Teaching Children Science
A Discovery Approach

Donald A. DeRosa
Boston University

Joseph Abruscato
Late, University of Vermont

Pearson
330 Hudson Street, NY NY 10013
Director and Publisher: Kevin M. Davis
Portfolio Manager: Drew Bennett
Managing Content Producer: Megan Moffo
Content Producer: Yagnesh Jani
Portfolio Management Assistant: Maria Feliberty
Development Editor: Jill Ross
Executive Product Marketing Manager: Christopher Barry
Executive Field Marketing Manager: Krista Clark
Procurement Specialist: Deidra Smith
Cover Design: Studio Montage
Cover Art: gettyimages.com
Editorial Production and Composition Services: SPI Global
Editorial Project Manager: Heather Winter, SPI Global
Printer/Binder: RR Donnelley
Cover Printer: Phoenix Color

Credits and acknowledgments borrowed from other sources and reproduced, with permission, in this textbook appear on the appropriate page within text.

Copyright © 2019, 2015, 2010, 2004, 2000, 1996 by Pearson Education, Inc. All rights reserved. Manufactured in the United States of America. This publication is protected by Copyright, and permission should be obtained from the publisher prior to any prohibited reproduction, storage in a retrieval system, or transmission in any form or by any means, electronic, mechanical, photocopying, recording, or likewise. To obtain permission(s) to use material from this work, please submit a written request to Pearson Education, Inc., Permissions Department, One Lake Street, Upper Saddle River, New Jersey 07458, or you may fax your request to 201-236-3290.

Many of the designations by manufacturers and sellers to distinguish their products are claimed as trademarks. Where those designations appear in this book, and the publisher was aware of a trademark claim, the designations have been printed in initial caps or all caps.

Library of Congress Cataloging-in-Publication Data is on file with the Library of Congress.

Printed in the United States of America
10 9 8 7 6 5 4 3 2

Pearson
www.pearsonhighered.com
ISBN-10: 0-13-282488-4
PART ONE  Strategies and Techniques  1

CHAPTER 1  Inquiry: The Path; Discovery: The Destination  3
CHAPTER 2  Science Practices and Inquiry Process Skills  22
CHAPTER 3  Planning Units and Lessons  41
CHAPTER 4  Creating Environments for Discovery  70
CHAPTER 5  Assessment of Understanding and Inquiry  88
CHAPTER 6  Integrating Science and Engineering  111

PART TWO  The Earth/Space Sciences  129

CHAPTER 7  Earth and Space Science  136
CHAPTER 8  The Cosmos  150

The Life Sciences  165

CHAPTER 9  Living Things  173
CHAPTER 10  The Human Body  190

The Physical Sciences  203

CHAPTER 11  Matter and Motion  211
CHAPTER 12  Energy, Technology/Engineering  222
# Contents

## Preface  xiii

### PART ONE  Strategies and Techniques  1

1 Inquiry: The Path; Discovery: The Destination  3  

*It is not just teaching science, it is using science to teach thinking.*

- Getting Started  3
- Science: What Is It, Really?  4
  - What Is Scientific Thinking? A Look at Some Masters  4
  - Doing Science and the Next Generation Science Standards  5
- How Children Learn Science  7
  - The Nature of Science  10
  - Science as a Set of Values  11
  - Equity Issues: Your Science Teaching Will Help Resolve Them  14
  - Your Attitude Makes a Difference  14
- Connecting Technology and Engineering in Your Teaching  15
  - REALITY Check  16
  - Yes, You Can Do It! Science for All Children, Every Day, in Every Way  16
- Summary  17
- Going Further  19
- Resources for Discovery Learning  19
- Internet Resources  19
- Print Resources  19
- Notes  20

2 Science Practices and Inquiry Process Skills  22  

*How can I help children use science and engineering practices to make discoveries?*

