

The Nature of Science (NOS)

Core NOS Ideas to Inform K-12 Science Teaching

The following NOS ideas are emerging as the consensus elements that should define the content core when NOS is taught as content in K-12 educational programs.

- 1) Science demands and relies on empirical evidence.
- 2) Knowledge production in science shares many common factors such as shared habits of mind, norms, logical thinking and methods (including careful data recording, truthfulness, observation, etc.)
 - However, there is no one scientific methods by which all science is done
 - Experiments are not the only route to knowledge
 - Science uses both inductive reasoning and hypothetico-deductive testing
 - Scientific conclusions are peer reviewed but observations and experiments are not generally repeated
- 3) Scientific knowledge is tentative but durable. (This means that science cannot prove anything but scientific conclusions are still valuable and long lasting)
 - The problem of induction makes ultimate “proof” impossible
- 4) Laws and theories are related but distinct kinds of scientific knowledge. Hypotheses are special, but general, kinds of scientific knowledge (and the term probably causes more problems than it is worth).
- 5) Science has a creative component.
- 6) Science has a subjective element. (Ideas and observations in science are “theory”-laden; this bias plays both potentially positive and negative roles in scientific investigation).
- 7) There are historical, cultural and social influences on science.
- 8) Science and technology impact each other, but they are not the same.
- 9) Science and its methods cannot answer all questions. (In other words, there are limits on the kinds of questions that can be asked of science. There is no conflict between science and religion).

This list has been developed with reference to sources including McComas, Clough and Almazroa (1998), McComas and Olson (1998), Lederman, et al (2002) and Osborn, et al (2003).