

Teaching Science Skills

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There are three key components of teaching kids about science:

1. Content – “what” we teach. You may already have topics planned, or it can be fabulous if parents / teachers can be responsive to the child’s interests of the moment. What question are they asking *now* and what science topic could you study together to help learn it? Once you’ve decided on a topic, content is easy to find. My blog *Inventors Of Tomorrow* contains 100’s of activities, explanations, and book recommendations on 40 different science topics.
2. Attitudes – “why” it’s important (and fun!!!) to learn science. As teachers or parents, when we show enthusiasm about science, when we demonstrate being curious and imaginative, and when we get really excited about finding an answer to a question or solving a problem, our kids begin to view science as a powerful and rewarding subject.
3. Skills – “how” we teach. In our hands-on learning experiences, we are using six *science process skills*. These skills can be used when you’re “teaching science” but they can also be used at any time in your daily life. Let’s look at those skills, from simplest to most complex:

Observation

Observation is the fundamental skill of science. We observe with all our senses. One of the best things we can do for our children’s science learning is to help them *observe more closely* – look for more details. We do this by asking questions.

When a child is looking at something new, ask what they notice about it. They begin with a simple observation – often a label. “It’s a leaf.” If we ask them to describe it, they choose one way to describe it: “it’s green.” Encourage them to think in more depth by asking what they observe with each of their senses: what does it look like? smell like? taste like? sound like? feel like? Show them more ways to explore it... pick it up, turn it over to look at it from all sides, see how it interacts with other things (can you cut it with scissors?), shake it to see if it makes noise. Introduce them to tools which enhance their observation, such as a magnifying glass.

Communication

Observing and communicating those observations go hand-in-hand. As they’re observing something, encourage them to draw a picture or write a description. This process brings up questions for the child which motivate them to look more closely to figure out how to get the drawing right. As they write or draw, ask more questions to help them notice finer details.

Children need to learn lots of adjectives... lots of commonly agreed upon ways to describe what we observe so that others can understand us. While your child is drawing the leaf, you might teach the words serrated, or glossy, or sage green, or brittle, all depending on what kind of leaf they’re observing. If they were describing music, we might talk about tempo, mood, etc.

Measuring

Measuring is a special case of observing and communicating. Observing how big something is by measuring it against something else, and then communicating that information to someone else using commonly agreed upon units. Counting and weighing are part of measurement. Saying a tree was “ten feet tall” makes it clear to everyone exactly how big it was.

It is easy to incorporate measurement into play. Just ask: how tall is your tower, how far can you jump, how high can you throw a ball? Teach your child how to use measuring tools with standard units, but also show that it’s fun (and sometimes useful) to use non-standard

measurements. Maybe the snake puppet is 10 dominoes long. If I'm wondering if something will fit somewhere, I can take a piece of string or a piece of paper to measure the space.

Classifying Into Groups / Sorting

Sorting is a way of creating order, or making sense out of a large collection of objects by using observation skills to notice what things have in common with each other and how they are different. One method of classifying is putting things in serial order: lining up from smallest to biggest, or arranging them by color in the order of the rainbow, or smoothest to roughest.

Objects can be sorted into binary categories: magnetic or not magnetic; plastic or wood, vertebrate or non-vertebrate. These sort by a single criteria – you could also have more than two categories, such as sorting into: red, yellow, green or blue or reptile, mammal, bird, fish, insect. You can also do a multi-stage classification. First, sort out the plastic toys from the wood, then sort the plastic ones by color, then sort the red plastic ones by size. We use this skill a lot when sorting laundry or when putting toys and art supplies away in the right bins.

Inference

An inference is an explanation or interpretation that follows an observation. We observe with all five senses, but we interpret what we sense based on our prior experience and knowledge. Observation results can be called data or facts. The inference is what those facts mean.

Your child might observe that there's a mixing bowl, measuring cups, and baking ingredients on the counter. You might ask them what they think this means. If they say "we're making pancakes", you can ask how they know. They say "it's Saturday morning and sometimes we make pancakes in Saturdays... so if all those things are out, I bet we're making pancakes."

Ask your child about their assumptions: *why do they think that?* Ask: what does this remind you of? Help them sort out the difference between facts – anyone looking at this object would see the same thing – and inferences – different people could interpret this data in different ways, based on their experiences. Or we might interpret it differently if it weren't Saturday morning.

Prediction

A prediction is an educated guess, based on our observations and inferences, about future events. It is always based on data. We identify trends in the data which let us predict what will happen. Predictions can be tested: if I do X, does Y happen? "If I put this in water, do you think it will sink or float? Why do you think that? Will the same thing happen every time we try it?"

How children benefit from learning science process skills

The better they get at using all these skills, the better they will learn science. But these skills go beyond just science! Measurement teaches math skills. Communication builds language skills. Sorting, inference and prediction teach critical thinking skills. And all these skills can be used in everyday life tasks, and in helping kids make sense of their world.

Resources for learning more:

- Practicing Science Process Skills at Home: <http://static.nsta.org/connections/elementaryschool/200712TorresHandoutParentNSTACConn.pdf> (includes lots of concrete examples of easy ways to practice these skills with your child.)
- Teaching the Science Process Skills: www.longwood.edu/cleanva/images/sec6.processskills.pdf