



Bruce Alberts is Editor-in-Chief of *Science*.

## An Education That Inspires

WHY IS IT THAT CHILDREN, WHO ENTER SCHOOL AT AGE 5 FILLED WITH EXCITEMENT AND WONDER about the world, often become bored with education before their teenage years? How might the United States produce a more engaging education system, one that allows a child with a specific fascination to explore that interest in depth as an integral part of his or her early education? Here I sketch a possible plan based on science, technology, engineering, and math (STEM) awards that would be largely earned through student activities outside of school.

The idea has been partly inspired by the U.S. Advanced Placement (AP) system of courses and exams, which makes a first-year college-level education in selected subjects available to high school students. As a nationally recognized standard of achievement, passing an AP course is a mark of success for both students and schools. High schools now strive to increase the number of students taking such courses, and this nongovernmental but nationally certified program has been rapidly growing in popularity. Could a nationally validated set of “STEM challenge awards,” designed for students at earlier stages of schooling, similarly motivate schools and school systems to value a new type of achievement?

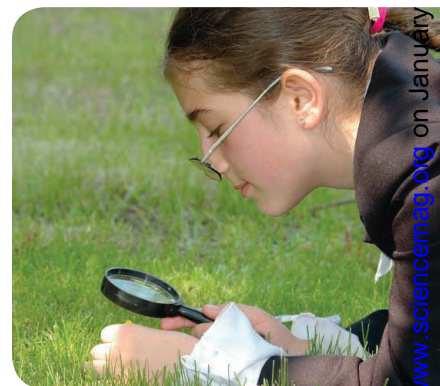
I suggest that the proposed STEM challenge awards be modeled on the achievement badges that youth organizations around the world have developed to promote the active learning of specific subjects in depth. For example, the Boy Scouts of America allows more than 100 different merit badges to be earned, each focused on a specific topic such as Plant Science or Lifesaving.\* In addition to this large selection, each badge provides a young person with a variety of options. Thus, to earn a Plant Science merit badge, a scout can choose between agronomy, horticulture, or field botany. Most learning experiences are active ones, such as “Select a study site that is at least 100 by 100 feet. Make a list of the plants in the study site by groups of plants: canopy trees, small trees, shrubs, herbaceous wildflowers and grasses, vines, ferns, mosses, algae, fungi, lichens. Find out which of these are native plants and which are exotic (or non-native).” This is infinitely more interesting than a typical school experience in which students memorize the names of plants and their parts from pictures in a textbook, often without encountering the actual object.

A STEM challenge award program might provide 100 different challenges to choose from at each level of schooling (for example, sets of awards of increasing difficulty for ages 5 to 8, 9 to 13, and 14 to 18), on subjects ranging from reptiles to Web design. Scientific and engineering societies in each discipline could create the requirements for many awards, as could industry groups or government agencies such as the U.S. National Aeronautics and Space Agency. But a single umbrella organization would be needed to certify the contents of the award projects, as well as the mechanisms used to judge and record their completion. Such national certification would be critical for the awards to have a substantial positive impact, serving as a widely recognized, valid mark of success for both students and school districts.

The most ambitious and revolutionary part of this plan supplements the teachers in schools with adult volunteers, each serving as an expert for a particular STEM challenge award. To earn a merit badge, a scout must demonstrate to a qualified adult volunteer (a “counselor” for that badge) that he has satisfied that badge’s requirements. In a similar way, many thousands of adults with science and technology backgrounds would be enlisted as counselors, both to help teachers and to judge each student’s performance, making full use of modern communications tools. A great many scientists and engineers would be willing to contribute to improving science in schools if an efficient and effective way for them to do so could be generated. And their contributions could truly inspire today’s students.

– Bruce Alberts

10.1126/science.1199138



\*[www.scouting.org/scoutsources/BoyScouts/AdvancementandAwards/MeritBadges.aspx](http://www.scouting.org/scoutsources/BoyScouts/AdvancementandAwards/MeritBadges.aspx).