## **Contents**

1

Putting the Principles to Work in the Classroom, 20 Intent and Organization of This Volume, 21 Notes, 25 References, 26 Part I: History 2 Putting Principles into Practice: Understanding History 31 Peter J. Lee 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 Rosalyn Ashby, Peter J. Lee, and Denis Shemilt 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

M. Suzanne Donovan and John D. Bransford

Learning Environments and the Design of Instruction, 12

1

Introduction

A Fish Story, 2

Notes, 177 References, 177

"They Thought the World Was Flat?": Applying the Principles of How People Learn in Teaching High School History 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

(on enclosed CD; not printed in this volume)

Mathematical Understanding: An Introduction 5 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 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

217

	Summary and Conclusion, 305 Acknowledgments, 306 Notes, 306 References, 306	
7	Pipes, Tubes, and Beakers: New Approaches to Teaching the Rational-Number System  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	309
8	Teaching and Learning Functions  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	351
	Part III: Science	
	(on enclosed CD; not printed in this volume)	
9	Scientific Inquiry and How People Learn 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	397
10	Teaching to Promote the Development of Scientific Knowledge and Reasoning About Light at the Elementary School Level Shirley J. Magnusson and Annemarie Sullivan Palinscar The Study of Light 422	421

	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  James Minstrell and Pamela Kraus  The Unit: The Nature of Gravity and Its Effects, 477  Summary, 511  Notes, 512	475
12	Developing Understanding Through Model-Based Inquiry  James Stewart, Jennifer L. Cartier, and Cynthia M. Passmore  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	515
	A Final Synthesis:	
	<b>Revisiting the Three Learning Principles</b>	
13	Pulling Threads  M. Suzanne Donovan and John D. Bransford  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	569
Bio	ographical Sketches of Committee Members and Contributors	591
Inc	dex	597