

# Assessment of working scientifically – the TAPS Focused Assessment approach

**Kendra McMahon** explains what Focused Assessments are and why they are effective for both teachers and learners



Let's focus on... making balloon rockets!

## What is Focused Assessment?

The assessment of working scientifically (science enquiry) is a challenge. How do you assess what thirty children are thinking and doing in a lively practical session? In this article, we will unpick what the challenges are in more depth and explain how the TAPS Focused Assessment approach offers a manageable response to them.

The TAPS Focused Assessment approach embeds assessment within normal classroom science activities. In essence, a Focused Assessment is a lesson plan for a science enquiry, with an identified focus for assessment and guidance on how to interpret the children's responses in relation to expectations for that age group. We recommend that they are used about two-thirds of the way through a science topic, so there is still time for teaching to respond, and the assessment can also be used as a broad indicator that contributes to building a picture of the child's achievement in working scientifically.

This is a free, downloadable resource, developed by teachers and

university researchers with funding from the Primary Science Teaching Trust (PSTT). The materials and further explanation can be found on the PSTT website: <https://pstt.org.uk/resources/curriculum-materials/assessment>

There are two kinds of resource: ones that focus on assessment of a particular concept, such as what damages teeth, or suitability of materials for their use, and those that we discuss here in this article – which support the assessment of an aspect of working scientifically, such as raising questions, or interpreting data, in a conceptual context.

Importantly, they assess children doing a real, hands-on enquiry, so they have more validity than a pencil and paper test. They help us to make judgements about the ways in which children behave in action. Although the teacher will focus his/her attention on a fairly narrow area, the children may well use a whole range of knowledge and skills during their investigation.

**So many children, so little time!** Assessment always involves sampling –

we can never know the whole of what is happening inside a child's head, all of the time. Once we have reconciled ourselves to the fact that assessment cannot be perfect, we need to identify our choices and make some decisions about how to make it 'good enough' for purpose. In the limited time we have, we can either assess a few children in depth over a broad range of science, or we can assess more children over a narrower range. The TAPS Focused Assessments have selected a focus for assessment that is narrow enough to make it possible to assess all the children in a class within a reasonable timeframe. The classroom organisation for this varies a great deal with the age of the children and the specific enquiry, but aims to make assessment of children in action manageable.

## Working scientifically is complex!

Any full scientific enquiry involves a complex set of skills, knowledge and attitudes. It involves deciding on a productive question and how to go about answering it. There are decisions to be made about what

## An example of a Focused Assessment

information will be recorded and how it will be interpreted. The English National Curriculum is designed to show how different skills and knowledge are brought together, as in this statement on 'Working Scientifically' for Lower Key Stage Two (age 7-9): 'using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions' (DfE, 2013). But to simplify this complexity we can group working scientifically into three broad strands: 'Plan, Do and Review' and TAPS has designed activities that help teachers to assess within one strand at a time. A different strand can be the focus each term so that, over a school year, they build up to give an overall picture. Some project teachers also decided to focus their teaching that term on the same strand.

We recognise that working scientifically is complex, and realise that one assessment will not give a definitive view of all a child understands and can do, but suggest that Focused Assessment can offer particular insight, which can be combined with information gained from informal observations.

### I know my children – do I need to do this?

A great strength of primary teaching is that teachers get to know the children in their class well, and see them as whole people with different strengths across the curriculum. However, in forming a holistic view of a child, we sometimes over-generalise, and miss a child's particular strengths or don't realise that there are areas that they haven't understood. Some children come to our attention more than others but, by making sure we have observed every child, we can be sure that we have some evidence against which to check our informal judgements and that no one has slipped past our attention.

