

National Science Education Standards: How You Can Make a Difference

Susan Speece

IN 1991, the National Research Council was commissioned by the National Science Teachers Association, the National Association of Biology Teachers, the presidents of several scientific societies, the United States Secretary of Education, the National Science Foundation and others to study the problems facing science education and to suggest possible solutions. Throughout the popular and professional literature we are reminded that students in the United States score poorly on science and mathematics exams when compared with students from other countries. While we could debate the weaknesses of some of the comparisons that have been made, students in this country are not doing as well as we would like them to do when it comes to scientific literacy. This means that our future leaders will also come from the ranks of those who have been identified as being scientifically illiterate.

The comments that follow emphasize the extent to which professional organizations are concerned with science education and science education reform. "Scientific literacy—which embraces science, mathematics and technology—has emerged as a central goal of education. Yet the fact is that general scientific literacy eludes us in the United States" (AAAS 1989). "The wish to educate every citizen is at the foundation of American democracy. . . . There is currently great concern, however, about the quality and effectiveness of our public education system. . . [along] with the growing awareness that a citizenry with an understanding of the role of science and technology is the key to our nation's future economic security" (NRC 1990). "A careful analysis of the existing scope, sequence and coordination of science subject matter in U.S. secondary schools reveals very serious deficiencies" (Aldridge 1989).

There is a growing concern about the lack of science literacy among our youth and citizenry. Despite several reform efforts, there is no foundation that can direct where we need to be going as a nation with these reform programs and assess how we will

have done once we arrive where we think we want to be. To address the perceived problems in science education, the National Research Council has established an advisory committee to help plan and advise the development of National Science Education Standards. The advisory committee and three working groups (on curriculum, teaching and assessment) include 89 individuals representing science teaching, science education and science research. The committee's charge is to formulate the National Science Education Standards. Science teachers from grades K-12 constitute a plurality on the working groups (NRC 11/1992 draft).

The three working groups—curriculum, assessment and teaching—began developing their respective areas in the summer of 1992. Liaisons with scientific, educational and other interested organizations (including NABT) were formed for the purpose of review and input of ideas. A pre-draft of major concepts was the topic of discussion at a forum cosponsored by AAAS and the National Academy of Sciences in Washington, DC, in October of 1992. The first partial draft of the National Science Teaching Standards which reflected the input of the Washington meeting and review by many classroom teachers was published in November of 1992. This "Sampler" focused primarily on the curricular aspect of the standards, with one illustration of teaching standards included. Future drafts will include assessment standards and more teaching standards. A full draft is expected in the fall of 1993 and a final release of the standards is projected for the fall of 1994. In the meantime, there is a great need for input on the part of classroom teachers and biology educators across the country. To assist in obtaining input from biology teachers, NABT has formed a National Science Education Standards Task Force to involve members in this review process.

The call for reform might lead the public to believe that teachers are not doing a good job. If you talk with classroom teachers, however, they justifiably (and predictably) negate that assumption. What is not being said is that science has changed dramatically in the past 30 years, and society's need for relevance has also changed. This burgeoning of scientific information makes the teaching of science

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increasingly more difficult. Much of what is being taught in the biology classroom is based on good pedagogy. However, we have less time to develop concepts before we feel we must rush on to the next topic and complete the text before the end of the year. Because we tend to deal with each topic on a superficial basis rather than with depth, the oxymoronic phrase "less is more" has become the mantra of science education reform. Unlike what some narrow visioned administrators have claimed, *less is more* does **not** suggest that we should teach fewer science courses. On the contrary, more courses would be preferred. Less is more suggests that we do not need to teach every topic in a text. It is far more effective to teach fewer topics and teach them with more depth and more hands-on activities, to allow for reflection, analysis, knowledge and the excitement of discovery to develop and reach full impact.

According to James D. Ebert, Ph.D., vice president of the National Academy of Sciences and chair of the National Committee on Science Education and Assessment, the National Science Education Standards are intended to be a *banner* behind which all science educators can rally.

The National Science Education Standards will be descriptive not prescriptive. Narrative form, rather than checklists, will support thoughtful consideration and application. The curriculum standards will not define a specific curriculum, syllabus or course of study; teaching standards will not be certification or licensure specifications; assessment standards will not be an examination.

Strengths

Every effort is being made to involve many classroom teachers in the process of developing and assessing the standards. Frequent reviews and revisions are being made, and additional teachers will be recruited to assist with the standards. The NABT task force will be communicating to you through *News & Views* and possibly through *The American Biology Teacher Journal*. Your comments are requested and encouraged.

The National Science Education Standards project is working simultaneously on Science Curriculum Standards, Science Teaching Standards and Science Assessment Standards. The standards will provide guidelines for local school districts and state departments of education to develop meaningful curricula, teaching standards and assessment tools that are relevant to the specific region.

Implications for Biology Teachers

Frequently heard comments at the Denver NABT Convention suggested a concern over having the federal government tell teachers how to teach. The intention of the National Science Education Stan-

dards Project is not to tell biology teachers what and how they must teach. Rather, it is hoped that the standards will free teachers to explore subjects in greater depth, to have time for reflection on the significance of the content and to have the opportunity to put the excitement back into the biology classroom. The National Standards will provide guidelines and documentation for teachers to request the time and money needed to teach biology more effectively.

Many teachers have expressed concern that there is a movement to eliminate individual science disciplines. While the classroom teacher will likely have to know more about the interrelationships between disciplines, it is anticipated that there will still be separate disciplines. The National Science Education Standards may help to provide more opportunities for team teaching experiences, and hopefully there will be more opportunities for students to **do** science rather than follow unimaginative lab procedures.

The Role of NABT

NABT will be making a strong effort to gather consensus from the membership on the standards as they develop. The membership will also be asked to evaluate the standards in the formative stages. The NABT Science Education Standards Task Force consists of classroom teachers, biologists and biology educators who will serve as the contacts and review panel for the revisions that will be made in the document over the next 18 months. The task force will maintain an open line of communication between the membership and the NRC Standards committees. It will review biological standards developed by the NRC committees and distribute those standards to the membership for evaluation and revision, with the help of the NABT executive office and staff. The task force will also filter comments received from the science research community and forward those comments to the NRC. *News and Views* and possibly *ABT* will serve as the primary modes of communication with the membership. You are encouraged to respond to the standards through the national office (11250 Roger Bacon Dr., #19, Reston, VA 22090). The input of the membership over the next year is extremely important to the success of the project; we need your ideas and input. Additional communication can be made with the NRC and the individual committees at the addresses listed at the end of the article. If you do write to NRC or the committees it would be helpful if you would also provide NABT with copies of your comments.

Biology teachers have a prime opportunity to be proactive rather than reactive. You can make a difference in the future of biology education in the nation.

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References

- Aldridge, B.G. (1989, 12 May). *Essential changes in secondary school science: Scope, sequence and coordination*. Washington, DC: National Science Teachers Association.
- American Association for the Advancement of Science. (1989). *Project 2061: Science for all Americans*. Washington, DC: AAAS.
- National Research Council. (1990). *Fulfilling the promise: Biology education in the nation's schools*. Washington, DC: NRC.
- National Research Council. (1992, November). *National science education standards: A sampler*. Washington, DC: NRC.

For more information on NABT's 1993 National Convention, November 17-21, in Boston, see pages 316-320. Also, complete convention details will appear in the May/June 1993 issue of News & Views.

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Alain Corcos and Floyd Monaghan

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