- Getting Started  22
- A Vision For Learning Science and Engineering through Discovery  23
  - How Do I Teach So Discovery Learning Happens?  24
  - Discovery Is a Time of Enthusiasm, Excitement, and Energy!  24
  - What Is Inquiry?  25
  - Learning Content Through Inquiry and Learning to Inquire  25
- REALITY Check  29
## Inquiry Skills 31
- Inquiry Process Skills Used to Create Descriptive Models 32

### REALITY Check 33
- PRACTICAL applications Using Inquiry Process Skills to Create a Descriptive Model of a Butterfly 33
- Inquiry Process Skills Used to Create Explanations 35
- Inquiry Process Skills Used to Create an Experimental Model 35
- Make the Case An Individual or Group Challenge 37

### Summary 37

### Resources for Discovery Learning 39
- Internet Resources 39
- Print Resources 40
- Notes 40

## Planning Units and Lessons 41
*How can I plan and manage inquiry-based, discovery-focused units and lessons?*

### Getting Started 41
- Curriculum Planning, Unit Planning, And Lesson Planning: How Are They Different? 42
  - The Scope of the Science Curriculum 42
  - The Sequence of the Science Curriculum 43
- Science Standards: How They Inform Scope And Sequence 43
- Guidelines For Planning Your Curriculum 44
  - Unit Planning 48
  - What Makes a Good Lesson Plan? 50
  - Developing a Good Lesson Plan: Six Essential Elements 50
  - Sample Lesson Plan Templates 61
- Aids to Planning 63

### REALITY Check 65

### Summary 66

### Discovery Learning 67
- Internet Resources 67
- Print Resources 67
- Notes 68

## Creating Environments for Discovery 70
*How can I effectively create an inviting science discovery space, encourage science talk, and foster cooperative learning in my science classroom?*

### Getting Started 70
- Creating a Dynamic and Inviting Science Workspace 71
  - Discovery Stations 72
  - Adding Some Life to the Classroom 72
  - Remember to Consider Other Senses 72
  - Distributing Materials 73
  - Providing Work Areas 73
  - Providing Clear Directions 73
  - Creating Routines 74

### Encouraging Science Talk 76
Assessment of Understanding and Inquiry  88

A good teacher asks, “How am I doing?” A great teacher asks, “How are my students doing?”

Getting Started  88
Distinguishing Formative and Summative Approaches to Assessment  89
Assessment and the NGSS  90
Developing Assessment Strategies  92
Prompt and Rubric  92 • Performance Assessment  92
REALITY Check  93
Portfolios  94 • Anecdotal Records  94 • Affective Development
Checklists  95 • Science Conferences with Children  95 • Science
Notebooks  95 • Science Probes  97 • Children’s Self-Assessment  97 • Concept
Mapping  98 • Creative Assessments  99
Evaluating Traditional Assessment Strategies  99
End-of-Chapter Assignment  99 • Quizzes  100 • End-of-Unit Tests  100 • Research
Reports  101 • Activity Writeups  102 • Standardized Tests  102
Creating Rubrics and Scoring Guides  103
REALITY Check  106
Summary  107
Going Further  109
Resources for Discovery Learning  109
Internet Resources  109
Print Resources  109
Notes  110

Integrating Science and Engineering  111
How can I integrate inquiry-based science and engineering with other subjects in a child’s school day?

Getting Started  111
The Next Generation Science Standards  112
Science/Engineering and Language Arts   113
   The Common Core State Standards  113 • Selecting Trade Books That Stimulate Inquiry and Discovery  113 • Three Integrating Techniques  114 • Weaving It All Together with Language Arts  115 • Extending the Basics: Vocabulary, Comprehension, and Writing  115
   REALITY Check  116
Science/Engineering and Mathematics   118
   Computational Skills  118 • Data Collection and Expression  118
   Make the CASE  119 • Logical Reasoning  120
Science/Engineering and Social Studies  120
Science/Engineering and Art   121
Science/Engineering and Music   122
A Note about STEAM: Science, Technology, Engineering, the Arts and Mathematics   123
Science/Engineering, Health, and Physical Education   123
   REALITY Check   124
Summary   124
Going Further   126
Resources for Discovery Learning   127
Internet Resources   127
Print Resources   127
Notes   128

