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The National Science Resources Center (NSRC) is operated by the Smithsonian Institution and the National Academies to improve the teaching of science in the nation’s schools. The NSRC disseminates information about exemplary teaching resources, develops curriculum materials, and conducts outreach programs of leadership development and technical assistance to help school districts implement inquiry-centered science programs.

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Community leaders and state and local school officials across the country are recognizing the need to implement science education programs consistent with the National Science Education Standards to attain the important national goal of scientific literacy for all students in the 21st century. The Standards present a bold vision of science education. They identify what students at various levels should know and be able to do. They also emphasize the importance of transforming the science curriculum to enable students to engage actively in scientific inquiry as a way to develop conceptual understanding as well as problem-solving skills.

The development of effective standards-based, inquiry-centered curriculum materials is a key step in achieving scientific literacy. The National Science Resources Center (NSRC) has responded to this challenge through the Science and Technology Concepts for Middle Schools (STC/MS) program. Prior to the development of these materials, there were very few science curriculum resources for middle school students that embody scientific inquiry and hands-on learning. With the publication of the STC/MS modules, schools will have a rich set of curriculum resources to fill this need.

Since its founding in 1985, the NSRC has made many significant contributions to the goal of achieving scientific literacy for all students. In addition to developing the Science and Technology for Children (STC) program—an inquiry-centered science curriculum for grades K through 6—the NSRC has been active in disseminating information on science teaching resources, in preparing school district leaders to spearhead science education reform, and in providing technical assistance to school districts. These programs have had a significant impact on science education throughout the country.

The transformation of science education is a challenging task that will continue to require the kind of strategic thinking and insistence on excellence that the NSRC has demonstrated in all of its curriculum development and outreach programs. Its sponsoring organizations, the Smithsonian Institution and the National Academies, take great pride in the publication of this exciting new science program for middle schools.

J. Dennis O’Connor, Under Secretary for Science
Smithsonian Institution

Bruce M. Alberts, President
National Academy of Sciences
Preface

The National Science Resources Center (NSRC) is dedicated to the development, dissemination, and implementation of innovative, hands-on science education programs. After the completion of the Science and Technology for Children (STC) program for elementary schools, the NSRC launched in 1997 the Science and Technology Concepts for Middle Schools (STC/MS) project. The STC/MS program is designed to meet the challenge of the National Science Education Standards to place scientific inquiry at the core of science education programs.

The STC/MS program, which consists of eight instructional modules, is designed to provide students with stimulating experiences in the life, earth, and physical sciences and in technology while simultaneously developing their critical-thinking and problem-solving skills. The NSRC believes that the way to do this is to engage students in scientific inquiry. The National Science Education Standards state: “Students in grades 5–8 should be provided opportunities to engage in full and partial inquiries.... With an appropriate curriculum and adequate instruction, middle school students can develop the skills of investigation and the understanding that scientific inquiry is guided by knowledge, observations, ideas, and questions.”

Bruce Alberts, president of the National Academy of Sciences, reflects on the importance of teaching science through inquiry in the National Academies’ publication Inquiry and the National Science Education Standards: A Guide for Teaching and Learning:

Teaching science through inquiry allows students to conceptualize a question and then seek possible explanations that respond to that question.... Inquiry is in part a state of mind—that of inquisitiveness. Most young children are naturally curious. They care enough to ask “why” and “how” questions. But if adults dismiss their incessant questions as silly and uninteresting, students can lose this gift of curiosity. Visit any second-grade classroom and you will generally find a class bursting with energy and excitement, where children are eager to make new observations and try to figure things out. What a contrast with many eighth-grade classes, where the students so often seem bored and disengaged from learning and from school!

The STC/MS modules developed by the NSRC keep inquiry at the center of the learning process to encourage student curiosity—even in eighth graders. And the materials are unique in a number of other ways. The NSRC has developed each module using a rigorous research and development process. The STC/MS activities have been developed through repetitive cycles of classroom testing, review, and improvement. This research and development process has included both trial teaching and field-testing nationwide, as well as the active involvement of many scientific experts from universities, museums, government agencies, and industry. The NSRC has also designed special apparatus for many of the activities and tested each piece of equipment to perfect the design. After field testing, the STC/MS developers continued to revise the
materials and apparatus, based on feedback from students, teachers, and experts.

The research and development process of the STC/MS curriculum involved a very productive collaboration of master teachers and scientists. Beginning with the conceptualization of each module, scientists have been involved, reviewing the conceptual structure and contributing to the learning activities in each module. Expert middle school science teachers have also worked with NSRC developers—master teachers themselves—to assess how students respond to the activities and to suggest ways to improve them. This collaboration, involving both scientists and expert teachers, has ensured that the learning activities in each module reflect current scientific thinking and are effective in the classroom. The involvement of such experts from the beginning has sparked creativity in the module development process and has added originality to every lesson.

Because this research and development process is time-consuming and labor-intensive—and therefore expensive—it is not surprising that few traditional science textbooks have been developed this way. The NSRC has received major support from the National Science Foundation and from many corporate and philanthropic foundations to develop the STC/MS program.

Thus, three unique factors—keeping inquiry at the center of each lesson, following a rigorous research and development process, and engaging the active collaboration of scientists and expert teachers—have characterized the development of the STC/MS program. This process has enabled the NSRC to produce a focused, inquiry-centered curriculum for middle schools that actively engages students in learning new science and technology concepts, while building critical-thinking and problem-solving skills that will be useful to them throughout their adult lives.

The NSRC is grateful to Kitty Lou Smith, STC/MS Project Director, for her tireless efforts and creative leadership of this project. Working in partnership with Managing Editor Dorothy Sawicki, Dr. Smith has guided her staff through all the phases of the arduous research and development process that has led to the publication of the STC/MS program modules.

We would also like to thank the NSRC’s parent institutions, the Smithsonian Institution and the National Academies, for their vision and support in helping the NSRC to undertake this project. We look forward to hearing from teachers regarding their classroom experience with the STC/MS modules, together with any suggestions they may have for improvements.*

DOUGLAS M. LAPP
Executive Director
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*Suggestions and feedback can be sent by e-mail to: stcms@nas.edu, or mailed to: STC/MS Program, National Science Resources Center, Smithsonian Institution, Washington DC  20560-0403.
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