



Science must learn from the early years of schooling, as everything is built on these foundations. Exploring physical phenomena through play is the backbone of this. In this respect, the recent Cambridge review of primary education in England (Alexander, 2009) shows more vision than the earlier Rose review (Rose, 2009). It does not recommend 'no formal learning until the age of 6', as has been reported in the media, but 'extend[ing] the foundation stage until the age 6' and so extending the 'play' part of learning. The suggestion is for training in the pedagogy of teaching, rather than particular 'activities'. But we need to address parental concerns that 'play' means that they learn very little that is 'concrete'. Perhaps we need to ask adults what they learn when they play with something? How many of us get a new mobile phone and mess about with it to make a call or text, and then follow the maxim of 'if all else fails – read the instructions'?

The early years are also the time when the awe and wonder is still there in abundance, with those never-ending questions! Some examples from the children of editorial board members include: 'Why is there rain inside the car?' 'Do birds have bottoms?' 'Where does your food go [when you swallow it]?' and 'How can I make the paint stay on my umbrella?' Exploratory play inevitably excites and throws up science questions; and this is not new. Humphry Davy, the great Cornish chemist, claimed 200 years ago that 'surprise and wonder are central to a proper appreciation of science'. So we should encourage and celebrate young children's excitement at the new phenomena they encounter in play.

But all play is not exploration. We feel that what distinguishes exploration from play is focusing on objects, events and phenomena that young children are probably experiencing for the first time. Play in its broadest sense can involve repetitive, familiar activities such as dressing up, riding a bike or playing tag. So the environment for play is crucial; for example, children will not only want to make patterns with the different coloured autumn leaves, but they will also discover that they can dive into huge piles of fallen leaves and not hurt themselves. So they are exploring the properties of leaves for the first time. That is where play links to science exploration and enquiry; indeed, it initiates the exploration, as it inevitably throws up questions.

And these learners' interests are vital to science activity. Young children's questions provide a focus for enquiry into new ideas and a context for developing

and using a wide range of process skills. Knowledge, skills and attitudes are learnt by the children as a result of meaningful enquiry and interaction with other children and adults. Real learning, relevant to the learner, results. But we must not forget the importance of children sharing their experience with an enthusiastic adult who is able to see the world like a child 'fresh and new and beautiful, full of wonder and excitement', as explored by Rachel Carson in her essay *The sense of wonder*. Unfortunately, classroom assistants (and some teachers) often intervene with 'the right answer' or show the child what to look for. This indicates that targeted training is needed for support staff in the classroom. Experience then helps us to avoid getting it wrong at the crucial juncture, so that the children are not thinking 'She's off again ... can't I just come out here and kick the leaves ...'. We need therefore to reaffirm the key role teachers have to play in play! Knowing what to say and when is a vital pedagogical skill that we must develop through training and shared expertise, particularly with good early years teachers.



For teachers to think like this and have confidence, they have to be encouraged to play and encounter new things

themselves, to be immersed in an exploratory, questioning approach and how this is organised daily and termly. Encouraging parents to play with their children is also important. Even just exploring substances from the kitchen and bathroom or outside in the garden is essential, because the younger children are the bigger the impact. For example, 5- to 7-year-olds can become very keen on recycling and composting and badger their parents to do it. With all environmental interventions, 'catch 'em young' is a good watchword.

How does early years exploratory play link with the curriculum? There are concerns that the new early years framework introduced in English schools will mean that some children seem unprepared for the more formal setting in year 1 (age 5–6). Maybe the focus on 'play' should be extended to year 1, when the children will hopefully show more 'readiness' to learn formally, as in many European countries. Has the emphasis on literacy been a barrier? When questioned, teachers seem not to see a problem, since the 'science' elements of the early years curriculum are more practically based. So plenty of play-related talk should eventually provide motivation to write and use number with science at its heart. And this, we feel, is not just limited to younger pupils. Year 6 children also love exploratory play, but will they be excused all that revision in case they get 'sampled' on the Friday of SATs week?

References

- Alexander, R. ed. (2009) *Children, their world, their education. Final report and recommendations of the Cambridge Primary Review*. London: Routledge. Available at: www.primaryreview.org.uk
- Rose, J. (2009) *Independent review of the primary curriculum: final report*. London: DCSF. Available at: www.dcsf.gov.uk/primarycurriculumreview