

## Inquiry: Process Skills

*All of us are watchers—of television, of time clocks, of traffic on the freeway—but few are observers. Everyone is looking, not many are seeing.* —Peter M. Leschak, author



I thought a great way to get students involved in learning the metric system was by having them go around the classroom and measure many objects. My goals for the lesson included building skills in careful observation, thinking and problem solving, and vocabulary. This would also develop the skills that would be required as we moved forward in our lessons, even though it was not within the context of what we were studying. A worksheet was provided with simple illustrations of items; height, width, and depth all to be measured using appropriate cm or mm. I conducted my usual walk-around and talked to students as they worked. I was surprised when students revealed their measuring skills by beginning from the end of the ruler instead of at zero, using the inch side instead of the metric side, and flipping back and forth. Needless to say, I changed my approach quickly.

We take for granted that students have some abilities in questioning, observing, predicting, planning an investigation, collecting data, interpreting information, and communicating their ideas. But, this is more than likely not the case. We must be deliberate in how we instruct students and encourage their development of these skills. For example, we can't simply say "observe this leaf" and expect them to be able to clearly see the intricacies of the vein and margin patterns. We must be specific in how we direct them and teach them how to critically look at a phenomenon and question it.

I also changed the way in which I created learning opportunities surrounding process skills. Learning in isolation of content does not maximize the ability to learn these skills in such a way that they can be easily transferred to other situations. The National Science Education Standards integrate process skills into the broader abilities of scientific inquiry. "Students at all grade levels and in every domain of science should have the opportunity to use scientific inquiry and develop the ability to think and act in ways associated with inquiry, including asking questions, planning and conducting investigations, using appropriate tools and techniques to gather data, thinking critically and logically about relationships between evidence and explanations, constructing and analyzing alternative explanations, and communicating scientific arguments" (NRC 1996, p. 105).

If you search, you will find a variety of lists identifying process skills. Basically, they are the tools and skills students need to investigate phenomenon. But don't assume students develop these skills without your careful guidance. They must be prompted to investigate in such a way that they can develop increasingly more sophisticated skills and attitudes. We should not underestimate the capabilities of young students and they should be urged to reach a high bar. They are capable of engaging in all of the process skills when provided with guidance and encouragement. Don't simply hand them a ruler and ask them to measure.

## Reference

National Research Council (NRC). 1996. *National Science Education Standards*. Washington, DC: National Academies Press.

A handwritten signature in black ink that reads "Linda Froschauer". The signature is written in a cursive, flowing style.

### Editor

**Linda Froschauer**

### Managing Editor

**Valynda Mayes**

### Associate Editor

**Stephanie Andersen**

*Assistant Executive Director, Journals*

**Kenneth L. Roberts**

### Internet Editor

**Lauren Jonas**

### Art Director

**Will Thomas**

### Senior Graphic Designer

**Joseph Butera**

### Graphic Designers

**Lucio Bracamontes**

**Tracey Shipley**

### Printing & Production Manager

**Catherine Lorrain**

### Asst. Production Manager

**Nguyet Tran**

### Electronic Prepress Technician

**Jack Parker**

### Assistant Executive Director, Publications Operations

**Rick Bounds**

### Publisher

**David Beacom**

### Executive Director

**Francis Q. Eberle**

### Advertising

**Richard E. (Rick) Smith**

**Managing Director**

**rsmith@nsta.org; 703-312-9282**

Science & Children (ISSN 0036-8148) is published nine times a year [Sept., Oct., Nov., Dec., Jan., Feb., Mar., Apr./May (combined), and July] by the National Science Teachers Association, 1840 Wilson Blvd., Arlington, VA 22201-3000. Individual memberships dues are \$75 (\$50 for publication, \$25 for membership). Memberships outside the United States (except territories), add \$15 per year for postage. Single copies, \$10. Periodicals postage paid at Arlington, VA, and additional mailing offices. Publications Mail Agreement no. 41506028. Return undeliverable Canadian addresses to: P.O. Box 503, RPO West Beaver Creek, Richmond Hill, ON L4B 4R6 Canada. ©2010 by the National Science Teachers Association, all rights reserved. Reproduction in whole or part of any article without permission is prohibited.

POSTMASTER: Send address changes to Science & Children, NSTA, 1840 Wilson Blvd., Arlington, VA 22201-3000.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.