



# Get Ready to Teach Science!



## Science Practices and Young Children

### What are science practices and why do they matter?

Young children are natural scientists! They are curious and develop ideas about the world around them by exploring their surroundings and asking questions. These are the beginnings of science practices, the actions and behaviors that scientists engage in when they “do science.” Young children learn science best when they have structured experiences that build on prior knowledge and experience and bring out these tendencies.

So, what are key science practices for young children?

#### *Observing and Describing*

Observing requires children to use their senses and focus their attention on characteristics of objects, events, or phenomena. Children can describe observations in many ways, such as with words, gestures, or pictures.

#### *Comparing and Contrasting*

These practices build on observing and describing by asking children to identify what is the same (comparing) and what is different (contrasting) about two objects or situations.

#### *Sorting*

As children learn to compare and contrast, it is important to invite them to sort by creating groups based on particular characteristics. This allows them to notice and examine patterns in their observations and the information they have documented.



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## **What are science practices and why do they matter? (continued)**

### ***Questioning***

Questions are great starting points for investigations. With support, young children can pose testable questions that they can answer by conducting investigations. Questions raised by others may also spark a child's interest or help to develop their understanding.

### ***Predicting***

Predicting is more than making a random guess. Predicting involves using prior knowledge and experience to make an educated guess or trying to reach a logical conclusion about what will happen in a new situation. Children who are asked to predict what will happen need to be invited to make a guess based on observations or evidence. This is important because it can help focus their attention on an experiment, help them remember the outcome, and provide a sense of accomplishment.

### ***Experimenting (planning and carrying out investigations or tests)***

Children are able to test their predictions by engaging in experiments that allow them to refine their understanding and ideas. This involves hands on explorations that allow them to test their ideas (for example, comparing what happens to plants if you water or do not water them).

### ***Documenting Observations and Recording Data***

Throughout their experiments, children should be invited to document observations (by drawing or taking pictures) and record data using tables or graphs so that they can keep track of what happens.

### ***Analyzing and Interpreting Data***

Once data is collected, it is important to provide guidance as children review their data, identify patterns, and draw conclusions. At this time, children can revisit their predictions and revise initial theories if necessary. New questions often arise at this stage.

Young children who engage in these scientific practices on a regular basis are better prepared to engage in more advanced thinking as they transition to elementary school. This can prepare them for future science learning as well as learning in other academic areas. It can also help them think critically and analytically as they confront everyday life problems. Below we provide some strategies and sample activities for each of the science practices described above.



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## How can you promote science practices in your classroom?

### ***Observing and Describing***

Invite children to use their senses to observe and describe objects. For example, invite them to use their sense of:

- *sight* to notice shape, size, and color.
- *touch* to notice texture (e.g., smooth/rough) or temperature (e.g., hot/cold).
- *hearing* to notice sounds (e.g., loud/quiet).
- *smell* to notice scents (e.g., fresh/rotten).
- *taste* to notice flavors (e.g., sweet/sour).

Science tools, such as a magnifying glass, can help children use their senses to make observations.

### ***Comparing and Contrasting***

Invite children to compare characteristics that are the same or different. You can do this by drawing their attention to features such as an object's color and size, or asking them to compare various parts of objects.

As you guide these activities, keep in mind the following:

- For comparing: introduce/use words or vocabulary such as *same* or *similar* or phrases such as *which one is like this one...why?*
- For contrasting: introduce/use comparative words such as *bigger/smaller*, *hotter/cooler*, *rougher/smooth*, etc.

### ***Sorting***

Invite children to sort or form groups of objects based on particular characteristics or features. For example, they can sort objects based on color/size/shape, or based on whether they're living/non-living, or fresh/decayed.

Initially it may be important to suggest the characteristics by which children should sort, and provide them with baskets to separate objects. With practice, children may be able to sort by themselves and even determine the characteristics that distinguish groups of objects.



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## How can you promote science practices in your classroom? (continued)

### *Questioning*

Coming up with a testable question is very hard for young children. You can promote this practice by modeling how to pose testable questions (posing a question and explaining how it could be tested).

### *Predicting*

Invite children to take *educated* guesses; in other words, ask them to share not only *what* they think will happen but *how* and *why* they think it will happen based on what they already know or have observed.

### *Experimenting (planning and carrying out investigations or tests)*

Children will need your guidance to come up with a method to answer their testable question. This may be a great opportunity to invite children to share ideas and provide counterarguments when needed. In an experiment, you compare two or more situations in which everything is the same except for one difference that will let you answer your testable question. For instance, to answer which surface lets objects slide faster, you could set up several ramps with different surface textures but identical length and steepness.

### *Documenting Observations and Recording Data*

As children conduct their investigations, invite them to keep track of their observations and other data (information about their experiment) by inviting them to:

- Draw and/or write in journals. This can allow them to track their science findings while practicing fine motor, writing and art skills as well.
- Record measurements. Keeping track of non-standard (e.g., Unifix® cubes) and standard (e.g., rulers) measurements allows children to document height or length systematically while also practicing important mathematics skills.
- Create tables and graphs, which can set the stage for discussion about findings. Tables or graphs allow children to observe patterns in their observations or data (e.g., compare what happened over a period of time or in different groups).

### *Analyzing and Interpreting Data*

Once children have documented observations or recorded data, it is important to invite them to analyze and interpret this information by inviting them to identify patterns, describe lessons learned, and/or compare their findings to their original predictions.