Supporting the teaching and assessment of working scientifically

James Mepsted considers a range of strategies that help to support the teaching of working scientifically within schools and lead to effective assessment

Children investigating reaction times

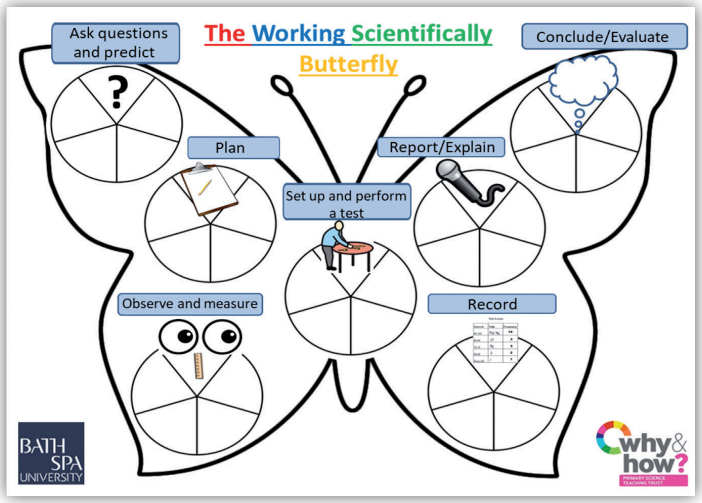
My project aimed to develop and implement the assessment of working scientifically (WS) skills at Victoria Park Primary School. I had previously identified a gap in the curriculum coverage and assessment of WS skills and my goal was to address the lack of provision for assessing children's WS skills and raise the confidence of teachers in assessing these skills.

Science teaching in my school takes an enquiry-cycle approach, with termly blocks that focus on history, geography and science topics and draw upon other areas of the foundation subjects. Before I was able to develop assessment of WS, I needed to raise its profile. I used the school butterfly emblem to create a way of sharing and tracking coverage of WS (see Figure 1). The WS Butterfly is stuck on the classroom wall, making it a visual tool for both adults and pupils. A segment can be coloured in at the end of the lesson, so that pupils can see the specific skills they are using and adults can see what they still need to cover, so helping with planning. As a subject leader, it has been a quick way for me to gather coverage evidence of WS at any point in the year.

I believe that, in order to effectively assess a WS skill, a single skill should be focused on in a single science lesson. This gives the teacher the scope to teach, in depth, the necessary components that make up that skill, and offers the pupil the opportunity to effectively learn the skill. Subsequently, it allows the teacher to assess the skill against a set of assessment criteria and reflect on his/her teaching.

Having raised the profile of science in the school I felt it necessary to develop further support for teaching and assessing the WS skills. As part of TAPS 'Responsive Teaching', ongoing formative assessment should include: 'Teachers gather[ing] evidence of their pupils' learning through study of the products of activities and tasks' and I felt that the TAPS Focused Assessments could help to do this. I wanted to provide further structure to support pupil and teacher recording of the focused skill,

Figure 1 The Working Scientifically Butterfly



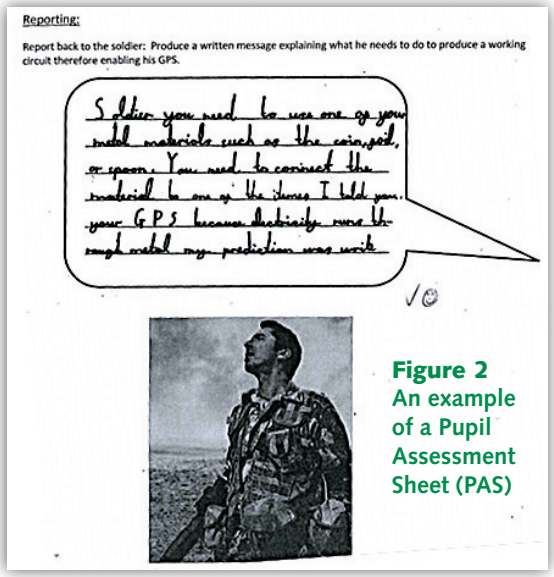


Figure 2 An example of a Pupil Assessment Sheet (PAS)

but also to encourage teachers to use their creativity, so I created template documents that they could adapt. The Pupil Assessment Sheet (PAS, see Figure 2), as well as working on a formative basis to record day-to-day assessment and to drive planning for future WS skill-focused lessons, would ultimately help to inform teachers on a more summative basis when reporting Interim Assessment Framework (IFA) levels at Key Stage end or an achievement level for WS skills in pupils' end of year reports. The development and introduction of a document for teachers to complete following a WS-focused lesson resulted in a Teacher Assessment Sheet (TAS, see Figure 3), which meant that the valuable learning demonstrated by pupils on the PAS was used to provide teachers with the necessary information to adapt teaching and learning approaches and, therefore, drive the continual improvement of pupils' learning.

