

# How to advance scientific literacy

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Society needs science, and scientists need an informed, thoughtful, and open-minded citizenry. Thus, the obvious dependence of American society on science is strikingly inconsistent with the low level of scientific literacy among U. S. citizens. By establishing 2009 as the "Year of Science," professional scientific organizations and grassroots, citizens-for-science groups hope to bring a renewed and invigorated focus on the importance of science now and in the future. As knowledge experts and educators, practicing scientists are key players in advancing the scientific literacy agenda.

As part of its 2008 annual meeting, the Botanical Society of America (BSA) organized a symposium to help inform attendees about the issues involved in scientific literacy as well as the progress achieved toward the goal of obtaining a public that is better informed and more accepting of scientific achievements and [science](#) in general. There were five presentations during the symposium: Marshall Sundberg discussed the PlantingScience initiative developed by the BSA ([www.PlantingScience.org](http://www.PlantingScience.org)), Gordon Uno showed how developing botanical literacy among our students can contribute to scientific literacy, Judith Scotchmoor illustrated how she and her colleagues have developed educational outreach and resources for helping teachers teach the process of science to their students, and Matthew Nisbet and Dietram Scheufele each discussed different aspects of science communication and the public.

Papers based on these presentations will be published in the October

issue of the [American Journal of Botany](#) and will remain free for viewing. All of the papers—including the introduction by Christopher Haufler and Marshall Sundberg (<http://www.amjbot.org/cgi/reprint/ajb.0900241v1>)—show how both passive and active forces have contributed to current concerns about scientific literacy.

In his contribution, Gordon Uno (<http://www.amjbot.org/cgi/reprint/ajb.0900025v1>) summarizes why it is important for scientists in general and botanists in particular to invigorate science teaching with inquiry methods. He illustrates the challenges we face because students lack critical thinking skills, are generally uninformed about plants, and many are actually hostile toward learning about plant biology. To improve this situation, Uno provides seven principles of learning that make recommendations about how botanists should teach, including using themes and "thinking botanically" to illustrate all biological concepts.

Judith Scotchmoor and her colleagues Anastasia Thanukos and Sheri Potter (online soon at <http://www.amjbot.org/papbyrecent.dtl>) discuss efforts targeted at raising public awareness of science (via COPUS, the Coalition on the Public Understanding of Science) and provide resources that are available to teachers who seek to weave the "process of science" into courses to inform students about how science works. By developing a public that is more actively aware of science as part of their lives, both citizens in general and students in particular are more likely to be interested in learning about science. Scotchmoor et al. also discuss the web-based project called "Understanding Science" that aims to improve teacher understanding of the nature of the scientific enterprise, provide resources that encourage and enable K-16 teachers to reinforce the nature of science throughout their teaching, and serve as a clear and accessible reference that accurately portrays the scientific endeavor.

Matthew Nisbet and Dietram Scheufele

(<http://www.amjbot.org/cgi/reprint/ajb.0900041v1>) melded their presentations into a joint-authored paper to discuss efforts targeted at raising public awareness of science. As researchers into communication about science, these authors illustrate that building a public that is more receptive to science requires more than enhancing scientific literacy. They emphasize that science communication efforts need to be based on a systematic, empirical understanding of the intended audience's existing values, knowledge, and attitudes, their interpersonal and social contexts, and their preferred media sources and communication channels.

Taken together, this set of papers captures current issues about the public understanding of science, illustrates why greater emphasis on helping students understand and appreciate the process of science is so important, and provides insights and perspectives on what all practicing scientists can do to build a more receptive audience. It appears that in some respects academic scientists are contributing to the problem because we tend to teach content (facts about biology) rather than process (how to learn about biology). We need to help our students understand how scientists actually do our work, and we should learn about the social dynamics involved with scientific communication. Each of the papers presents different elements of making us more aware of the challenges we face, better prepared to help our students appreciate and learn about science, and in general enhancing our capacity to change the future. Practicing scientists should be active participants in making sure that scientific literacy improves for new generations of students.

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