

Who's Getting It Right and Who's Getting It Wrong in the Debate About Science Literacy?



Opinions clash over the best way to bolster public support for science

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Scientists consistently worry that the public just doesn't know enough about science, and that this general lack of public understanding carries with it dreadful consequences, jeopardizing everything from government financing of research to social progress. Recent controversies in the U.S. and Europe over therapeutic cloning and agricultural biotechnology have brought fresh concerns from the scientific community. Many scientists assume, for example, that if the public knew more about human genetic engineering, then any moral or religious reservations about cloning-for-medical-research might be tempered. Or, if the public better understood the science behind the genetic modification of crops, then few would take seriously the hyperbolized risks associated with the technology.

Yet, how much of a role does "science literacy" really play in the public's resistance to new technologies? Research over the past decade has begun to question the central importance of knowledge in shaping public opinion about science. Instead of public education programs, argue some social scientists, we should be more concerned with public engagement strategies that get citizens directly involved in science policy-making, and that enhance public trust in science-as-an-institution.

A recent debate appearing in the British newspaper *The Guardian* reflects the continued tension between scientists that still regard science literacy as the key component of public support for science, and the new view put forth by many social scientists who insist that other factors are important. The debate leads to new questions, rather than easy answers.

The Science Literacy Perspective

The dominant view historically among policymakers and scientists has been that it is possible to achieve a society-wide level of science literacy that would ensure public support for science, and the emphasis has been on public communication efforts. In fact, the "popular science" movement--comprised of best-selling magazines, TV programs, and books--has long been cherished as a prime vehicle for public education, disseminating relatively uncritical information about the technical discoveries and wonders of science (For an historical overview, see Lewenstein, 1992). If the science community is to share some of the blame for the public's resistance to science, the blame only extends so far as the faulty communication skills of scientists and their institutions.

This emphasis on informal public education is termed the "science literacy" model. The common assumption is that greater science knowledge enables individuals to sort through the misinformation, "bad" science, and extraordinary claims that emerge during political disputes over science and technology. It is believed that greater science literacy would ensure that the public makes "proper"

judgments about science, i.e., judgments in line with those of scientists or experts (For more, see Bodmer, 1985).

The science literacy banner has been carried in the past by well-known scientists such as Carl Sagan and Richard Dawkins, and is argued most recently by Susan Greenfield, a professor of pharmacology at Oxford University, and director of the Royal Institution of Great Britain. In an April 10 column published in *The Guardian*, Greenfield writes:

The only way to evaluate the implications of science is, of course, to be scientifically literate, and one can only be scientifically literate if one is willing to have an open mind and stop expecting our scientists alone to be the conscience of the nation. Imagine a society where to talk about science was as natural as talking about football; where, although one wasn't a scientific David Beckham, one was an armchair amateur up to speed with the latest breakthroughs and even performing virtual experiments on the net.

Once we have a society where science is as exciting as football, and where attending a science lecture or debate is as relevant and fun as going to the cinema, only then will we be truly empowered as a society to harness science for what we want in life, rather than the other way round.

Certainly, it would be a good thing if the public knew more about science, and if the public were more appreciative of science. Survey evidence from the U.S. supports the notion that science knowledge is linked to more positive views of science. (For more, see Miller & Kimmel, 2001; Miller, Pardo, & Niwa, 1997). Despite this evidence, however, is scientific understanding really the key piece of the puzzle in promoting public support for science? Or does a primary focus on science literacy miss the mark?

The Public Engagement Perspective

Many social scientists, for example, question the heavy emphasis on science literacy. Instead, these researchers insist that the scientific community has been too quick to blame the public. By "problematizing" the public, scientists assume too often that the science they produce is "unproblematic," even though technologies such as genetic engineering raise a number of valid technical and moral concerns. As a result, when science knowledge and know-how is brought to bear in policy decisions or communicated to the public by scientists, the view from science is often privileged over differing public perspectives about the issue, thereby simply reinforcing any resistance. The "public engagement" perspective asserts that scientific institutions and scientists need to focus less on programs designed to inform the public about the facts of science, and should instead focus on programs that get citizens involved in science-related decision-making, with a goal of promoting public trust. (For various takes on this theme, see Dierkes & von Grote, 2000).

In a response to Susan Greenfield, published April 17 by *The Guardian*, Jon Turney argues that Greenfield has it all wrong when she emphasizes science literacy. Turney, a science historian and a former journalist, is a professor in the department of science and technology studies at University College, London. He writes:

What of scientific literacy, that supposed panacea? It is a misleading term, implying an analogy with an easily tested functional ability, literacy, which simply does not hold. Most attempts at definition end up with piles of elementary facts, some ideas about the nature of science and, perhaps, the relations between science and society. All worthy enough, though

it tends to reduce to a list of stuff that scientists think everyone else ought to know and turns discussion of public understanding of science into a consideration of plans for abolishing ignorance. This is unlikely to happen any time soon.

Turney accurately explains that scores on survey questions measuring the public's knowledge of science have remained relatively stable over the past few decades, despite popular science efforts. He also correctly points out that many people are relatively indifferent to science, and lack the motivation to learn about science. Additionally, as Turney comments:

But if large numbers of people fail to achieve some ideal of scientific literacy this may be because they have got the message that they have no real purchase on scientific decision making, not because they are incapable of mastering technicalities.

Hence the success of efforts to reverse that message. When members of the public take part in discussions that make them feel they can influence real decisions, lack of scientific knowledge is no problem. A host of experiments with consensus conferences, citizens' juries, deliberative polls, even the Royal Society's new annual Science and Society Forum, all have in common that people are convinced they will be listened to, as well as told what's what scientifically. And they all show that people involved in such discussions quickly become adept at quizzing experts, mastering a brief, asking questions and unmasking political assumptions masquerading as scientific conclusions. They become scientifically literate, but under conditions in which they decide what they need to know.

In the end, the idea of scientific literacy is part of the problem. Although Greenfield's suggestion that we "imagine a society where to talk about science is as natural as talking about football" will have romantic appeal, it leads to thinking about the situation in exactly the wrong way.

Building Trust and Efficacy Through Knowledge

So who is right and who is wrong in this debate? Both sides have valid points. Greenfield and other scientists are right when they assert that science literacy does make a difference in public estimations of science and technology, but it is by no means the only solution in assuaging public fears about new technologies such as genetic engineering. Yet, Turney and others are also correct when they emphasize the impacts of public trust, "public efficacy," (the feeling of being listened to, and being able to make a difference in science-related decision-making), and institutionalized forms of public deliberation.

In fact, it's possible that the current debate relative to science can draw upon valuable research focused on why people participate in politics generally, and why people trust (or distrust) various government institutions. This research shows that knowledge, trust, efficacy, and deliberation are all closely related. Enhanced knowledge of politics leads to an increased belief among individuals that they can make a difference in politics, and also leads to increased trust in political institutions. Deliberating or discussing politics with others enhances knowledge, but also gets people involved. (For more, see McLeod, Scheufele, & Moy, 1999; Moy & Pfau, 2000).

There is little reason to believe that science is an exception when it comes to the generalizability of these findings, yet to date, this research from political science and political communication has

been barely applied to science-related issues or settings. It's likely that increased science literacy makes a difference in public support for science, at least indirectly, through its connection to public trust and efficacy. To completely dismiss either knowledge or trust in shaping public opinion about science is where both sides can get it wrong.