Psychological research into unconscious biases (Kahneman, 2011) shows that we are all vulnerable to make judgements that we are not aware of, and this happens even

## 7 Features of TAPS Focused Assessments:

Topic	Year 3 Plan	Title
Working Scientifically	Force	Balloon Rockets
Conceptual Knowledge		Compare how things move on different surfaces
Assessment Focus		Can children use results to predict and explain what may happen on the next attempt?
Activity		Set up a balloon rocket with the children (inflated balloon taped to straw, string through the straw, let go of balloon to shoot along string). Ask them to discuss what they think will happen if different tracks of different materials are used (e.g. wood, garden string, plastic, coated wire, etc. In groups or as a class, test out different tracks. Each time predict the distance the rocket will go, applying knowledge of friction and previous runs. Children could record predictions and results OR suggestions of improvements to the method after the investigation.
Adapting the activity		Support: Prepared sheet for recording predictions and measurements Extension: Extra colours to note explanations for results
Key Questions		<ul style="list-style-type: none"> <li>What do you think will happen when we let go of the balloon?</li> <li>Do you think it will be different if we use different tracks? Why?</li> <li>From the top down, what do you think the track is? Why?</li> <li>Which balloon went furthest?</li> <li>Why did that balloon go furthest? As far?</li> <li>Which track do you think was the best?</li> <li>How accurate do you think our results are?</li> <li>What could we do to be more accurate?</li> </ul>
Assessment Indicators		<p>Working Scientifically: Decision differences between different balloon tracks.</p> <p>Working: Comparisons of results use comparisons to previous results to make further predictions and suggest improvements for investigation set up. e.g. need a longer track, we didn't use the same balloon.</p> <p>Examining: Suggests improvements with reasons, e.g. 'it's not fair because we used different tracks, the balloon could have gone further if the track was longer so we need to be fairer.'</p>

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

if we are aware of the dangers of cultural stereotyping. One bias is the 'halo effect', where having formed a good view of a person, we are then more likely to see all their actions as good. Another is confirmation bias, when we notice or look for evidence that confirms our ideas and reinforces them. As teachers, we might assume that a child has understood something more than they have. In the TAPS project, experienced classroom teachers sometimes used the Focused Assessments to check where they were unsure about what a child or group of children could do and also to make sure that every child had a moment of the teacher's thoughtful attention.

We propose that this attention to every child helps to make our summative assessment more valid than relying only on informal judgements. We would strongly recommend an 'expansive' approach (Lum, 2015) in which teachers make judgements about the value of the different sources of evidence they have available to them and combine them accordingly.

### A focus on what? Concepts, contexts and types of enquiry

The child's knowledge of the context and understanding of relevant concepts has an impact on how they make sense of the situation and what possibilities they consider. Some areas of science lend themselves more easily to a certain type of enquiry than others; for example, learning about natural habitats is not generally amenable to fair testing, but observation over time and pattern-seeking enquiries are useful approaches. Where variables can be identified and controlled, there is potential for a fair test type of enquiry – e.g. *What's the most waterproof material? How can we make the best parachute?* As we

want children to encounter the full range of types of enquiry, this range of concept contexts is actually very helpful; however, it may need mapping out to check that children are encountering a good range in working scientifically. There is a full range of Focused Assessments available, currently based on the English National Curriculum, so that teachers can use them to assess the full range of types of enquiry, and these have been mapped out to show how they could build up over a child's time in primary school.

### Ongoing research

So far, the TAPS project teachers and tutors have looked at how the Focused Assessments are being used in the project schools, and this inevitably means that the teachers have been thinking in depth about science assessment. We have made detailed classroom observations of Focused Assessments in action, so far mostly in the classes of experienced teachers, looking to see to what extent our claims about them are true in practice (see the articles by TAPS project teachers Kerry-Anne Barber and James Mepsted in this issue for their perspectives.) Our next step is to find out how the Focused Assessments are being used more widely and by less experienced teachers and how we can improve the resource for them. With over 30,000 downloads to date, we would like to find out what the wider audience thinks of them and how they are using them. We would welcome your feedback – please e-mail us on [primaryscience@bathspa.ac.uk](mailto:primaryscience@bathspa.ac.uk)

### References

- Department for Education (2013) *The National Curriculum in England: Key Stages 1 and 2 framework document*. Available from: <https://www.gov.uk/government/publications/national-curriculum-in-england-primary-curriculum>.
- Kahneman, D. (2011) *Thinking, fast and slow*. London: Penguin.
- Lum, G. (2015) with Davis, A. & Winch C. *Educational Assessment on Trial*. London: Bloomsbury.

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See Kendra explain more about Focused Assessment here: <http://tinyurl.com/TAPSfocusedasst>