PART TWO
The Earth/Space Sciences   129

History and Nature of the Earth/Space Sciences   130
   Careers in the Earth/Space Sciences  130 • Key Events in the Understanding of the Earth/Space Sciences  131 • Women and Men Who Have Shaped the Development of the Earth/Space Sciences  132
   Personal and Social Implications of the Earth/Space Sciences   134
   Personal and Community Health  134 • Hazards, Risks, and Benefits  134
      The Design of Earth/Space Science Technology  135 • Examples of Earth/Space Science Technology  135 • Long-Term Implications of Earth/Space Science Technology  135

Earth and Space Science   136
   Getting Started   136
   Earth Materials (ESS2.A)  137
   Plate Tectonics and Large-Scale System Interactions (ESS2.B)  138
   Earth Systems (ESS2.A)  140
      Weathering and Erosion  141
   The Roles of Water in Earth’s Surface Processes (ESS2.C)  141
## Contents

- The Ocean Floor .................................................. 142
- Real Teaching: Clouds .......................................... 144
- The History of Planet Earth (ESS1.C) ...................... 145
- Weather and Climate (ESS2.D) ............................... 146
- Natural Hazards (ESS3B) ......................................... 147
  - Violent Weather .................................................. 147
- Summary ............................................................ 148
- Notes ................................................................. 149

### 8 The Cosmos .................................................... 150

#### Getting Started .................................................. 150

- Earth’s Place in the Universe (ESS1) ....................... 151
  - Magnetars ................................................. 152
  - Quasars, Pulsars, and Black Holes ................. 152
  - Galaxies .................................................. 153
  - Constellations ......................................... 153
- Our Solar System .................................................. 154
  - Our Sun, a Star ......................................... 154
  - Types of Interactions (PS2.B) .......................... 156
- The Planets ....................................................... 157
  - Exploring Space ......................................... 160
  - The Hubble Space Telescope ......................... 160
- Exploring Space: The Next Steps ......................... 163
  - Space Launch System (SLS) ......................... 163
  - The International Space Station: A Rest Stop on the Road to Mars? 163
- Summary ............................................................ 164
- Notes ................................................................. 164

### 9 The Life Sciences ............................................. 165

#### History and Nature of the Life Sciences .................. 165

- Careers in the Life Sciences ................................ 165
  - Key Events in the Development of the Life Sciences 166
  - Women and Men Who Have Shaped the Development of the Life Sciences 168

#### Personal and Social Implications of the Life Sciences ... 169

- Personal and Community Health ............................ 169
  - Hazards, Risks, and Benefits .......................... 170


- The Design of Life Science Technology .................... 170
- Examples of Life Science Technology ..................... 171
- Long-Term Implications of Life Science Technology .... 171

### 10 Living Things ................................................ 173

#### Getting Started .................................................. 173

- From Molecules to Organisms: Structure and Processes (LS1-1) 174
  - Organization for Matter and Energy Flow in Organisms (LS1.C) 175
  - Structure and Function (LS1.A) ........................... 176
  - Information Processing (LS1.D) .......................... 176
  - Growth and Development of Organisms (LS.B) ........ 177
## Contents

