# EDITORIAL


The idea of '*planning*' probably means different things to different people. Often, I suspect, it conjures up a negative image (especially among trainees) of long nights writing lesson plans in excessive detail, using formats that appear irrelevant or inappropriate, which nobody will look at. '*Investigation*', on the other hand, has a positive buzz, and is often used interchangeably with ideas like enquiry and experimentation, the idea being that children themselves should learn the skills and processes of science by getting involved in doing what 'real' scientists do. But despite this, there is probably less real investigation going on in science classrooms than most of us would like, thanks to the constraints of time, resources, confidence and the demands of testing.

For me, the best planning is that which is kept simple and focused on the essentials. I used to tell my trainees that there were only four questions they needed to answer to provide a good plan: What do you want children to learn? What will they need to do to learn it? What will your role in this be? And, how will you know if they have learned anything? I always worried them, too, by saying that I didn't believe in standard formats; the only planning templates they would ever continue to use would be those they designed themselves. My reason was to make sure they didn't lose the 'buzz' of a new investigation by drowning in details of objectives and structure. And one way to do this is to keep the investigations 'real', by which I mean focused on phenomena in the real world that enthuse children.

As this issue demonstrates, there are many kinds of investigations that will excite children, some of which will need to be planned in advance by the teacher, and others – perhaps the best investigations – which the children initiate and plan themselves around their own questions. This issue might equally have been entitled 'Authentic investigations', as many of the articles describe situations where teachers have found different ways to let children investigate the world outside the classroom: the night sky, the Moon and stars, sea-life in an aquarium, the work of engineers, musical performances, the bread and pizza we eat, even the ecology of the Arctic. The message from the children in every case is a positive one; this kind of work makes learning science more fun, and so we learn more. In most cases, it has also engaged teachers and parents in learning themselves.

## Planning authentic investigations

**Anne Goldsworthy** first shows us how we can help improve children's own planning of their investigations. Her simple idea is to let children analyse the findings and methods of other similar investigations first, in order to generate their own 'ground rules' for quality science. Children will often find that, when collecting data in groups, they come up with conflicting results; this happens with real scientists too, and can be the starting-point for suggesting what caused the differences and how the investigation might be improved. Science begins when you get stuck! **John Baruch** and his colleagues in Bradford then describe how children in local schools can log on and instruct a robotic telescope to take pictures of the Moon or stars and e-mail these back to them at school. (The telescope used to be in Hebden Bridge in West Yorkshire, but was moved to Tenerife where the weather was slightly better!) This article emphasises how easy it can be to make planning investigations child-centred and child-friendly; even for less able children, the approach opened up access to a wealth of new images and ideas. **Emma Ferris** continues this theme of exploring the night sky from a different perspective. She works with Bangladeshi children in Tower Hamlets, where observing the night sky is almost impossible because of light pollution from the city and nearby Canary Wharf. Her way round this was to use their annual residential experience in Essex to focus on the night sky, and to plan specifically with skills progression in mind. Through this and the deliberate use of group roles, she was able to enhance their learning about 'The Earth and Beyond' and to link the work to other curricular areas. Her work demonstrates clearly that the socio-economic and geographical factors that appear to constrain learning can be overcome through utilising children's own enthusiasm and exploiting all opportunities.

**Helen Hedges** from New Zealand used a visit to an aquarium by very young children to demonstrate the importance of teachers' (and parents') own background knowledge if planning investigations is to lead to real learning. She shows how, by doing some research into effective ways to present specific science ideas (in this case, to do with whales, penguins and reproduction!), teachers can enhance the experiential learning of young children. The teachers built their investigations around individual children's interests, provided time for dialogue, and encouraged enquiry in an authentic situation, where one child identified a wobbegong (a kind of bottom-living shark) by the way '*it came dangling up*'! **Rebekah Iiyambo** then demonstrates the value of cooperative planning amongst colleagues within a group of schools in Newham, East London, when tackling what at first sight looked challenging: the teaching of science entirely through a focus on creative arts.

