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Improving Scientific Communication

EVEN THE MOST BRILLIANT SCIENTIFIC DISCOVERY, IF NOT COMMUNICATED WIDELY AND ACCURATELY, is of little value. And with the explosion of science around the globe, the dissemination of scientific information, once the purview of learned societies and a handful of publishers, is now a growth industry. This growth has attracted new models and new providers of services. In the process, the standards for scientific communication are slipping (see the special section on Communication in Science beginning on p. 56). The science community must explore new ways to improve upon them.

Why are standards important? For science professionals, time is a very precious commodity. The peer-review process provides some level of assurance about the accuracy of a study's conclusions, relieving each scientist from having to assess the veracity of each paper personally. Through the efforts of independent experts and editors, peer review raises the quality of what is ultimately published. For nonscientists, peer-reviewed publications are considered the "gold standard" of trusted material for policy, management, and other applications of science.

Yet, for a profession that prides itself on the application of experimentation and observation to find truth, scant attention has been paid to improving the institution of peer review, despite the pressure to evolve this time-honored tradition. Much of the growth in journals has been in open-access titles, a trend that has improved access to scientific information. But the open-access business model depends on a high volume of published papers for financial viability, leaving little time for the deliberative process of traditional peer review. Some open-access journals that promise peer review fail to deliver it (see the News story by Bohannon on p. 60).

Novel ways to streamline the review process have been proposed, such as having authors solicit and pay for their own reviews. For the most part, the new schemes lack the sort of "double-blind" tests that scientists would expect, in a drug trial, for example. In such a test, both the author revising the paper and the judges determining which papers are most improved through the review process are blind to which method of peer review is applied. I propose that the science community explore more of these alternatives, but also consider how the effectiveness of new reviewing methods can be rigorously assessed. Which maintain or improve quality standards? Are some better suited to various open-access models of publishing?

Even before scientific material is published, the first outlet for communication is typically a scientific meeting. All presenters want to describe their findings to an audience of influential luminaries in their fields, and they certainly would be disappointed if a conference billed as a gathering of experts were nothing of the sort (see the News story by Cohen on p. 76). Travel budgets are so meager that scientists must carefully prioritize what meetings they attend. On the other hand, much of the growth in science overall has been in nations that, until recently, rarely hosted international meetings. It is understandable that organizations within those countries would want to attract outside scientists to present papers, to benefit their own national efforts. Again, there is scant evidence on how to best use scientific meetings to build an international community. What meeting sizes work the best? What is the best mix of students and established researchers? What assures someone of the quality of a meeting before they commit to attend (such as a peer-reviewed program)? What venues are best for particular types of meetings? Is it better to limit the number of concurrent sessions at the expense of a longer meeting? How does the experience of remote attendees (viewing sessions online) compare to that of in-person attendees? How can that experience at a distance be improved?

It is high time that scientists apply scientific thinking to determine how to better communicate their science. Science progresses through experimentation and evidence. I would like to think that science communication can as well.

— Marcia McNutt

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