Science and Health Literacy in a Global Age: Images, Meanings, Prospects

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Introduction

"What do people need to know about science to function effectively in the world of today and tomorrow?" That question – posed by Emlyn Koster and Mary Nucci in their invitation to participate in today's meeting – is simple to ask, yet complicated to answer. I'll try to answer it in three ways:

- What images do citizens today have of science and health, and how are these images conveyed?
- What meanings do people attribute to these images and the enterprise that they represent?
- What are the prospects for shaping these images and meanings to ensure that the public has an improved understanding how our systems of science and global health operate?

My overall conclusions are straightforward:

- We have a vital interest in encouraging the public to take an active interest in science and health.
- Perhaps the best way to accomplish this task is to develop compelling narratives of how committed individuals are making a difference in society by applying their knowledge of science and health to solve problems with a direct impact on individual lives.

I'll illustrate these points with an example from Merck's recent experience with global health partnerships and related communications. This brief essay concludes with a suggestion for how giant screen films can put these ideas to use.

Images of science and health

It's often observed that we live in a world shaped by science, technology and medicine. This observation is hardly surprising – but the pervasive impact of technical applications of scientific and medical knowledge is undeniable. Reflect for a moment on your own daily routines: the ubiquity of science in its myriad manifestations makes it seem almost mundane and unremarkable. Yet, if we stop to think about the world we inhabit, surrounded by laptops, Blackberries, iPods, iPhones,

wireless broadband Internet, cellular telephones, flat screen TVs, and dozens of other devices, it's nothing short of magic, as Arthur C. Clarke once famously observed.

Think in another way of the impact of science, technology and medicine on our lives. Reflect for a moment on the issues in contention during this U.S. election season – and again we see the critical and inescapable impact of science on our lives. Whatever the political issue – energy independence? climate change and the environment? stem cell research? healthcare reform? abortion rights? hurricane preparedness? pandemic preparedness? military intervention? --the technical dimensions are obvious. As citizens, Americans require a basic level of scientific and health literacy to understand and decide about myriad issues of public policy. Science is too important to leave to scientists alone.

How do citizens learn about these issues, and where do they obtain their images of science and medicine? Let me mention three mechanisms: the media (broadly conceived), science centers and museums, and film and television. Each of these institutions makes a unique contribution to public understanding of science and medicine.

First, the media.
Print and broadcast media, in reporting news about science, technology and medicine, follow their own imperatives and practices. Driven by the news judgment of editors, much of the coverage we see in newspapers, magazines, and radio and television news is focused on medicine and health. Not only do people who depend on these outlets for information about science see a skewed distribution (think of the hackneyed phrase "news you can use"), but the emphasis on scientists as aloof experts yields an image of a timeless, reified scientific enterprise, rather than a messy, dynamic and vital pursuit. This distorted image is reinforced by the fact that science and medical news follows the dictates of journalistic, rather than scientific, practice -- and coverage may lack essential detail, or focus on elements of the story that serve to create drama or controversy, rather than balance and precision (Dunwoody, 2008; Schwitzer, 2008).

Next, science centers and museums.
These have evolved from an earlier tradition of cabinets and static collections to a new incarnation as public institutions organized around principles of interactive programming and participative learning. As Bernard Schiele (2008, 34) observes in a recent essay, "everything is geared to attract, stimulate, captivate and hold [the visitor's] attention, to motivate, awaken their interest or mobilize their cognitive styles." One consequence of this focus on active engagement has been a shift in science centers to focusing on the risks of scientific progress and the spinoffs of science in innovation and technology.

Finally, science and health in film and television.
Asked to think of a scientist depicted on the big or small screen, our mind inevitably leaps to the image of Dr. Frankenstein as mad scientist in the classic 1931 film. As Roslynn Haynes has pointed out, this image is just one of several canonical views of scientists and doctors on screen: the absent-minded professor (Fred MacMurray in

the eponymous Disney film of 1961), the inhuman rationalist (Mr. Spock in *Star Trek*), the heroic adventurer (Paul Muni as Louis Pasteur, or Greer Garson as Marie Curie), the helpless scientist, or the social idealist. These cultural images of science play an important, if underappreciated role, in helping the public shape their understanding of science and medicine, one based on their everyday experiences, pre-existing knowledge and beliefs (Haynes, 1994; Kirby, 2008).

What do we mean when we talk about science and health literacy?

On some level, the public's images of scientists and doctors and researchers in general inform their understanding and appreciation for the scientific enterprise and its impact on society. Specifying those linkages more systematically has led to a growing academic literature attempting to tease out the different threads of what we mean when we talk about science and health literacy, or public understanding of science and research. Bruce Lewenstein and Rick Bonney have summarized conveniently some of the challenges involved, alluding to different approaches advocated by one or another group of experts: "Focusing on current research is different than focusing on process of research. Focusing on bodies of knowledge is different than focusing on social and ethical implications. Focusing on the people who conduct research is different than focusing on the products of that research." (Lewenstein & Bonney, 2004, p.68-69).

