

EDITORIAL



In his 1822 *'Dissertation on Roast Pig'*, Charles Lamb gave a satirical account of how roast pork was discovered in China, when a child accidentally set fire to a house with a pig inside. Poking around in the embers, villagers discovered

a new delicacy; which soon led to a rash of house fires, a tragic example of false reasoning! Piaget's laboratory experiments suggested that children could not reason until at least the age of 7; yet Martin Hughes and others in the 1970s showed that, if the context was familiar to children, then they could reason as early as 3 or 4 years old. But what is 'to reason'? The motto of my school was *'Suivez la Raison'*, which we were told meant, 'follow the right or follow reason'. The fact that *right* and *reason* can become confused in this way – one implying we should behave ethically, the other to be logical – is perhaps why 'having a reason' and 'scientific reasoning' are not easily distinguished by children, in the same way that they find the idea of a 'fair' test difficult to grasp as something different from merely 'taking turns'.

Different kinds of reasoning

In science, there is not simply one kind of reasoning that children need to learn. The dominance of testing, particularly of science facts and concepts, has perhaps masked the importance of children's need to reason in relation to evidence: at best, tests require children to interpret data, but rarely to go further. Some would argue that the brightest children who think and reason are actually at a disadvantage in the way standard tests are constructed and marked. The work of CASE, P4C and other research programmes has raised the profile of thinking and reasoning skills; but it is probably fair to say that they need to have a much higher profile in the average classroom, and in teacher assessment, especially in relation to science investigations. This issue therefore highlights work that deliberately focuses on how children can be helped to think and reason, in different contexts.

Richard Watkins is a primary teacher from North Wales;

his article won the prize for best new writer for *PSR* earlier this year. He set out to uncover ideas about how and why children in his year 6 class (10/11 year-olds) reason in a particular way, which proved valuable not only in developing his teaching of science skills, but also helped children to reflect critically on the nature of their scientific judgements. The children enjoyed the challenge of these 'thinking' tasks: what he learned also helps us understand how children can distinguish between inductive and deductive reasoning. They also learned that whilst inductive reasoning plays an important role in modern science, it has limitations. Peter Loxley's piece on 'The pleasure of finding things out' is based on a book of the same name by the Nobel Prize winning scientist Richard Feynman, who describes how, on their regular walks, his father would tantalise him with questions and visions of how nature works. Feynman's walks with his father remained with him for the rest of his life; the pleasure of learning science, he maintained, comes from finding out that the world is not as we first perceive it to be. But Peter reminds us that children cannot discover nature's secrets for themselves; they need to 'unveil' them with the help of an inspiring teacher.

Helping children to reason about science ideas

Chris Joyce and her colleagues from New Zealand show us exactly how this can be achieved, by devising strategies that support the development of children's reasoning skills during fair testing. They do this by making data-recording quick and easy, and by helping children create patterns of results so obvious that comparing and reasoning about them is easier. By using visual cues within structured materials, they show that reasoning becomes less abstract: once the need to memorise lots of data and patterns is reduced, reasoning about fair testing became more accessible, allowing children to demonstrate and discuss their thinking. Jane Maloney introduced her children to four different activities, and noted that some groups engage in the reasoning process about their findings more effectively than others. These more successful reasoners, she points out, learnt how to challenge someone whose view is different from their own, to question others who disagree with them and to be prepared to change their minds: the less successful only took turns to speak, without trying to reach a collaborative decision. To develop good reasoning skills, she suggests, we need to model the way children should discuss their ideas about what they have found. Finally, in the theme section, we have incorporated the *PSR* interview with Stuart Naylor and Brenda Keogh, whose materials, even for the youngest children, are about how to get children thinking about science. As the title of their piece indicates, the reason their workshops and materials are so popular with teachers is that they are simple to use, have a

clear purpose, and yet are problematic: they get children thinking about a real problem, find out what they think, and bring their ideas into the discussion. Children should, in their view, be actively engaged in thinking and reasoning in every lesson.

