

# Science for life

The recent election cycle has made it abundantly clear to most scientists that a large fraction of adults in the United States are surprisingly susceptible to illogical arguments designed to fool them. Research suggests that a great many people assess evidence not as scientists are trained to do, but rather in an emotion-biased manner that is strongly influenced by the beliefs of their cultural cohort. The increasing dominance of social media reinforces this natural human tendency. The consequences are frightening for those who believe that, for humanity to prosper, both personal and community decisions must be based on the best science. This conclusion demands a major rethinking of the goals and methods of science education at all levels—from kindergarten through college.

Why science? Science is an amazing human invention—a huge community effort to discover truth through repeated cycles of testing and self-correction. As a result, we now have a deep understanding of how the natural world works. The same type of understandings that allow humans to precisely deliver the Curiosity Rover to Mars also enable us to ensure that vaccination is safe and to forecast the danger of continued carbon dioxide emissions. But most of those who teach science, including myself, have failed to recognize the crucial importance of producing adults who understand the nature of the scientific enterprise well enough to defend its judgments. In a recent survey, for example, the statement that “climate scientists’ research findings are influenced by the best available scientific evidence most of the time” was supported by only 32% of U.S. adults ([www.pewinternet.org/2016/10/04/the-politics-of-climate](http://www.pewinternet.org/2016/10/04/the-politics-of-climate)). This result is shocking to scientists. But it becomes much less surprising once one admits that science courses are generally taught as the “revealed wisdom” of scientists, with little

or no effort spent on conveying the nature of the scientific process. For example, there is a long-standing belief that every introductory college biology course must “cover” a staggering amount of knowledge. There is no time to focus on a much more important goal—insisting that every student understand exactly how scientific knowledge is generated. Science is not a belief system; it is, instead, a very special way of learning about the true nature of the observable world. And yet a large proportion of adults graduate from college without this realization, despite having been forced to memorize a great many scientific facts.

In previous commentaries on this page, I have argued that “less is more” in science education, and that learning how to think like a scientist—with an insistence on using evidence and logic for decision-making—should become the central goal of all science educators. I have also pointed out that, because introductory science courses taught at universities define what is meant by “science education,” college science faculty are the rate-limiting factor for dramatically improving science education at lower levels.

As an important aid for teaching college science, I call attention to an expanded and redesigned resource—*Science in the Classroom*, a growing collection of 80 research articles ([www.scienceintheclassroom.org/](http://www.scienceintheclassroom.org/)). As explained in a brief video ([youtu.be/Y6LwiIniYmo](https://youtu.be/Y6LwiIniYmo)), selected *Science* articles have been carefully annotated for teaching, thanks to the efforts of many volunteers. This free resource makes it readily possible for every college student to read an outstanding research paper as part of a course module focused on teaching the scientific process, and to thereby learn how science actually works. Please try it out, volunteer, and provide feedback at [scienceeducation@aaas.org](mailto:scienceeducation@aaas.org).

—Bruce Alberts



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