

Making science accessible and scientists human

The Reference Frame “What Is Science?” by Helen Quinn (PHYSICS TODAY, July 2009, page 8) misfires, from opening paragraph to final sentence.

I have instructed elementary and junior-high students in general science, conducted planetarium and backyard astronomy sessions, given workshops for homeschoolers, presented maritime history and whaling technology to museum visitors, assisted a class in celestial navigation for sailors, conducted robotics workshops for middle-school science teachers, and judged middle-school science fairs. This diversity has afforded a wide opportunity to hear and ask what people think of science.

Most people do not see science and scientists as Quinn believes: “an authority that provides some information . . . that they use to help make sense of their world.” Most of us do not distinguish between scientist and engineer. We tend to view science and technology as an endless source for nifty new gadgets and medical miracles. Other nonscientists perceive science as the emotionless underlying source of war and environmental destruction that often wastes tax revenue by examining frivolities. Most of us no longer ask Why? or How? The questions now are Why can’t I? and How much will it cost?

Quinn’s sense is that the public’s excitement for science can be ignited by expanding the “usual description of the scientific method” to include the notion that it is an iterative, cyclical process incrementally increasing one’s insight

into the workings of the universe and by including token examples of missteps to show that scientists are human. That concept would fall flatter than Euclid’s plane on nearly everyone I have worked with. Even if her suggestion that revealing scientists’ fallibilities were an effective means to titillate a wider interest in science, her dry examples pale against letters and responses in the same issue (page 10).

People pursue science for many of the same reasons they do anything else. Some are drawn to the intellectual stimulation; others hope to better mankind; others want to make a buck, gain power, or advance an agenda. The need for “absolute honesty” and the other admirable characteristics Quinn relates aren’t exclusive to scientists.

Science has lost luster not because scientists are fallible, but because much of it is so far removed from daily experience that the gap seems unbridgeable and therefore suspect. Quantum mechanics and string theory, despite their impact on us all, are arcane realms that cannot be discussed at dinner beyond tabloid fabrications, and we seem to lack scientists who can or will bridge that chasm.

Quinn further attempts to justify science’s isolation from endeavors such as philosophy and politics by explaining that scientific rational methods, and hence scientists, are necessarily limited to narrow pursuit of one type of knowledge. That explanation may be accurate. However, to the rest of us it sounds like scientists want to experiment unfettered on our dime, unleash hurried results to meet grant deadlines, and then claim immunity because “moral and ethical questions are not amenable to the methods of science.” How does abandoning ordinary folks to bear the full weight of difficult ethical decisions advance the stature of science?

Rather than merely noting “the public’s feeling that science is always changing its conclusions,” scientists need to explain the escalating stream of contradictory studies bewildering most of us. The media portrays such nonsense in terms of this week’s miracle

diet becoming next week’s tragic mistake. Most scientists avoid such frays and leave us nonscientists to draw our own misinterpretations. That does not garner public interest. Part of the price for public support of research is routine explanations of how it’s going to those footing the bills.

A disconnected, arid appeal to scientists to reiterate the usual academic line will not get many laypeople excited about science. People get excited about a subject when they actively share others’ enthusiasm and passion about it. The participation and enthusiasm must be genuine; even very young children readily sense gimmicky “experiments” and feigned hyper-excitement designed to entice them. Yet the simplest hands-on explorations of basic questions, combined with the challenge that many of those questions still lie unanswered, can foster lifelong interests and understanding that enhances support for science. I have seen the success of such a process.

Bill Gill

(bill.gill1@worldnet.att.net)
Mystic, Connecticut

Much of the essay by Helen Quinn on the teaching of science deals with the field’s overall structure and process. She seems to downplay the importance of the human side of science; she mentions it only briefly at the end of her essay and in a negative way that involves jumping to conclusions, making mistakes, faking data, and committing fraud. After 31 years of teaching physics at a community college, I am convinced that it is important to stress that science is a human endeavor. By doing so, we can make science far more interesting and far less intimidating to students.

If we portray science in too perfect an image, how could any student feel capable of pursuing it? And if a scientist is perceived as a cold and logical thinking machine, why would any student want to be one? I think good biographies of scientists should be required reading in introductory science courses so that students see their humanity. It’s good, too, for teachers to show their own human sides and tell students

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