EARLY YEARS SCIENCE IS SO MUCH MORE THAN JUST 'Knowledge and understanding of the world'

Figure 1 Apparatus for the floating, sinking and freezing activity

Debra Barton *shares her thoughts on how science and early years are intrinsically linked*

With the introduction of the new Early Years Foundation Stage (EYFS) in September 2008 in England (for 3–5-year-olds), some early years practitioners have had to include a formal early years curriculum into their practice. Training is being offered by local authorities to assist in the delivery of a quality early years curriculum in line with the EYFS and I recently had the good fortune to attend a science in the early years course. I went with an open mind, keen to discover what I would be taught and excited about taking new activities back to my setting. I was shocked to discover that another delegate attending the course had the preconceived idea that we would look at science in respect of the '*Knowledge and understanding of the world*' (KUW) section of the curriculum only. This got me thinking about science being so much more than this.

Science and the early years curriculum

Science can be described as exploring, using all the senses; it is often a messy and time-consuming subject, which encourages children to be thoroughly active in their investigations. Children have an intrinsic need to learn and develop no matter what the subject or area of the curriculum; this is achieved through conversations, experimentation and reflection, followed closely by revisiting the activity to cement their ideas and understanding.

Science and scientific experiments and investigations cover all six areas of the curriculum to some degree:

- *Knowledge and understanding of the world* (KUW).
- *Personal, social and emotional* (PSE).
- *Communication, language and literacy* (CLL).
- *Problem solving, reasoning and numeracy* (PSRN).
- *Physical development* (PD).
- *Creative development* (CD).

As with other early years activities, no one area will be developed in isolation. Whilst the KUW section does list *Exploration and investigation* as an area of the EYFS curriculum, and describes it as how children investigate objects and materials and their properties, learn about change and patterns, similarities and

Figure 2
Will it sink or float?

differences, and question how and why things work (DCSF, 2008), much more learning and developing takes place when a child is actively engaged in an experiment or investigation.

Children aged 3 to 5 years are naturally curious; they use questioning to develop their understanding of the world around them. How many questions do children ask during the course of a session in an early years setting? And of those questions, how many are preceded by 'why'? – '*Why is ice cold?*', '*Why is the night dark?*', '*Why is the grass green?*', '*Why is the Moon out? It's not night*'. Children have a thirst for knowledge and are fascinated by the natural world and how things work.

Early years science encourages the development of the CLL area of the curriculum through discussions with peers and knowledgeable adults and through reflection. Practitioners can further extend the children's learning through the use of books and the Internet to complement the investigation taking place. New vocabulary can be introduced to describe the concepts being taught and learnt.

A child's PSE development is being expanded as relationships are being formed when children work with an adult or their peers and as they share their experiences. Negotiation, turn-taking and sharing, together with team-working skills, are being learnt as children work together to investigate and record a scientific activity. The PSRN area of the curriculum is developed with grouping and sorting exercises, while mathematical language is being extended with experiments involving capacity, shape or amounts. Physical development (PD) occurs naturally as children move and work, and creativity (CD) is seen in the manner in which children investigate a new topic or concept.

Science is one area of the early years curriculum where the adult plays a vital role. That role starts with the adult having an understanding of the ages and stages of children's development, and what is appropriate for particular age groups. Scientific opportunities should be well planned. After the adult has provided an exciting and stimulating environment, they must then look at ways of enhancing and developing the children's learning, starting with what they already know, and building in opportunities they may not have experienced in the home setting. The EYFS describes exploration and investigation as how children develop the knowledge, skills and understanding that help them to make sense of the world, while being supported by a knowledgeable adult. It goes on to suggest that opportunities should be offered for children to use a range of tools, encounter creatures and plants in the environment, undertake practical experiments, and work with a range of materials (EYFS, 2008).

How science and early years work together

To develop my understanding of how science covers all areas of learning and development, I facilitated an activity where small toy dinosaurs and other items were to be frozen in a block of ice. The activity started with a tray, two tubs of water, one larger than the other, and a selection of floating and sinking objects, such as small dinosaurs, lolly sticks and plastic lids (Figure 1). The children arrived at the table and, without any adult interaction, **M** immediately said '*I wonder what will float?*', to which **L** replied '*the heavy things*'.

