Consider using some of the resources listed below as you enter a career in science teaching. However, don’t be too quick to purchase them with your own funds; your school district will mostly likely have at least one copy of the books listed below available for teacher-use. If not, try to see if your district science coordinator or building principal can’t purchase copies for your building. Most of the following titles are considered essential handbooks for science educators and you will be sure to make good use of them throughout your science-teaching career.

SCIENCE FOR ALL AMERICANS, by Rutherford & Ahlgren

Book Description
In order to compete in the modern world, any society today must rank education in science, mathematics, and technology as one of its highest priorities. It’s a sad but true fact, however, that most Americans are not scientifically literate. International studies of educational performance reveal that U.S. students consistently rank near the bottom in science and mathematics. The latest study of the National Assessment of Educational Progress has found that despite some small gains recently, the average performance of seventeen-year-olds in 1986 remained substantially lower than it had been in 1969. As the world approaches the twenty-first century, American schools—when it comes to the advancement of scientific knowledge—seem to be stuck in the Victorian age.

In Science for All Americans, F. James Rutherford and Andrew Ahlgren brilliantly tackle this devastating problem. Based on Project 2061, a scientific literacy initiative sponsored by the American Association for the Advancement of Science, this wide-ranging, important volume explores what constitutes scientific literacy in a modern society; the knowledge, skills, and attitudes all students should acquire from their total school experience from kindergarten through high school; and what steps this country must take to begin reforming its system of education in science, mathematics, and technology.

Science for All Americans describes the scientifically literate person as one who knows that science, mathematics, and technology are interdependent enterprises with strengths and limitations; who understands key concepts and principles of science; who recognizes both the diversity and unity of the natural world; and who uses scientific knowledge and scientific ways of thinking for personal and social purposes. Its recommendations for educational reform downplay traditional subject categories and instead highlight the connections between them. It also emphasizes ideas and thinking skills over the memorization of specialized vocabulary. For instance, basic scientific literacy means knowing that the chief function of living cells is assembling protein molecules according to the instructions coded in DNA molecules, but does not mean necessarily knowing the terms "ribosome" or "deoxyribonucleic acid."

Science, mathematics, and technology will be at the center of the radical changes in the nature of human existence that will occur during the next life span; therefore, preparing today’s children for tomorrow's world must entail a solid education in these areas. Science for All Americans will help pave the way for the necessary reforms in America's schools.

BENCHMARKS FOR SCIENCE LITERACY, PROJECT 2061, by American Association for the Advancement of Science (AAAS)

Book Description
Published to glowing praise in 1990, Science for All Americans defined the science-literate American—describing the knowledge, skills, and attitudes all students should retain from their learning experience—and offered a series of recommendations for reforming our system of education in science, mathematics, and technology. Benchmarks for Science Literacy takes this one step further. Created in close consultation with a cross-section of American teachers, administrators, and scientists, Benchmarks elaborates on the recommendations to provide guidelines for what all students should know and be able to do in science, mathematics, and technology by the end of grades 2, 5, 8, and 12. These grade levels offer reasonable checkpoints for student progress toward science literacy, but do not suggest a rigid formula for teaching. Benchmarks is not a proposed curriculum, nor is it a plan for one: it is a tool educators can use as they design curricula that fit their student's needs and meet the goals first outlined in Science for All
Americans. Far from pressing for a single educational program, Project 2061 advocates a reform strategy that will lead to more curriculum diversity than is common today.

Benchmarks emerged from the work of six diverse school-district teams who were asked to rethink the K-12 curriculum and outline alternative ways of achieving science literacy for all students. These teams based their work on published research and the continuing advice of prominent educators, as well as their own teaching experience. Focusing on the understanding and interconnection of key concepts rather than rote memorization of terms and isolated facts, Benchmarks advocates building a lasting understanding of science and related fields. In a culture increasingly pervaded by science, mathematics, and technology, science literacy require habits of mind that will enable citizens to understand the world around them, make some sense of new technologies as they emerge and grow, and deal sensibly with problems that involve evidence, numbers, patterns, logical arguments, and technology—as well as the relationship of these disciplines to the arts, humanities, and vocational sciences--making science literacy relevant to all students, regardless of their career paths.