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ecosystems: Interactions, Energy, and Dynamics (LS2)</td>
<td>178</td>
</tr>
<tr>
<td>Interdependent Relationships in Ecosystems (LS2.A)</td>
<td>178</td>
</tr>
<tr>
<td>Ecosystem Dynamics, Functioning, and Resilience (LS2.C)</td>
<td>179</td>
</tr>
<tr>
<td>Social Interactions and Group Behavior (LS.D)</td>
<td>179</td>
</tr>
<tr>
<td>Heredity: Inheritance and Variation of Traits (LS3)</td>
<td>180</td>
</tr>
<tr>
<td>Inheritance of Traits (LS3.A)</td>
<td>180</td>
</tr>
<tr>
<td>Variation of Traits (Environment)</td>
<td>180</td>
</tr>
<tr>
<td>Biological Evolution: Unity and Diversity (LS4)</td>
<td>180</td>
</tr>
<tr>
<td>Extinction</td>
<td>181</td>
</tr>
<tr>
<td>Natural Selection (LS4.B)</td>
<td>181</td>
</tr>
<tr>
<td>Classifying Living Things</td>
<td>182</td>
</tr>
<tr>
<td>The Six Kingdoms</td>
<td>182</td>
</tr>
<tr>
<td>The Plant Kingdom: A Closer Look</td>
<td>183</td>
</tr>
<tr>
<td>The Structure of Flowering Plants</td>
<td>183</td>
</tr>
<tr>
<td>Sexual and Asexual Reproduction in Flowering Plants</td>
<td>184</td>
</tr>
<tr>
<td>The Animal Kingdom: A Closer Look</td>
<td>185</td>
</tr>
<tr>
<td>Vertebrates: Mammals</td>
<td>185</td>
</tr>
<tr>
<td>Real Teaching</td>
<td>186</td>
</tr>
<tr>
<td>Climate Change and Stewardship of Earth</td>
<td>187</td>
</tr>
<tr>
<td>Summary</td>
<td>188</td>
</tr>
<tr>
<td>Notes</td>
<td>189</td>
</tr>
</tbody>
</table>

## The Human Body

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Getting Started</td>
<td>190</td>
</tr>
<tr>
<td>The Digestive System</td>
<td>190</td>
</tr>
<tr>
<td>Structure and Function</td>
<td>191</td>
</tr>
<tr>
<td>Food and Nutrition</td>
<td>191</td>
</tr>
<tr>
<td>The Skeletal-Muscular System</td>
<td>192</td>
</tr>
<tr>
<td>Bones: Structure and Function</td>
<td>192</td>
</tr>
<tr>
<td>Muscles: Structure and Function</td>
<td>192</td>
</tr>
<tr>
<td>The Respiratory System</td>
<td>192</td>
</tr>
<tr>
<td>The Diaphragm, Windpipe, and Lungs: Structure and Function</td>
<td>193</td>
</tr>
<tr>
<td>Oxygen Transport</td>
<td>193</td>
</tr>
<tr>
<td>The Nervous System</td>
<td>193</td>
</tr>
<tr>
<td>Nerves: Structure and Function</td>
<td>194</td>
</tr>
<tr>
<td>The Senses</td>
<td>194</td>
</tr>
<tr>
<td>The Excretory System</td>
<td>196</td>
</tr>
<tr>
<td>The Kidneys: Structure and Function</td>
<td>196</td>
</tr>
<tr>
<td>The Skin and Lungs: Function</td>
<td>196</td>
</tr>
<tr>
<td>The Liver and Intestines: Function</td>
<td>196</td>
</tr>
<tr>
<td>The Circulatory System</td>
<td>197</td>
</tr>
<tr>
<td>The Heart and Blood Vessels: Structure and Function</td>
<td>197</td>
</tr>
<tr>
<td>Blood</td>
<td>197</td>
</tr>
<tr>
<td>The Reproductive System</td>
<td>199</td>
</tr>
<tr>
<td>Structure and Function</td>
<td>199</td>
</tr>
<tr>
<td>Reproduction and Heredity</td>
<td>201</td>
</tr>
<tr>
<td>Summary</td>
<td>201</td>
</tr>
<tr>
<td>Notes</td>
<td>201</td>
</tr>
</tbody>
</table>
The Physical Sciences 203

