

Contents

Tribute to Ann Brown	
<i>Annemarie Sullivan Palincsar</i>	xi
Preface	xv
Acknowledgments	xxi

Part I: Development and Instruction

1	Psychological Models for the Development of Mathematical Understanding: Rational Numbers and Functions	1
	<i>Mindy Kalchman, Joan Moss, and Robbie Case</i>	
2	Similarity of Form and Substance: Modeling Material Kind	39
	<i>Richard Lehrer, Leona Schauble, Dolores Strom, and Margie Pligge</i>	
3	Cognitive Development and Science Education: Ships That Pass in the Night or Beacons of Mutual Illumination?	75
	<i>David Klahr, Zhe Chen, and Eva Erdosne Toth</i>	

Part II: Teachers and Instructional Strategies

4	The Role of the Teacher in Making Sense of Classroom Experiences and Effecting Better Learning	121
	<i>Jim Minstrell</i>	

- 5** The Interplay of First-Hand and Second-Hand Investigations to Model and Support the Development of Scientific Knowledge and Reasoning **151**
Annemarie Sullivan Palincsar and Shirley J. Magnusson
- 6** **Discussion of Parts I and II:** Cognition, Instruction, and the Quest for Meaning **195**
Robert Siegler
- 7** **Keynote Address:** Learning to Research about Learning **205**
Herbert A. Simon
- Part III: Tools for Learning from Instruction**
- 8** What Role Do Cognitive Architectures Play in Intelligent Tutoring Systems? **227**
John R. Anderson and Kevin Gluck
- 9** BGuILE: Strategic and Conceptual Scaffolds for Scientific Inquiry in Biology Classrooms **263**
Brian Reiser, Iris Tabak, William A. Sandoval, Brian K. Smith, Franci Steimmuller, and Anthony J. Leone
- 10** Tools to Assist Learning by Doing: Achieving and Assessing Efficient Technology for Learning **307**
Alan Lesgold and Martin Nahemow
- Part IV: Social Contexts of Instruction and Learning**
- 11** A Collaborative Convergence on Studying Reasoning Processes: A Case Study in Statistics **347**
Marsha Lovett
- 12** Cognition and Instruction: Enriching the Laboratory School Experience of Children, Teachers, Parents, and Undergraduates **385**
Sharon M. Carver

13 Discussion of Parts III and IV:	
Themes in Cognitive Science and Education	427
<i>Earl B. Hunt</i>	
Part V: Cognition and Instruction: The Next 25 Years	
14 A Third Metaphor for Learning:	
Toward a Deweyan Form of Transactional Inquiry	439
<i>Timothy Koschmann</i>	
15 Supporting the Improvement of Learning	
and Teaching in Social and Institutional Context	455
<i>Paul Cobb</i>	
16 Affect and Effect in Cognitive Approaches to Instruction	479
<i>Sam Wineburg and Pam Grossman</i>	
17 General Discussion:	
Progress Then and Now	493
<i>Robert Glaser</i>	
Author Index	509
Subject Index	517