By careful consideration of the 'how?' and 'why?' of their science schemes, they were able to avoid duplication of learning objectives and to generate confidence, cohesion, camaraderie and real rigour in their science work. **Sarah Marks** and **Emma Ranger** are trainees from University College, Winchester, who have confronted the question of planning effective investigations around children's work on bread and pizza. Using a skills-based approach, they encouraged children to bake samples and share ideas about testing quality, learning that they didn't always agree on which sample tasted best! Sarah and Emma learned important lessons about the importance of making space to build further investigation on unintentional and unexpected outcomes, encouraging children to plan their own way of recording and making ample time for debate and discussion, even at the expense of curtailing some tests.

### Using web-based sources for investigation

Two other articles should stimulate you to explore data available free on the Internet, as a basis for children's own authentic investigations. **Peter Stidwill,** as an engineering student, developed *Engineering Interact*, a modular game that teaches all aspects of the Physical Processes part of the curriculum, whilst at the same time introducing children to how engineers use such science in their work. Peter acknowledges that he first looked at other science learning 'games' on the Web to see what their weaknesses were, and has created something extremely popular with children, teachers and trainees alike, which can be used for free, either in class or by individual children at home. In their article, **Sandrine Truchot**, a teacher, and **Agathe Weber** from the International Polar Foundation, describe the journey of the yacht *Alcyon* from France to the Arctic via Britain, a journey which has the deliberate purpose of generating and providing scientific information direct to schools for children to use as part of their science and geography work. We hope to hear from any school that takes advantage of this unique mission, which will continue until just before Christmas 2005.

### Looking at other countries

In this issue our international focus is on China, as Chinese teenagers tell us of their primary school experiences.

### Editorial Board changes

Those of you who read the 'contents' page may have noticed various changes in the Editorial Board in recent months, as several long-serving members have come to the end of their term of office. In replacing them, I have tried to preserve the right balance in terms of gender, geography and occupation. So we have already welcomed **Mick Dunne**, a primary science tutor from Bradford College, with a specific interest in ecology, and more recently **Sarah Earle** from Elmlea Junior School in Bristol, who contributed an excellent article on using the interactive whiteboard in a recent issue. To even up the geographical representation, we also welcome **Peter McAlister,** a science adviser from Northern Ireland, **Robert Collins** from the Faculty of Education at Strathclyde University in Glasgow, and a particularly warm welcome goes to **Ian Milne,** who represents our growing readership in New Zealand. We hope the Board will continue to serve your interests. So do let us know if you have any views or suggestions about the content of current or future issues.

**Alan Peacock**

## For the record

**Energy transfer:** We must apologise for an error in *PSR* **87,** in the table on energy transfers in the article on 'Pop bottle rockets' (page 25). A reader has pointed out that it is possible to interpret the table to infer that sunlight, biomass and elastic are all forms of energy, which obviously they are not. Light of course is a form of energy; biomass, however, uses its chemical energy to generate heat energy when burned, and the elasticity in muscles is a form of potential energy, which is transformed into motion energy when the bottle is struck. We hope this clarifies what were potentially misleading statements, and we are grateful to diligent readers who write in to point out such slips.

**RSPCA education service:** We have also been asked to point out that the URL for the new RSPCA education service website mentioned in the article by Karen Hartley (*PSR* **86**, page 24) is: **www.rspca.org.uk/education**

## Contributing to *PSR*

Each issue of *PSR* focuses on a theme, but also includes other articles on a range of topics, so if you have something to write about that is not on a theme or deals with a theme already covered, don't be deterred. All contributions are very welcome. Forthcoming themes are listed below:

***PSR* 89 (Sept/Oct 2005): Scientific reasoning**

How to distinguish inductive and deductive reasoning; developing thinking and reasoning skills; 'hands-on' and 'brains-on' activities to promote reasoning; making time for making sense of evidence. How real scientists work things out. Problems to tangle with.

***PSR* 90 (Nov/Dec 2005): Forensic science**

*(copy deadline 22 July 2005)* Using science tests such as careful observation, microscopy, chromatography, indicators, biometrics, to determine the validity of evidence. How real forensic scientists and psychologists work. Tests you can do in your classroom.

***PSR* 91 (Jan/Feb 2006): Beyond the classroom**

*(copy deadline 16 September 2005)* Learning science in the environment, in school grounds, on visits and fieldwork, or at environmental centres and science centres. Making use of environmental agencies and workplaces to generate more real-world science learning.

*Contributions of all kinds – articles, letters, news items, views, comment, practical ideas, reflective pieces – are very welcome. Please send contributions or suggestions to:*
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