History and Nature of the Physical Sciences 203
  Careers in the Physical Sciences 203  •  Key Events in the Development of the Physical Sciences 204  •  Women and Men Who Have Shaped the Development of the Physical Sciences 206

Personal and Social Implications of the Physical Sciences 208
  Personal and Community Health 208  •  Hazards, Risks, and Benefits 208

  The Design of Physical Science Technology 209  •  Examples of Physical Science Technology 210  •  Long-Term Implications of Physical Science Technology 210

11 Matter and Motion 211

Getting Started 211

Matter and its Interactions (PS1) 212
  Conservation of Matter 213  •  A Closer Look at Matter 213  •  Chemical Reactions (PS1.B) 214  •  Elements, Compounds, and Mixtures 215

Forces and Motion (PS2.A) 216
  Newton’s Laws of Motion 217  •  Types of Interactions (PS2.B) 217  •  Gravity and Motion 218  •  Air Pressure and Flight: An Example of Physics and Technology 218

Real teaching: Air pressure 219

Summary 221

12 Energy, Technology/Engineering 222

Getting Started 222

Conservation of Energy and Energy Transfer (PS3.B) 223
  The Conservation of Energy 224  •  Relationship Between Energy and Forces (PS3.C) 224  •  Energy in Chemical Processes and Everyday Life (PS3.D) 224  •  Waves and Their Applications in Technologies for Information Transfer (PS4) 225

Electrical Energy 225
  Static Electricity 225  •  Current Electricity 226  •  Electrical Circuits 227  •  Magnets, Generators, and Motors 228

Real Teaching: Simple Circuit 229

Sound Energy 230
  What Causes Sound? 230  •  Sound Can Be Absorbed or Reflected 230

Light Energy 231
  The Reflection and Refraction of Light 231  •  Light, Prisms, and Color 232

Heat Energy 233

Summary 234
Preface

About the Authors

Don DeRosa, Ed.D., is a clinical associate professor at Boston University School of Education, where he teaches science teaching methods to elementary and secondary education pre-service teachers.

Joseph Abruscato was a nationally prominent educator and author of professional books in the field of science teaching. He retired from The University of Vermont in 2006 with the rank of Professor Emeritus after a distinguished career that began there in 1969. Joe received his B.A. and M.A. degrees from Trenton State College in science education, physics and chemistry and his Ph.D. in science education and curriculum development from The Ohio State University. At The University of Vermont, Joe was the chief architect of enhancing the Elementary Teacher Preparation Program with articulated campus-based pedagogy and public school practica.

About this Book

*Teaching Children Science* was written with the K—5 pre-service elementary teacher in mind. The authors understand that teaching science may be out of the comfort zone for many readers. A primary goal of the text is to help aspiring elementary teachers understand their roles not as science experts, but as lead learners of science who can inspire and guide their young students to experience science through the joys and challenges of inquiry and discovery. It emphasizes methods and strategies for teaching the subject that invite students to learn science through doing science. Practices are grounded in theory that reflects research about how students learn science and scientific ways of thinking. Effective science teaching requires a familiarity with science practices and content as well as strategies and methods. Chapter 1, *Inquiry: The Path; Discovery: The Destination*, begins with some insights about what it means to do science and the nature of science. Chapters 7–12 are devoted specifically to providing fundamental content knowledge in the Earth/space, life, and physical sciences for the elementary school teacher.

New to This Edition

- **Expanded coverage of (and alignment to) NGSS Standards**

  As the Next Generation Science Standards become more embedded in the national curricula, evidence and resources that inform effective three-dimensional teaching and learning continue to emerge. This text addresses each science practice and incorporates resources to support three-dimensional instructional strategies.