There is no right approach, since the way forward depends on the questions you're asking. But for our purpose today, I find a set of distinctions proposed by Benjamin Shen (1975, p. 48-52) quite helpful. In defining science literacy, Shen suggests three different categories: practical science literacy, civic science literacy and cultural science literacy. Practical science literacy, as the name suggests, means understanding enough scientific knowledge to solve practical problems. This is what most observers mean when they talk about science literacy, focusing on "bodies of knowledge." But Shen's other categories are equally important. Civic science literacy is critical because of the scientific and technological basis of so many public policy issues in the modern world. The average citizen "feels that science-related matters are somehow beyond his [or her] grasp and that at any rate there are experts who will do the worrying," Shen notes. "Yet the same person would not hesitate to apply his common sense to public issues, say, in income taxation or election procedures, even though tax and election matters are much more complex than the vast majority of science-related issues." Informed public policy in democratic societies requires improvements in civic science literacy, which will come from increasing public exposure to science through public education. Civic science literacy will also benefit from Shen's third category, of cultural science literacy, defined as knowing something about the human achievement of science, "It is to science what art appreciation is to art" (ibid, p. 48-49)

What are the prospects for shaping improved public understanding of science and global health?

This brings us back to the key question posed by Emlyn Koster and Mary Nucci: what do people need to know? And, how can we shape the images and meanings of science so that the public has improved civic science literacy? Again, this question has many answers, but I'd like to focus on one important dimension, namely, the power of

narratives about compelling individuals making a difference. Let me give an example from my experience at Merck to highlight what I mean.

Kofi Annan once observed that the world faces an increasing number of "problems without passports," which will require all of our efforts to solve. Given these challenges, it is important to find common ground in defining and working together on sustainable solutions. Even if Merck develops great products for the developing world, without the right health system infrastructure or trained doctors and nurses to deliver care and treatment, those medicines and vaccines can't do their job. With our knowledge base as a profit-making organization, there are ways in which we can apply our skills within public/private partnerships to help developing countries achieve tangible results themselves.

The most ambitious public/private partnership in which Merck participates is African Comprehensive HIV/AIDS Partnership (ACHAP), a collaboration among the Government of Botswana, the Bill & Melinda Gates Foundation and Merck, designed to help Botswana transform their approach to the HIV epidemic across the spectrum of prevention, care, treatment and support. Merck and the Gates Foundation each committed $50 million, beginning in 2000, to help Botswana implement its comprehensive national HIV/AIDS strategy. This project, begun in mid-2000, is making remarkable progress, in a country that has one of the highest adult HIV prevalence rates in the world (with about one in five adults HIV+). As former President Festus Mogae has pointed out, Botswana's very survival depends on its ability to successfully meet its AIDS crisis.

The results have been impressive to date. To give just three examples, the government's treatment program now reaches more than 100,000 patients, and Botswana is one of the few African countries to have reached universal access. The death rate from AIDS was cut in half between 2003 and 2007, and the proportion of HIV+ infants born dropped from 40% to less than 4%. These are dramatic changes in public health in a short period of time. There is still more work to do – new infections are still unacceptably high – but ACHAP has had an important impact (Barrett & Daniela Ballou, 2006; Bill & Melinda Gates Foundation, 2006; de Korte, Mazonde & Darkoh, 2004; Ramiah & Reich, 2005; Ramiah & Reich, 2006; Watson, 2004; Weber, Austin & Barrett, 2001).

One way to tell this story was through the experience of some of the individuals involved. Together with the Gates Foundation, we sponsored a WGBH production entitled *Rx for Survival: A Global Health Challenge*, which was launched on PBS in 2005. *Rx for Survival* focused on critical health issues facing us in a global society – infectious diseases like HIV/AIDS, TB and malaria killing millions in the developing world, the emergence of new diseases (like SARS and avian flu), and the challenges of "superbugs" resistant to treatment, among others. The documentary told these stories through the compelling narratives of individuals who were implementing solutions around the world. Among those individuals were several in Botswana – Donald de Korte, a Dutch physician who left a job as managing director of Merck's business in South Africa to lead ACHAP; Ernest Darkoh, a young physician on the front lines of building a treatment program second to none in Africa; and Ndwapi

Ndwapi, a Botswana native who returned home after medical training in the United States and treated hundreds of HIV patients a day (Hilts, 2005; *Rx for Survival: A Global Health Challenge*, 2005).

Telling the story through the experience of people like us

The narrative style of *Rx for Survival* – bringing the story of science and global health alive through the compelling narrative of people making a difference – is an important example of civic science literacy at work. Through the visual medium of film, *Rx for Survival* heightened awareness of the complex issues involved in fighting the HIV epidemic in the developing world and placed this case in the context of the broader fight for global health. Viewers responded to the vignettes of people like themselves, taking risks and doing good. They learned as they were being entertained.

This brings me, finally, to what implications these reflections on the images and meanings of science and health and the importance of civic science literacy have for future development of giant screen cinema productions? As experts in the field, I'm sure you will formulate your own response, but let me offer two suggestions.

First, the public who constitute your audience share an important characteristic – they respond to personal narratives, to stories of people with whom they can identify or empathize. These stories provide an important vehicle for expanding the horizons of viewers, and even encouraging them to take action – to learn more, to share what they've learned, to support a cause. Second, the giant screen medium can bring these personal stories in science and global health to life in unique ways – by showing people in exotic locales doing amazing things, and thus creating affective bonds between audience and subject. By choosing interesting cases of people doing science, or undertaking critical global health interventions, the giant screen film can help to build awareness and understanding among the general public by showing committed individuals making a difference in the lives of others. That's a contribution to civic science literacy that's well worth the effort.

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