If Americans are to participate in a world shaped by modern science and mathematics, a world where technological know-how will offer the keys to economic and political stability in the twenty-first century, education in these areas must become one of the nation's highest priorities. Together with Science for All Americans, Benchmarks for Science Literacy offers a bold new agenda for the future of science education in this country, one that is certain to prepare our children for life in the twenty-first century.

Reviewer #1: A Help for Science Teachers, January 29, 2003

“I teach science in a small, very rural school to grades 7-12. I have been using this book for the first time this year. I like how this book makes the benchmarks clear and specific. It doesn't just say, "Students will understand the structure of atoms" the way my state's standards do. It spells out exactly what the student should know about the structure of the atom. I used to run a very textbook driven curriculum, but I found that the textbooks were woefully inadequate, but I lacked direction as to what I should be doing. When I recently changed schools, I also discovered this book, and it presented the answer.

At my new school, my textbooks are only a reference that mostly sits on the shelf. I have designed my curriculum more around these standards and my state standards. This book makes it clear that there are many topics that I have taught that don't need to be taught. For example, during the past 2 years, I taught photosynthesis and respiration from the book: electron transport chain, pyruvate, and all. This year, I talked more about the carbon and the energy and where all the atoms went. My students this year can actually answer questions about these subjects. For the most part, they understand them. My previous students did not understand.

This book also has an excellent section on dealing with vocabulary. Much of science education substitutes vocabulary for understanding. I am now using many fewer technical words, and even then only introducing those words when the students understand the concepts. I don't agree with some of the things in this book. There are a few subjects I think are more important than the authors do. There are also a few subjects the authors think are more important than I do. I also dislike their emphasis on attitudes about science and the amount of time they spend on the culture and history of science. I would like to see more emphasis on content. Overall, however, this will make you a better teacher. If you are a parent, it will equip you to question what your child is learning (at any level) and to get your school to start making the changes our education system needs.”

ATLAS OF SCIENCE LITERACY, PROJECT 2061: by American Association for the Advancement of Science (AAAS)

Book Description
An oversized book with ambitious goals: That's the Atlas of Science Literacy. Asking-then answering-such vital questions as:
- What should students learn?
- When should they learn it and in what order?
- How does each strand of knowledge connect to other vital threads?

This new educational tool from AAAS's Project 2061 graphically depicts connections among the learning goals established in Benchmarks for Science Literacy and Science for all Americans. The Atlas is
collection of 50 linked maps that show exactly how students from kindergarten through 12th grade can expand their understanding and skills toward specific science-literacy goals. But the maps don’t just show the sequence of Benchmark ideas that lead to a goal. They also show the connections across different areas of mathematics, technology, and science - including gravity, evolution and natural selection, the structure of matter, and the flow of matter and energy in ecosystems.

Reviewer #1: Science Specialist, March 17, 2001

“This book is a "must have" resource for science, mathematics, and technology educators who want to see the story of science teaching and learning unfold over time. These maps of ideas, which start with fundamental K-2 understandings, are constructed to show how ideas build over time, how they interconnect, which ideas lead to others, and what important prerequisites exist. This book will forever transform your thinking and planning for curriculum, instruction, and assessment. There is no other resource like this. Project 2061 has done it again- a simply elegant, extremely useful tool for standards-based educators!"

NATIONAL SCIENCE EDUCATION STANDARDS (NSES): Observe, Interact, Change, Learn, by National Research Council (Editors: ?)
Available at: Amazon.com, www.nap.edu, www.nsta.org

Book Description
From Book News, Inc.
Offers a coherent vision of scientific literacy, describing what students should be able understand at different grade levels in various science categories. Overviews principles and definitions in education standards, and lists standards for science teaching and professional development for teachers, content standards, and education program and education system standards. Includes sample classroom activities. Annotation c. by Book News, Inc., Portland, Or.