Beyond the theme

One of the 'wobbly bits' that we have looked at in two previous issues is the tricky area of particle theories and their place in primary science. Lee and Tan started the discussion in *PSR* 82, and Malcolm Parry in *PSR* 87 explained how we could use particles to explain upthrust and air resistance. In this issue, **Keith Skamp** provides evidence that most primary-age children do not have a view of matter as made of particles at all, and suggests how to simplify the way we present the key ideas about what 'stuff' is made of, to help teach about tricky areas such as forces. I'm sure many teachers will find this approach very helpful in organising their own thinking.

As part of our look at other countries, we then present outlines of how primary science is taught in Northern Ireland and the Irish Republic, from **Peter McAlister**, our Ulster representative on the editorial board, and **Rachel Grant**, a teacher in Dublin. Peter points out how changes are afoot to reduce the content of the curriculum and allow teachers more time to focus on skills, as in Wales; and reminds us how science continues to be linked with technology. Rachel describes changes arising from the re-launch of the curriculum, the reduction in dependence on textbooks, and the impact of science clubs and new forms of in-service training for teachers.

Finally, in NQT Corner, **Christiana Turner** demonstrates the importance of linking work inside and outside the classroom in the early years to develop children's enthusiasm and understanding of wider issues. She makes a strong case for early-years practitioners being aware that ethical issues are embodied implicitly and/or explicitly in their teaching. She shows how using different environments can provide a wide range of activities to stimulate young children's interest and curiosity, and to help link science to education for sustainable development and to citizenship.

PSR

In response to various requests, we include here a statement of what *PSR* is trying to achieve. We hope our various objectives fit with those you would want us to focus on to support your work. The editor would be pleased to hear your views.

We also welcome to the editorial board **Sarah Earle**, a class teacher from Bristol and contributor to *PSR*, who replaces **Anne Qualter** at the end of her term. Anne has served *PSR* and ASE in many ways over the years, and we are sorry to lose her.

Alan Peacock

The role of *PSR*

Within the ASE's commitment to 'promoting excellence in science teaching and learning', the editorial board of *PSR* sees the aims of the journal as being to develop good practice in primary science teaching and to support primary educators by:

- CHALLENGING AND DEVELOPING EDUCATORS' THINKING ABOUT THE WHAT AND HOW OF CHILDREN'S SCIENCE LEARNING;
- HELPING TEACHERS, TRAINERS AND TRAINEES TO SHARE THEIR SCIENCE EXPERTISE WITH OTHERS;
- SEEKING OUT, SUPPORTING AND DISSEMINATING GOOD PRACTICE, FROM THE EARLY YEARS THROUGH TRANSITION TO THE SECONDARY PHASE;
- BROADENING AND IMPROVING PRIMARY TEACHERS' AND TRAINEES' BACKGROUND KNOWLEDGE AND UNDERSTANDING IN SCIENCE IN ORDER TO ENHANCE THEIR TEACHING;
- DISSEMINATING AND DISCUSSING THE FINDINGS OF RELEVANT RESEARCH IN SCIENCE EDUCATION, BY PRACTITIONERS AND OTHERS;
- KEEPING READERS UP TO DATE WITH CURRICULUM DEVELOPMENTS AND NEW RESOURCES;
- PROVIDING AN INDEPENDENT NATIONAL AND INTERNATIONAL PERSPECTIVE ON THE ABOVE, IN RECOGNITION OF OUR READERSHIP AND THE INCREASING IMPORTANCE OF INTERNATIONAL LINKS.

Science beyond the classroom (*PSR* 91)

Are you doing some interesting science work with your children outside the classroom? Are you short of time to write about it for us?

Don't worry! Just send us your name, school name, your e-mail address (optional) and a sentence or two describing what you are doing, and in *PSR* 91 we will provide a 'notice board' with all the ideas on, to enable you to share your ideas with other readers. Write to us at psreditor@ase.org.uk, before the end of September, and we will include your contribution.