]			