Ingram
This volume offers a coherent vision of what it means to be scientifically literate, describing what all students regardless of background or circumstance should understand and be able to do in science as a result of their learning experience. The standards reflect the principles that learning science is an inquiry-based process, that science in schools should reflect the intellectual traditions of contemporary science, and that all Americans have a role in science reform.

Available at: Amazon.com, www.nap.edu, www.nsta.org

Book Description
We can’t teach science the way we used to! In 1996 the National Research Council gave us the National Science Education Standards. We learned in order to guide our nation toward a scientifically literate society we must emphasize inquiry as a way of achieving knowledge and understanding about the world. The NRC is expanding on this concept in the newly released Inquiry and the National Science Education Standards: A Guide for Teaching and Learning. This addendum illustrates how students, K-12, can truly understand the nature of science through inquiry-based education. It shows how students learn to do science and consequently master science content.

One of the exciting things about this follow-up book is that it builds on the original Standards book by demonstrating ways to provide opportunities for students to develop scientific understanding. Teachers will be pleased with the many vignettes demonstrating how to put inquiry into practice. Several myths concerning inquiry-based learning are discussed and dispelled--one of the most important is the myth that all science subject matter should be taught and learned through inquiry. Although inquiry certainly should be the main teaching strategy in the science classroom, like any approach or method it should be used in
In conjunction with a variety of other teaching techniques, to avoid boredom if nothing else.

Inquiry can take on many different forms, ranging from student-initiated, open-ended inquiries to highly structured teacher investigations. The form depends on the educational goals and both of these extremes have a place in the science classroom. Unfortunately, inquiry is often viewed as a free-for-all where anything goes and where no real direction is in sight. The authors explain how teachers can take control of inquiry learning and move it toward the goals and objectives of their particular class.

In the first two chapters, Inquiry and the National Science Education Standards provides definitions and examples of inquiry-based education. The following chapters address using different kinds of inquiry for different learning outcomes. They give detailed examples to help clarify how much the teacher should provide structure, guidance, and coaching. They also discuss administrative support, teacher evaluation, parent communication and other areas needed in order to garner the support necessary for this teaching/learning approach. At the end of the book, appendices elaborate on the understandings of inquiry from the Standards and list inquiry-based science education resources. This book is a valuable and practical guide, useful to anyone interested in effective science education.

Available at: Amazon.com, www.nap.edu, www.nsta.org

Book Description
The National Science Education Standards address not only what students should learn about science but also how their learning should be assessed. How do we know what they know? This accompanying volume to the Standards focuses on a key kind of assessment: the evaluation that occurs regularly in the classroom, by the teacher and his or her students as interacting participants. As students conduct experiments, for example, the teacher circulates around the room and asks individuals about their findings, using the feedback to adjust lessons plans and take other actions to boost learning. Focusing on the teacher as the primary player in assessment, the book offers assessment guidelines and explores how they can be adapted to the individual classroom. It features examples, definitions, illustrative vignettes, and practical suggestions to help teachers obtain the greatest benefit from this daily evaluation and tailoring process.

NSTA PATHWAYS TO THE SCIENCE STANDARDS: Guidelines for Moving the Vision into Practice by Rakow (Middle School Edition) or by Texley & Wild (High School Edition)
Available at: Amazon.com, www.nap.edu, www.nsta.org

Book Description
This practical guidebook demonstrates how you can carry the vision of the Standards - for teaching, professional development, assessment, content, program, and system - into the real world of the classroom and school. Pathways is also a tool for you to use in collaborating with administrators, school boards, and other stakeholders in science education. Filled with specific suggestions and clear examples that guide teachers in implementing each of the Standards, Pathways is a valuable resource for everyone involved in science education.