

Contents

1	Introduction	1
	<i>M. Suzanne Donovan and John D. Bransford</i>	
	A Fish Story, 2	
	Learning Environments and the Design of Instruction, 12	
	Putting the Principles to Work in the Classroom, 20	
	Intent and Organization of This Volume, 21	
	Notes, 25	
	References, 26	

Part I History

(on enclosed CD; not printed in this volume)

2	Putting Principles into Practice: Understanding History	31
	<i>Peter J. Lee</i>	
	History and Everyday Ideas, 33	
	Substantive Concepts, 61	
	History That Works, 65	
	Notes, 73	
	References, 74	
3	Putting Principles into Practice: Teaching and Planning	79
	<i>Rosalyn Ashby, Peter J. Lee, and Denis Shemilt</i>	
	The Reality Test, 80	
	Working with Evidence: Pilgrim Fathers and Native Americans, 84	
	Working with Evidence: The St. Brendan's Voyage Task, 119	

- Appendix 3A: Implications for Planning, 164
 Notes, 177
 References, 177
- 4 “They Thought the World Was Flat?": Applying the Principles of
How People Learn in Teaching High School History 179
Robert B. Bain
 Where to Begin? Transforming Topics and Objectives into
 Historical Problems, 181
 Designing a “History-Considerate” Learning Environment:
 Tools for Historical Thinking, 199
 Conclusion, 209
 Acknowledgments, 210
 Notes, 211
 References, 212

Part II Mathematics

- 5 Mathematical Understanding: An Introduction 217
Karen C. Fuson, Mindy Kalchman, and John D. Bransford
 Principle #1: Teachers Must Engage Students' Preconceptions, 219
 Principle #2: Understanding Requires Factual Knowledge and
 Conceptual Frameworks, 231
 Principle #3: A Metacognitive Approach Enables Student
 Self-Monitoring, 236
 Next Steps, 243
 Notes, 246
 References, 246
 Suggested Reading List for Teachers, 256
- 6 Fostering the Development of Whole-Number Sense:
 Teaching Mathematics in the Primary Grades 257
Sharon Griffin
 Deciding What Knowledge to Teach, 259
 Building on Children's Current Understandings, 267
 Acknowledging Teachers' Conceptions and Partial
 Understandings, 279
 Revisiting Question 2: Defining the Knowledge That
 Should Be Taught, 281
 How Can This Knowledge Be Taught?:
 The Case of Number Worlds, 282
 What Sorts of Learning Does This Approach Make Possible?, 302
 Summary and Conclusion, 305

- Acknowledgments, 306
 Notes, 306
 References, 306
- 7 Pipes, Tubes, and Beakers: New Approaches to Teaching the Rational-Number System 309
Joan Moss
 Rational-Number Learning and the Principles of *How People Learn*, 312
 Instruction in Rational Number, 319
 Conclusion: How Students Learn Rational Number, 341
 Notes, 343
 References, 345
- 8 Teaching and Learning Functions 351
Mindy Kalchman and Kenneth R. Koedinger
 Addressing the Three Principles, 359
 Teaching Functions for Understanding, 373
 Summary, 389
 Acknowledgments, 391
 Notes, 392
 References, 392
 Other Relevant Readings, 393

Part III Science

(on enclosed CD; not printed in this volume)

- 9 Scientific Inquiry and *How People Learn* 397
John D. Bransford and M. Suzanne Donovan
 Principle #1: Addressing Preconceptions, 399
 Principle #2: Knowledge of What It Means to “Do Science,” 403
 Principle #3: Metacognition, 407
 The *How People Learn* Framework, 411
 Conclusion, 415
 Notes, 416
 References, 416
- 10 Teaching to Promote the Development of Scientific Knowledge and Reasoning About Light at the Elementary School Level 421
Shirley J. Magnusson and Annemarie Sullivan Palinscar
 The Study of Light, 422
 The Study of Light Through Inquiry, 426
 Supporting Learning Through Cycles of Investigation, 460

The Role of Subject-Specific Knowledge in Effective Science Instruction, 467	
Conclusion, 469	
Notes, 470	
References, 472	
11 Guided Inquiry in the Science Classroom	475
<i>James Minstrell and Pamela Kraus</i>	
The Unit: The Nature of Gravity and Its Effects, 477	
Summary, 511	
Notes, 512	
12 Developing Understanding Through Model-Based Inquiry	515
<i>James Stewart, Jennifer L. Cartier, and Cynthia M. Passmore</i>	
Genetics, 516	
Developing Darwin's Model of Natural Selection in High School Evolution, 540	
Classroom Environments That Support Learning with Understanding, 555	
Summary, 561	
Notes, 562	
References, 563	

A Final Synthesis: Revisiting the Three Learning Principles

13 Pulling Threads	569
<i>M. Suzanne Donovan and John D. Bransford</i>	
Engaging Resilient Preconceptions, 569	
Organizing Knowledge Around Core Concepts, 575	
Supporting Metacognition, 577	
Principles of Learning and Classroom Environments, 586	
Notes, 588	
References, 589	
Other Resources, 590	
Biographical Sketches of Committee Members and Contributors	591
Index	597