The PAS and TAS were developed and trialled as part of my NPQML (middle leadership course). I began by modelling some initial ideas of my project with the school assessment co-ordinator and trialling the PAS in one class. The 'audience' for the trial PAS was a 'soldier', as the task was to produce a working electrical circuit for fixing a soldier's GPS. The children worked together to fix the soldier's GPS, but completed individual PAS at the end of the lesson, allowing the class teacher and myself to accurately assess the learning outcomes.

I met with representatives from other year groups to trial further. In an early meeting, the team reflected on the success of the trial PAS document and discussed ways in which we could address this issue of manageable recording, ultimately developing a redrafted version of the PAS that included an optional word bank. The early implementation of these documents in my own class was particularly valuable in the run-up to a staff meeting that I would be leading for all teachers, to promote the use of the PAS and TAS documents in a whole-school science enrichment day. I would also be communicating my vision for the outcome of the day, which was to implement their use across the school during science-based enquiry lessons.

The science enrichment day was a fantastic opportunity for children to be actively engaged in collaborative learning on science tasks that had 'global perspectives'. Teachers were also able to collaborate during the science day staff meeting, picking from a range of activities for their planning team. They had time to try the activities themselves, select a suitable activity for their year groups and begin to create a Focused Assessment for their science day lessons. The focus of the day was for every pupil to complete a PAS and for every teacher to subsequently complete a TAS assessing the 'reporting and concluding' WS skills. The teachers were actively engaged in the planning process, working with their colleagues to adapt the templates. The whole school science day provided the time for teachers to explore the Focused Assessments, just as they had done with the WS Butterfly the year before. It also meant that I could ask for samples from each class to carry out a school-wide moderation, to consider whether the use of Focused Assessments and the templates had supported the teaching and assessment of working scientifically.

For a middle leader, the staff voice is vital to help to steer and drive a project forward, so I created a questionnaire relating to the assessment of science in the school. At the beginning of the year, the question regarding staff confidence in accurate assessment of WS skills, was scored, on average, at 5.6 (with a range of 3 to 8) on a scale of 1 (most confident) to 10 (least confident). At the end of the year, when asked how confident they were in accurately assessing the WS skills of the pupils in their class, the average score was 2.83 (a range of 2 to 4). One teacher noted on their end of year questionnaire: *'I think the PAS that I have done with my class have been extremely informative'*. Another said: *'[TAS and PAS have] been a fantastic way to focus the planning of the science curriculum onto more of the working scientifically skills'*.

The next stage in my role as Science Subject Leader is to monitor the use of the PAS on a regular basis and provide support to teachers along the way. I will continue to research and develop more efficient methods of recording and tracking the assessment of the working scientifically skills. In the long run, I hope to develop an online science assessment strand of the school tracking system currently used for core subjects. This would allow deeper analysis of trends within the data and provide a non-paper-based approach to collating.

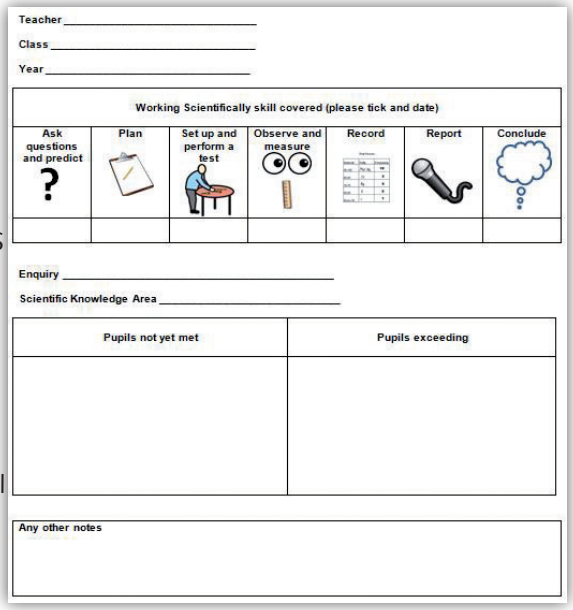


Figure 3 An example of a Teacher Assessment Sheet (TAS)

James Mepsted is Science Subject Leader and Year 5 (age 10) teacher at Victoria Park Primary in Bristol.

See James describe the Working Scientifically Butterfly here: **http://tinyurl.com/VPTAPS**