

## What Scientists Really Do

Over the past few decades, historians, philosophers of science, and sociologists have taken a much closer look at what scientists actually do—with often surprising results. In the conventional view, the lone scientist, usually male and usually white, struggles heroically with nature in order to understand the natural world. Sometimes scientists are seen as applying a “scientific method” to get their results. They are perceived as removed from the real world, operating in an airy realm of abstraction.

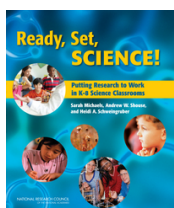
Studies of what scientists actually do belie these stereotypes. They approach problems in many different ways and with many different preconceptions. There is no single “scientific method” universally employed by all. Scientists use a wide array of methods to develop hypotheses, models, and formal and informal theories. They also use different methods to assess the fruitfulness of their theories and to refine their models, explanations, and theories. They use a range of techniques to collect data systematically and a variety of tools to enhance their observations, measurements, and data analyses and representations.

Studies also show that science is fundamentally a social enterprise. Scientists talk frequently with their colleagues, both formally and informally. Science is mainly conducted by large groups or widespread networks of scientists. An increasing number of women and minorities are scientists—although still not enough to match their representation in the population. They exchange e-mails, engage in discussions at conferences, and present and respond to ideas via publication in journals and books. Scientists also make use of a wide variety of cultural tools, including technological devices, mathematical representations, and methods of communication. These tools not only determine what scientists see but also shape the kinds of observations they make.

Although different domains of science rely on different processes to develop scientific theories, all domains of science share certain features. Data and evidence hold a primary position in deciding any issue. When well-established data, from experiments or observations, conflict with a hypothesis or theory, that idea must be modified or abandoned and other explanations must be sought that can incorporate or take account of the new evidence. Theories, models, and hypotheses are rooted in empirical evidence and therefore can be tested and revised or expanded if necessary. Scientists develop and modify models, hypotheses, and theories to account for the broadest range of observations possible.

Capture your thinking...

1. In the reading titled, *What Scientists Really Do*, the author explains the term, “scientific method”. Describe in your own words how it is defined by the author.
2. Many teachers tell their students that the Scientific Method is the way that scientists “do science”. Would the author agree? Be sure to cite evidence from the text in your answer.



The reading *What Scientists Really Do* (pp. 3-4) was taken from:  
Ready, Set, Science!: Putting Research to Work in K-8 Science Classrooms  
Sarah Michaels, Andrew W. Shouse, Heidi A. Schweingruber, National Research Council  
ISMN: 0-309-10615-X, 220 pages, 8 ¼ x 10, (2007)  
**This PDF is available from the National Academies Press at:**  
<http://www.nap.edu/catalog/11882.html>