CONTENTS: Sticky Learning Strategies for Primary Science

Stories / Emotions / Real Scientists / Science in the News

Year 3: Children learn about scientists through guided reading, they are inspired by science in the news. Year 3 were particularly interested in volcanoes after learning about James Hutton, They had lots of questions about volcanoes. Mount Etna was erupting at the time of this session and was discussed. The children asked me to come and talk to them about my family in Sicily and their experiences of volcanoes. **Children understand science is all around us and real and now!**

Y3, Rocks and Soils, All Saints' CE Primary, Clayton-le-Moors, Lancashire

Concrete/modelling: making something concrete is to connect an abstract idea or concept to the senses, e.g. visualise a concept. It is taking an abstract concept and creating an example based on real-life experiences to solidify the meaning of that concept.

Teachers can make concepts more concrete and 'sticky' by making them more visual or by allowing more opportunities to manipulate ideas and language associated with the concept. Concrete ideas refer to things that can be touched, sensed, moved and manipulated. The more concrete hooks an idea has, the more likely it will stick in children's memory.

Modelling a concept in a visual, simplified way can provide an opportunity to see a concept differently and to practise listening and speaking about the concept prior to writing. Representing information both visually and verbally enhances learning and retrieval from memory. The principle underlying this, known as dual-coding, is that visual and verbal information are processed through different channels in the brain, creating separate representations for the same information.

The practical nature of science investigations is at the heart of this strategy, and it is particularly beneficial when the concept cannot be seen effectively in real life. When learning about how sound waves travel, children cannot see sounds, but the way they travel can be modelled using a simple slinky toy. In a similar way, for children to understand the relationships between the Earth, sun and moon, and the planets of the solar system, a practical model using different sized balls or fruit can help children gain a better perspective.

During concrete/modelling strategies outlined below, words are made meaningful as children can associate a real representation of what the word(s) describes. The vocabulary and sentences can be pondered, discussed, rehearsed, adapted, and improved in a non-threatening environment, but with the support of the visual or kinaesthetic stimulus. Pupils are unlikely to forget, for example, acting out or making a model of 'from chewing to pooing' to help them visualise, discuss, and make sense of the digestive system. The key to these strategies is to ensure that, as a result of the modelling, the children can now talk or write about the concept (using their own words alongside the scientific vocabulary, with accuracy and confidence).

Strategies	Examples	Possible key learning coverage
Modelling / acting out the science Make a simplified model or act out a more complex or abstract concept. This strategy is particularly useful for KS2 children as they are exposed to more abstract ideas which are often difficult to visualise, or they have had less experience of. Teachers need to be aware of the limitations of a model to ensure it does not lead to further misconceptions. Asking relevant questions such as the ones in italics in the LKS2 example opposite will help with this. Can the children say what they have learned as a result of the modelling? How will they record their learning?	EYFS – acting out how a seed grows. How can you show what it needs to start growing (warmth and moisture)?  Y1, 'Being a weather presenter' - Manor Road Primary, Clayton-le-Woods, Lancashire KS1 – making a model of a minibeast from salt dough/modelling clay. Can children add in the details and features that they notice through their observations and what they find out through research using photographs and simple non-fiction texts with images? For example, the number of legs, are the legs jointed, where do the legs attach to the body, are the legs hairy, does the minibeast have antennae, what are they like? etc. LKS2 Skeleton - using bone shaped dog biscuits of various sizes for children to represent their knowledge of a human skeleton at the beginning of a unit. *Which biscuits were good for this? Which were not so good? Why? How are they different to real human bones?* What are you not sure about? For example, how many ribs we have, how our leg bones are connected to our backbone, is there a shoulder bone? How many bones are in the backbone/spine? This can unpick partial understanding and provide questions for further research and is easier to focus details without a complicated drawing.	**Y2** Identify and name a variety of plants and animals in their habitats, including micro-habitats **Y3** Identify that humans and some other animals have skeletons and muscles for support, protection and movement.

	 St Peter's CE Primary School, Chorley, Lancashire UKS2 Earth and Space – acting out day and night with a globe and a torch to represent the Earth and the Sun or acting out how the planets orbiting the Sun using different sized balls to represent the planets and pieces of string to represent orbits.	**Y5** Describe the movement of the Earth, and other planets, relative to the Sun in the solar system.
Annotated diagram / photograph Getting children to record their observations and learning as an annotated diagram or photograph helps to capture the talk that has occurred during a practical opportunity (also see 'Novelty' above). Can the children support one another, share ideas and use new language learned to draw and say what they now know/understand? Annotated diagrams and photographs help to make children's thinking more visual. As they grapple with turning their thinking into a	EYFS – children use natural materials from the outdoor areas to make an image of their faces. Can they add details such as eyebrows, eyelashes, lips, ears, noses with nostrils, etc.? This helps children focus on the details from previous observations made with mirrors and with each other. KS1 – after using song, rhymes and books to name the parts of the human body along with the parts associated with the senses, encourage the children to draw themselves with increasing accuracy (including parts such as the neck, eyebrows, jointed limbs etc.) and name the associated parts, joining the labels with a straight line. It may take longer for the children to draw themselves than just filling in a ready-made sheet but the action of 'drawing the details' from what they notice is more likely to ensure the learning embeds and sticks. LKS2 – can children draw what happens to food 'from chewing to pooing' to explain the digestive system? This could be done at the beginning of the unit and then repeated as the unit progresses, so the children get more and more confident with saying what is involved at each stage of the system. You could replace the drawing with a clay model and labels as an alternative.	**Y1** Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. **Y4** Describe the simple functions of the basic parts of the digestive system in humans.

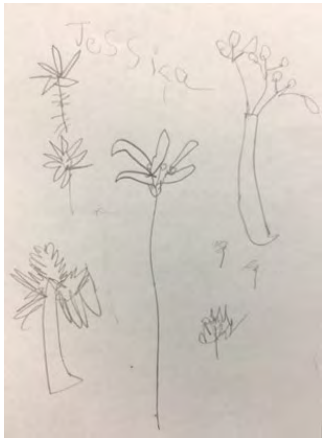
EYFS - Making models and annotating by talking about the features they have added

All Saints' CE Primary, Clayton-le-Moors, Lancashire

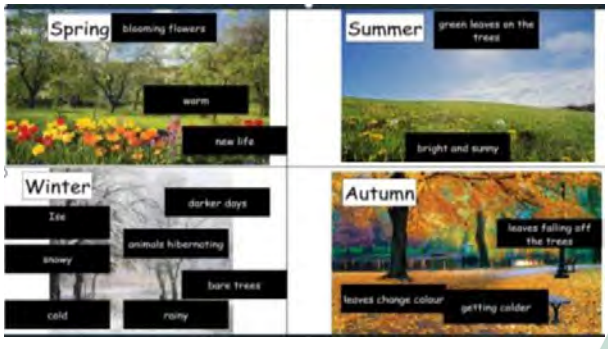
"An insect has 6 legs and 3 body bits (parts)", "The legs are bendy, we need to break the sticks" (child discussing jointed legs) –

EYFS comments after a school visit, numerous outdoor experiences, annotating their own drawings and making models with natural materials.

Y1 – Annotated drawings. Numerous opportunities to draw plants and talk about what they notice. During the year the aim is for children to begin annotating these with names and descriptions of the plant features.



Y1, Manor Road Primary, Clayton-le-Woods, Lancashire



Y1, Annotated photographs, seasonal changes.

Y1, St James' CE Primary, Chorley, Lancashire