

As part of its mission to *advance science innovation throughout the world for the benefit of all people*, the AAAS, like other professional societies, plays a key role in undergraduate education reform. The AAAS goals foster lifelong learning skills in research, technology, ethics, communications, international collaborations, and public understanding and appreciation of science and technology. Toward these ends, efforts in undergraduate education reform focus on both the education of students majoring in STEM fields as well as nonmajors.

Through the weekly journal *Science*, AAAS provides STEM professionals with cutting-edge knowledge and research findings that are useful in both the laboratory and classroom settings. *Science* magazine and other professional journals have long served as teaching tools to augment the textbook content with the latest research findings on a variety of topics. Often, educators use *Science* articles in classroom discussion or laboratory group assignments.

In recent years and because of the Internet, *Science* is able to provide enhanced undergraduate teaching resources through *Science Online*, including:

- **Special issues of *Science* or *Science Online* collections**, usually a series of articles and perspectives on a research topic. Examples include Mathematics and Biology (6 February 2004); Evolution of Language (27 February 2004); State of the Planet Series (14 November to 5 December 2003); Networks in Biology (26 September 2003); Biological Imaging (4 April 2003); Metals, Health, and the Environment (9 May 2003); and Tree of Life (13 June 2003).
- **Enhanced Perspectives**, essays on cutting-edge science, further enriched with links to related Internet resources. Enhanced Perspectives include hypernotes—which link directly to websites of other relevant information available online—beyond the standard bibliographic references. Topics for Perspectives have included Climate Science: Already the Day After Tomorrow (13 August 2004); The Ups and Downs of a Sea Anemone (28 May 2004); Social Science: Shrewd Investments (5 May 2000); Thermoelectricity in Semiconductor Nanostructures (6 February 2004); A Boost for Translational Neuroscience (9 July 2004); and The Maser at 50 (8 October 2004).
- **Netwatch**. Each week, the magazine features interesting STEM websites that have been recommended by

readers or staff. Sites that have been featured are grouped online back to April 1998.

- **Knowledge Environments (KE)**, an online approach to organizing ideas and insights in cross-disciplinary areas such as cellular signal transduction, aging research, and AIDS prevention and vaccine development.
- **Career supplements and online resources**, including practical essays and articles on job-hunting strategies, scientific trends and policy, career transitions, and work-life topics such as gender issues and balancing family and professional commitments. A special MiSciNet (Minority Science Network) site has been developed for students who traditionally do not pursue STEM doctorate degrees, including African American, Hispanic American, and American Indian students. MiSciNet is aimed at helping students make the transitions from undergraduate to graduate school into the postdoctorate and early career stage.

All of these online resources are archived and searchable on the AAAS website.

Another useful AAAS undergraduate teaching tool is designed to help improve the ability of undergraduate and graduate students, scientists, and others to develop informed and well-reasoned responses to ethical issues that arise in scientific research. Developed by AAAS Science and Policy Programs staff and college and university educators, the *Integrity in Scientific Research* (1) videos and discussion and resource guides address such topics as the role and responsibilities of mentors and lab chiefs; determination of authorship; data retention, selection, sharing, and reporting; scientific misconduct and institutional responses; animals in research; and intellectual property.

To reinforce teaching and learning in the biological sciences, the AAAS Education and Human Resources (EHR) Programs and the *Science* Signal Transduction Knowledge Environment (STKE)—with 11 other professional societies and coalitions—established the BiosciEdNet (BEN) collaborative. BEN serves as a catalyst and a technical support mechanism for these organizations to collaborate in terms of pedagogy, authentic assessment, and development of online multidisciplinary resources. BEN addresses the pressing need for scientifically accurate and adaptable inquiry-based and problem-solving e-resources that complement and strengthen advanced placement high school and undergraduate biological sciences education (BIO2010) (2,3). Through

# Perspectives from AAAS

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the BEN portal site, the collaborative currently provides searchable and seamless access to eight digital library collections maintained by the American Society for Microbiology, American Physiological Society, American Society for Biochemistry and Molecular Biology, Association for Biology Laboratory Education, Botanical Society of America, Ecological Society of America, Human Anatomy and Physiology, and the *Science* STKE.

In addition to providing print and online resources for use in the undergraduate classrooms and laboratory, AAAS serves as a convener for scientists, mathematicians, and educators to formulate undergraduate reform strategies and directions and curriculum guidelines. The AAAS annual meeting usually includes topics on STEM undergraduate education, and AAAS sponsors special meetings aimed at developing an action agenda or recommendations in regards to undergraduate education. Special meetings have included:

- *The Liberal Art of Science: Agenda for Action* (4). This study group deliberated about the *level of scientific understanding required for optimal participation in life and the 21st century and about the nature of undergraduate education in the natural sciences necessary to achieve a proper level of understanding* (4).
- *Seizing Opportunities: Collaboration for Excellence in Teacher Preparation* (5). A total of 102 deans, including deans of education and deans of science, from 51 institutions discussed ideas and strategies for restructuring mathematics and science teacher preparation programs.

In other efforts, the AAAS EHR unit partners with businesses to provide undergraduate research opportunities. With the Merck Company Foundation, AAAS provides awards to colleges and universities to provide students with research experiences that emphasize the relationships between chemistry and biology. With IBM, NASA, NSF, and others, AAAS provides internship opportunities for students with disabilities, particularly in computer sciences, mathematics, and some fields of business. The AAAS Mass Media Science and Engineering Fellowship Program places STEM undergraduate students in their senior year, graduate students, and postdoctoral fellows with print and broadcast media organizations for a summer experience communicating science to the public. Through the AAAS annual meeting student poster competition, these and other undergraduate and graduate students can showcase their research.

In conclusion, many STEM professional societies provide similar resources and tools, meetings, and opportunities for undergraduate educators and students, including the American Chemical Society, American Institute of Biological Sciences, American Institute of Physics, IEEE, and Mathematical Association of America. These services are a large part of the stewardship that professional societies provide for their disciplines, their members, and the larger STEM community in terms of research, education, and public understanding of science.

Yolanda S. George and Shirley M. Malcom  
Education and Human Resources Programs, AAAS

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