'*Let's see*', said **M**. As the two girls turned the objects in their hands we can see that immediately CLL was being developed through conversation, and PSE was being developed through organisation and teamwork. **M** and **L** spent about 25 minutes experimenting with the items to discover which would sink and which would float (Figure 2). The joy was evident when they guessed correctly that the dinosaur would sink and the lolly stick would

float, as they shouted '*yes!*' and punched the air with their fists. PSRN was being developed through positional language: '*look the dinosaur is under the stick*' and '*this plastic lid will be on top of the water; that's called floating*'.

The two girls worked out that it did not make any difference which tub of water they placed the item in; the result was the same, in that the dinosaurs would sink and the plastic lids would float. I asked '*If the water was frozen with the dinosaur in it, would the dinosaur still be 'sunk' to the bottom and the stick still floating on the top?*' **M** thought for a moment and said '*no*'. When I asked why not, she said '*because when the ice is taken out it will be upside down and the dinosaur will be on the top*'. Using her knowledge of a similar activity, **M** had remembered that the ice would be turned out onto a tray and would be upside down, making her prediction that the dinosaur would be on the top an accurate statement.

We talked about how the water would become ice, and predicted what it might look like once frozen, before going into the kitchen to put the tub in the freezer. This mini trip in itself was exciting for the two girls, as the kitchen is out of bounds for children ordinarily. They returned to share their experience of their visit to the kitchen with other children.

The learning continued the following day when the block of ice was placed outside on a Tuff Spot (tray for messy play). This time a group of boys accessed the activity first. Immediately the questions flowed: '*What's that?*', '*How did they get in there?*' These were closely followed by '*Let's get them out; here you hit it with this stone*' (Figure 3). This time practitioners could observe leadership skills and teamwork, together with problem-solving skills being displayed.

The children moved the ice around the tray, pushing it from one side to the other. '*It goes really fast*' said **J**. I asked why he thought that was. '*The ice is melting because it's turning into water, it's slippery*' was the reply from **M**. There followed a barrage of adjectives describing what the children felt and saw; for example smooth, wet and cold, slippery, melting and freezing. As the children were exploring, the Sun came out and I asked if the Sun would make the ice melt faster? **A** said '*yes, because the Sun is warm*', while another child predicted '*if you put the ice in the Sun it will melt, because the Sun will get in it and it will break open*'.

Even with the Sun on the ice block, the dinosaurs remained frozen in the ice for the rest of the session. For some children the investigation was taking too long and they got distracted, but others were excited to see how much it had melted while they had been away. As there was a great deal of ice still to melt, we placed it back in the tub and returned it to the freezer overnight. This enabled children to access it again the following day and pick up their learning where they left off, thus scaffolding and reinforcing the knowledge gained previously.

The importance of the role of an experienced and enthusiastic adult in this activity cannot be understated. Without the adult providing the stimulation and interaction initially, the learning would not have been as effective. Although this was a very simple activity to organise, it offered a wealth of opportunities for children to develop their language and exploration skills, and enabled them to work with other children they did not necessarily play or engage with on a daily basis. If I were to write this investigation up as an observation to record in the children's individual learning journeys, it would show that when children are engaged in an activity that captures their imagination, the learning takes place automatically and all areas are developed. Whilst this particular observation would not show a great deal of PSRN development, this could have been included by the timely intervention of an experienced practitioner asking open questions such as '*How long do you think it will take the ice to melt?*' or observational questions such as '*How many frozen dinosaurs can you count?*'

Figure 3 How can I get the dinosaur out?

So can we say that 'Science is so much more than just *Knowledge and understanding of the world*'? A resounding yes! And, while not all areas of development will be covered by the activity alone, the personal interaction with other children and adults will provide the necessary skills, conversation and thought processes to develop a child's six areas of learning.

Reference

DCSF (Department for Children, Schools and Families) (2008) *Practice guidance for the early years foundation stage*. Nottingham: DCSF Publications. Available at: www.standards.dcsf.gov.uk/eyfs

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