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Nota di contenuto	Chapter 1. Unravelling the construct of mathematical challenge based on conceptual characteristics of mathematical tasks, instructional setting and socio-mathematical norms -- Part I. Mathematical challenges in curriculum and instructional design -- Chapter 2. Introduction to Section I Mathematical challenges in curriculum and instructional design -- Chapter 3. Development and stimulation of early core mathematical competencies in young children: results from the Leuven Wis and Co project -- Chapter 4. Mathematical modelling as a stimulus for curriculum and instructional reform in secondary school mathematics -- Chapter 5. Personalized mathematics and mathematics inquiry: A design framework for mathematics textbooks -- Chapter 6. MATH-KEY program: Opening mathematical minds by means of open

tasks supported by dynamic applets -- Chapter 7. Making mathematics challenging through problem posing in the classroom -- Chapter 8. Challenging students to develop mathematical reasoning -- Chapter 9. Mathematical argumentation in small-group discussions of complex mathematical tasks in elementary teacher education settings -- Chapter 10. Commentary to Section I. Commentary on 'Challenge' in terms of curriculum materials and task, the teacher's role and the curriculum -- Part II. Kinds and variation of mathematically challenging tasks -- Chapter 11. Introduction to Section II Many faces of mathematical challenge -- Chapter 12. Probing Beneath the Surface of Resisting and Accepting Challenges in the Mathematics Classroom -- Chapter 13. Mathematical challenge in connecting advanced and secondary mathematics: Recognizing binary operations as functions -- Chapter 14. Challenging variations on a simple task -- Chapter 15. Visualization a pathway to mathematical challenging tasks -- Chapter 16. Challenges in designing and solving technology-based tasks -- Chapter 17. Creativity and Challenge: connections between task complexity and insight required for tasks solution -- Chapter 18. Challenging and assessing undergraduate students' mathematical and pedagogical discourses through MathTASK activities -- Chapter 19. Commentary on Section II Making Mathematics Difficult? What Could Make a Mathematical Challenge Challenging? -- Part III. Collections of mathematical problems -- Chapter 20. Introduction to Section III In Search of Effectiveness and Meaningfulness -- Chapter 21. Problem Collections, and "The Unity of Mathematics" -- Chapter 22. Meeting the challenge of heterogeneity through the self-differentiation potential of mathematical modeling problems -- Chapter 23. Complexity of Geometry Problems as a Function of Field-dependency and Asymmetry of a Diagram -- Chapter 24. Problem Sets in School Textbooks: Examples from the United States -- Chapter 25. Exams in Russia as an Example of Problem Set Organization -- Chapter 26. Taiwanese Teachers' Collection of Geometry Tasks for Classroom Teaching: A Cognitive Complexity Perspective -- Chapter 27. Flow and Variation Theory: Powerful Allies in Creating and Maintaining Thinking in the Classroom -- Chapter 28. Designing stepped tasks through investigations in Dynamic Geometry Environments -- Chapter 29. Commentary on Section III On Problems, Problem Solving, and Thinking Mathematically.

Sommario/riassunto

This book argues that mathematical challenge can be found at any level and at every age and constitutes an essential characteristic of any mathematics classroom aimed at developing the students' mathematical knowledge and skills. Since each mathematics classroom is heterogeneous with respect to students' mathematical potential, quality mathematical instruction results from matching the level of mathematical challenge to different students' potential. Thus, effective integration of mathematical challenge in the instructional process is strongly connected to the equity principle of mathematics education. In the three sections in this volume readers can find diverse views on mathematical challenges in curriculum and instructional design, kinds and variation of mathematically challenging tasks and collections of mathematical problems. Evidence-based analysis is interwoven with theoretical positions expressed by the authors of the chapters. Cognitive, social and affective characteristics of challenging mathematical activities are observed and analyzed. The volume opens new avenues of research in mathematics education, and pose multiple questions about mathematical instruction rich in mathematical challenge for all. The authors invite readers to explore and enjoy mathematical challenges at different levels. .
