CONTENTS

	Foreword	
	Rina Hershkowitz and Chris Breen	vii
	Introduction Angel Gutiérrez and Paolo Boero	1
0	ognitive Aspects of Learning and Teaching Content Areas	
	Research on the Learning and Teaching of Algebra Carolyn Kieran	11
	Numerical Thinking Lieven Verschaffel, Brian Greer, and Joke Torbeyns	51
	The Complexity of Learning Geometry and Measurement Kay Owens and Lynne Outhred	83
	ognitive Aspects of Learning and Teaching Transversal Areas	
	Research on Children's Early Mathematical Development Joanne Mulligan and Gerard Vergnaud	117
	Advanced Mathematical Thinking Guershon Harel, Annie Selden, and John Selden	147
	Proof and Proving in Mathematics Education Maria Alessandra Mariotti	173
	Research on Visualization in Learning and Teaching Mathematics Norma Presmeg	205
	ognitive Aspects of Learning and Teaching with Technology	
	The Role and Uses of Technologies for the Teaching of Algebra and Calculus	
	Francesca Ferrara, Dave Pratt, and Ornella Robutti	237
	Teaching and Learning Geometry with Technology Colette Laborde, Chronis Kynigos, Karen Hollebrands, and Rudolf Strässer	275
	ocial Aspects of Learning and Teaching Mathematics	
	A Thirty-Year Reflection on Constructivism in Mathematics Education	
	in PME	
	Jere Confrey and Sibel Kazak	305
	Socio-Cultural Research in PME Stephen Lerman	347

The Place of Equity and Social Justice in the History of PME	
Peter Gates	367
Affect and Mathematics Education	
Gilah C. Leder and Helen J. Forgasz	403
Professional Aspects of Teaching Mathematics	
Mathematics (Student) Teachers and Teacher Educators as Learners	
Salvador Llinares and Konrad Krainer	429
Mathematics Teachers' Knowledge and Practices	
João Pedro da Ponte and Olive Chapman	461
Authors Index	495
Terms Index	513