  - NGSS curriculum bundles are addressed in Chapter 3, and evidence statements are used to support three-dimensional assessment in Chapter 5.
  - Strategies for culturally responsive teaching based on NGSS Appendix D, “All Standards, All Students,” are included in Chapter 3. You will also find references of NGSS to Common Core State Standards in Chapter 2.
Sample lessons and activities throughout the text model the integration of science practices, disciplinary core ideas, and crosscutting concepts.

The content in Chapters 7–12 and the ideas for putting content into action in Appendices A, B, and C are organized around NGSS Disciplinary Core Ideas.

Updated videos that reinforce key ideas

Chapters 1–6 have been updated to include short video excerpts of experienced teachers in science classrooms as well as their personal reflections on their practices. Each video includes prompts that invite pre-service teachers to critique the videos that highlight key concepts addressed in the text.

Revised chapter on planning now focuses on the 5E learning cycle

The 5E learning cycle, developed by the Biological Science Curriculum Studies in the late 1980s, continues to be the basis for concept development in lesson planning strategies reflected throughout the text. More examples of hook questions for engagement are provided as well as a lesson plan template with explicit guidelines for developing lessons that incorporate criteria for the “Engage, Explore, and Explain” phases of the 5E instructional strategy in Chapter 3.

Reorganized and condensed chapters provide a more streamlined learning experience

The text has been reduced from 18 to 12 chapters and organized into two parts rather than four. Part 1 addresses science teaching theory and practice, while Part 2 provides a refresher of science content knowledge in the areas of Earth/space sciences, life sciences, and physical sciences.

Previous edition chapters on using technology and adapting the curricula have been eliminated, and the information presented in these chapters has been integrated throughout the book. For example, in Chapter 3, Sheltered Instruction Observation Protocol (SIOP) has been coupled with elements of the 5E instructional strategy to illustrate accommodations for English language learners. In Appendix A, students are directed to access and analyze data on the latest earthquake activity across the globe provided by the United States Geological Survey to explore the dynamics of plate tectonics.

Previous edition Chapters 12, 15, and 18 have moved to Appendices A, B, and C. These sections include suggested ideas and activities for implementing content in Chapters 7–12. Ideas for each content area—Earth/space sciences, life sciences, and physical sciences—are organized as follows:

- **Unit Plan Ideas and Questions**: These are organized by the Disciplinary Core Idea Arrangements of the NGSS and include a unit title, question, and brief unit overview.
- **Make the Case—An Individual or Group Challenge**: This section challenges the reader to reflect on the use of phenomena in three-dimensional teaching and identify potential phenomena for disciplinary core ideas.
- **Classroom Enrichment Ideas**: This section makes suggestions for discovery centers, bulletin boards, and field trips that could enrich each content area. Suggestions for articulation with disciplinary core ideas are listed in parenthesis for each enrichment idea.
- **Examples of Topics and Phenomena**: Suggested phenomena are given for selected topics in each discipline along with motivating questions, activities, and science content that support the topic for teachers.
• **Discovery Activities:** These are activities that you may find helpful to support teaching the content area. Each activity includes objectives, science processes, materials, a motivation (engagement), directions, discussion questions, and science content for the teacher.

• **Real Teaching vignettes provide insight and reflection on practices**
  
  Included in each content chapter (7, 9, 11 and 12), these vignettes describe real lessons taught or observed by the author. The narratives include brief reflections about the teaching moves and decisions made by the teacher during the class. Bracketed references to instructional strategies addressed in the text are also included. The examples are meant to illustrate actual teaching “episodes,” with the hope that readers will learn from these small victories and failures! See *Real Teaching: Air Pressure* in Chapter 11.

### Key Content Updates by Chapter

• Chapter 1, previously Chapters 1–2, provides updates with more depth on key topics such as how children learn science, the nature of science, and an introduction to the NGSS as essential resources for science educators.

• Chapter 2 addresses each of the science practices in much more depth than the prior edition as well as the role of inquiry and discovery in science learning with sample activities that illustrate inquiry skills.

