First year of peer-review for *The Natural Selection*

After 15 years of what began as a newsletter with updates about BSCS, *The Natural Selection* has now evolved into a peer-reviewed journal. The first year of this "new era" for *The Natural Selection* brought forth a Spring 2006 issue which reported the results of a September 2005 conference of leaders in business, industry, and education focused on the 21st century workforce and a Fall 2006 issue on high school reform.

The first half of the Spring 2006 issue presents the keynote address presented to the Science Education and the 21st -Century Workforce Conference on 19 September 2005 by Eric Hanushek, senior fellow at Stanford University's Hoover Institute. Alarmed that "other countries have managed to increase the universality of education and the amount of education that everybody gets while maintaining quality, as measured by international performance," Hanushek also laments that tripling resources for science education in the US between 1960 and 2000 has led to no change in American science test scores. What matters, Hanushek says, are "good teachers," which he defines by their ability to get high gains in learning. (According to the January 2007 issue of *NSTA Reports*, the Center for American Progress report, *Teacher Pay Reforms: The Political Implications of Recent Research*, supports Hanushek's assertion.) The key to improving science education in his program is to replace retiring teachers with better teachers, though Hanushek provides no procedure for identifying such better teachers before they are hired.

The second half of the Spring 2006 issue is an article, "Global Competitiveness: An Analysis of Business and Industry Recommendations," about the BSCS report, *Global Competitiveness: Implications for K-12 Science and Technology Education.* This report is based on "recommendations from 14 reports published by a variety of groups and organizations representing business and industry," including *Rising Above the Gathering Storm*, *Tapping America's Potential*, and *Keeping America Competitive* (reviewed in our Fall 2005 issue). One of the most frequently cited is a 2003 report from the Business-Higher Education Forum (BHEF), *Building a nation of learners: The need for changes in teaching and learning to meet global challenges*.

"Recent reports from various business and industry groups have used student performance on international and national assessments as the basis to call for reform of school science and technology education," the article states. "The rationale for these calls for reform rests on the fact that many students do not have the skills needed to do well in the contemporary domestic economy and the potential that the United States will become uncompetitive in the global marketplace." One of the calls is for high school standards to "reflect a new understanding of the skills and knowledge . . . high school graduates need to succeed in entry-level, well-paying jobs and credit-bearing courses at any college or university." (Achieve, Inc., and National Governors Association (NGA), *An action agenda for improving America's high schools* (2005)). The BHEF identifies these skills as "leadership, teamwork, problem solving, time management, self-management, adaptability, analytical thinking, global consciousness, and basic communications

skills (listening, speaking, reading and writing)." But the Achieve and NGA report notes that present high school standards typically "top out" at the tenth grade and emphasizes that they insure "only a subset of the skills that students will ultimately need."

The BHEF also notes that "Students cannot attain these critical skills simply by turning on a computer, watching a video, or passing a test. These crucial skills will not be transferred to higher education students without a sophisticated, highly adaptable education system." Another recommendation is to provide special support to students who have mastered high school graduation requirements in their transition to college. Lastly, the BHEF identifies "five key changes that can help redesign education to produce graduates for the 21st century": lifelong learning, challenging and relevant content, more interaction and individualization, increased opportunity and access to education, and adaptation of objectives to certifiable job-related skills.

The Fall 2006 issue of *The Natural Selection* is devoted to developing coherent science curricula for all four years of high school. The first half is devoted to developing cornerstone-to-capstone (C-to-C) curricula that span the first high school years. In an article, "Expanding the Vision: Curriculum Frameworks That Respond to Change," excerpted from the BSCS report, *The Cornerstone-to-Capstone Approach: Creating Coherence in High School Science*, pathways are laid out for sequencing a curriculum from ninth-grade physics to 10th-grade chemistry to 11th-grade biology to 12th-grade earth science, using change and equilibrium, interactions of matter and energy, and structure, properties, and function as unifying concepts. In separate vignettes, examples of the C-to-C program are contrasted with the traditional sequence of ninth-grade biology, 10th-grade chemistry, and 11th-grade physics.

The article in the second half, "Responding to Change: Nontraditional Models of Science Programs," features two nontraditional sequences, one developed by the Meaningful Science Consortium, composed of the School of Education and Social Policy at Northwestern University, the University of Illinois-Chicago, BSCS, It's About Time publishers, and individuals from the American Geological Institute, the University of Massachusetts-Boston, and the University of Maryland. The "Meaningful" science sequence addresses earth and environmental science in the ninth grade, using *Investigations in Environmental Science* (developed by Northwestern) and *Earth-Comm* (developed by the American Geological Institute); chemistry and physics in the tenth grade, using *Active Physics* and *Active Chemistry* (both developed by Arthur Eisenkraft at the University of Massachusetts-Boston); and biology in the eleventh grade, using *BSCS Biology: A Human Approach* (all the other texts are published by It's About Time). The twelfth grade year is reserved for a more advanced science course of the student's choice. The second nontraditional sequence, featuring "every science, every year" (again reserving the twelfth grade year for an advanced science elective) is based on *BSCS Science: An Inquiry Approach*. This program features more physics in the ninth-grade year, which tapers down by eleventh grade, while the emphasis on biology increases during this time.

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