



# SCIENCE AS INQUIRY IN THE SECONDARY SETTING

*Edited by Julie Luft, Randy L. Bell, and Julie Gess-Newsome*

**NSTA**press

National Science Teachers Association

# Contents

Foreword . . . . .	vii
--------------------	-----

Page Keeley

Preface . . . . .	ix
-------------------	----

Julie Luft, Randy L. Bell, and Julie Gess-Newsome

## SCIENCE AS INQUIRY

Chapter 1. . . . .	1
--------------------	---

What Is Inquiry? A Framework for Thinking About Authentic Scientific Practice in the Classroom

Mark Windschitl

Chapter 2. . . . .	21
--------------------	----

Historical Development of Teaching Science as Inquiry

Eugene L. Chiappetta

## IMAGES OF INQUIRY

Chapter 3. . . . .	31
--------------------	----

Inquiry in the Earth Sciences

Eric J. Pyle

Chapter 4. . . . .	41
--------------------	----

Inquiry in the Chemistry Classroom: Perplexity, Model Testing, and Synthesis

Scott McDonald, Brett Criswell, and Oliver Dreon, Jr.

Chapter 5. . . . .	53
--------------------	----

Field Studies as a Pedagogical Approach to Inquiry

Daniel P. Shepardson and Theodore J. Leuenberger

Chapter 6. . . . .	65
--------------------	----

Creating Coherent Inquiry Projects to Support Student Cognition and Collaboration in Physics

Douglas B. Clark and S. Raj Chaudhury

## FEATURES OF INQUIRY INSTRUCTION

Chapter 7. . . . .	79
--------------------	----

Inquiry-Based Science Instruction for Students With Disabilities

Kathy Cabe Trundle

Chapter 8. . . . .	.87
Scientific Inquiry: The Place of Interpretation and Argumentation	
Stephen P. Norris, Linda M. Phillips, and Jonathan F. Osborne	
Chapter 9. . . . .	.99
In Praise of Questions: Elevating the Role of Questions for Inquiry in	
Secondary School Science	
Catherine Milne	
Chapter 10 . . . . .	107
Assessing Science as Inquiry in the Classroom	
Pamela Van Scotter and K. David Pinkerton	
Chapter 11 . . . . .	121
Inquiry and Scientific Explanations: Helping Students Use Evidence	
and Reasoning	
Katherine L. McNeill and Joseph Krajcik	
References . . . . .	135
Editors . . . . .	143
Contributors . . . . .	143
Index . . . . .	145



# SCIENCE AS INQUIRY IN THE SECONDARY SETTING

It can be a tough thing to admit: Despite hearing so much about the importance of inquiry-based science education, you may not be exactly sure what it is—not to mention how to do it. But now this wise book takes the intimidation out of inquiry. It gives you an overview of what inquiry is like in middle and high school and explores ways of incorporating more inquiry-centered practices into your own teaching.

In 11 concise chapters, leading researchers raise and resolve such key questions as:

- What is inquiry?
- What does inquiry look like in specific classes, such as Earth science or in the chemistry lab?
- What are the basic features of inquiry instruction?
- How do you assess science as inquiry?

*Science as Inquiry* was created to fill a vacuum. No other book serves as such a compact, easy-to-understand orientation to inquiry for both preservice and inservice science teachers. It's ideal for guiding discussion, fostering reflection, and helping you enhance your own classroom practices.

As chapter author Mark Windschitl writes, "The aim of doing more authentic science in schools is not to mimic scientists, but to develop the depth of content knowledge, the habits of mind, and the critical reasoning skills that are so crucial to basic science literacy." This volume guides you to find new ways of helping students further along the path to science literacy.

Grades 6–12

**NSTA**press  
National Science Teachers Association



Developed with  
funding from the  
National Science  
Foundation

PB216X

ISBN: 978-1-93353-126-7



9 781933 531267