• Chapter 3 addresses planning learning experiences for children based on relevance, rigor, and coherence utilizing resources such as the NGSS bundles and Understanding by Design to guide unit planning. Elements of the 5E instructional strategy are used as frameworks for organizing science lessons that emphasize scientific ways of knowing. A sample lesson is included that illustrates lesson design using NGSS resources. Universal Design for Learning and Response to Intervention are included for consideration in lesson planning. Lesson plan templates, new to this edition, provide scaffolds for pre-service teachers to develop lesson plans that inspire scientific explanations and solutions to problems.

• Chapter 4, *Creating Environments for Discovery*, addresses more nuanced strategies for creating dynamic science learning experiences, ranging from the physical work space and discovery stations to an in-depth discussion about fostering accountable science talk through effective questioning, talk-tools, and science circles.

• Chapter 5 focuses on assessing across three dimensions with examples based on NGSS assessment tasks and evidence statements. Both formative and summative assessment strategies are addressed, including traditional and reform-based assessments such as science notebooks, student interviews, and portfolios. As in the previous edition, examples of analytical and holistic rubrics are provided.

• Chapter 6 addresses integration of science and engineering with other disciplines. New to this edition are discussions about STEAM in the context of integration.

• Chapters 7, 9, 11 and 12 provide a refresher of science content knowledge and have been updated and aligned with disciplinary core ideas. Sections referred to as *Real Teaching* have also been included in content chapters. *Real Teaching* consists of selected reflections by the author on his
experiences teaching concepts in the discipline to elementary children. References to teaching strategies introduced in Chapters 1–6 are bracketed to illustrate how the strategy may be implemented in practice.

Instructor Resources

The following supplements to the textbook are available for download under the “Educator” tab at www.pearsonhighered.com. Enter the author, title, or ISBN, then select this textbook. Click on the “Resources” tab to view and download the supplements detailed below.

- **Instructor’s Resource Manual with Test Bank**
  The Instructor’s Manual/Test Bank (0-13-357414-8) provides activity ideas for class sessions as well as multiple-choice quizzes.

- **PowerPoint™ Presentations**
  Ideal for lecture presentations or student handouts, PowerPoint™ Presentations (0-13-357424-5) for each chapter include key concept summaries.

Enhanced Pearson eText

The Enhanced Pearson eText provides a rich, interactive learning environment designed to improve student mastery of content with the following multimedia features:

- **Video Examples**: Embedded throughout the eText, these video clips illustrate key concepts and strategies. The videos in Chapters 1–6 have been updated to illustrate instructional strategies in practice by experienced teachers as well as their personal reflections on the use and effectiveness of those strategies.

- **Chapter Quizzes**: Located at the end of each chapter, these multiple-choice questions give students the opportunity to check their understanding of the learning outcomes introduced at the beginning of the chapter.

- **Internet Resources**: Included in the Resources for Discovery Learning section at the end of Chapters 1–6, these links provide students with an opportunity to extend their learning beyond the text.

Acknowledgments

Many people have shaped this book’s content, directly and indirectly. Most of all, I would like to acknowledge Joseph Abruscato, who passed away in 2009. Joseph was a gifted educator whose contributions to the field of science education have undoubtedly informed and inspired generations of teachers and students. He is responsible for the quality and success of this text and several other publications of which he is the author. It is with humility that I assume responsibility for carrying on the legacy of his wonderful work.

I would like to thank those who have reviewed this edition of *Teaching Children Science* for sharing their expertise and valuable insights: Audrey Cohan, Ed.D., Molloy College; Sarah J. Carrier, NC State University; Todd F. Hoover, Bloomsburg University of Pennsylvania; Joe Sciulli, University of North Carolina at Pembroke; John D. Tiller, Tennessee State University.

Finally, I would like to thank Drew Bennett, Jill Ross, Heather Winter, and Yagnesh Jani for their patience, guidance, and attention to the details of this book.

D. D.