Record Nr. UNINA9910438245103321 Teaching mathematical modelling: connecting to research and practice **Titolo** [[electronic resource] /] / edited by Gloria Ann Stillman, Gabriele Kaiser, Werner Blum, Jill P. Brown Dordrecht:,: Springer Netherlands:,: Imprint: Springer,, 2013 Pubbl/distr/stampa **ISBN** 94-007-6540-1 [1st ed. 2013.] Edizione Descrizione fisica 1 online resource (612 p.) International Perspectives on the Teaching and Learning of Collana Mathematical Modelling, , 2211-4920 612 Disciplina Soggetti Mathematics—Study and teaching Applied mathematics **Engineering mathematics** Learning Instruction **Mathematics Education** Applications of Mathematics Learning & Instruction Lingua di pubblicazione Inglese **Formato** Materiale a stampa Livello bibliografico Monografia Note generali Description based upon print version of record. Nota di bibliografia Includes bibliographical references and index. Nota di contenuto Series Preface: Gabriele Kaiser and Gloria Stillman -- Chapter 1 Mathematical Modelling: Connecting to Teaching and Research Practices – the impact of globalisation: Gloria Stillman, Gabriele Kaiser, Werner Blum, and Jill Brown -- Part I Innovative Practices in Modelling Education Research and Teaching -- Chapter 2 From Conference to Community: An ICTMA Journey—The Ken Houston Inaugural Lecture: Peter Galbraith -- Chapter 3 Modelling from the Perspective of Commognition – An Emerging Framework: Jonas Bergman Ärlebäck and Peter Freid -- Chapter 4 Should Interpretation Systems be Considered to be Models if They only Function Implicitly?: Rita Borromeo Ferri and Richard Lesh -- Chapter 5 Mathematical Modelling, Mathematical Content and Tensions in Discourses: Andréia Maria Pereira de Oliveira

and Jonei Cerqueira Barbosa -- Chapter 6 Ethnomodelling as a

Methodology for Ethnomathematics: Milton Rosa and Daniel Clark Orev

-- Chapter 7 Dual Modelling Cycle Framework for Responding to the Diversities of Modellers: Akihiko Saeki and Akio Matsuzaki -- Chapter 8 The Eyes to See: Theoretical Lenses for Mathematical Modelling Research: Nils Buchholtz -- Chapter 9 Strässer's Didactic Tetrahedron as a Basis for Theorising Mathematical Modelling Activity within Social Contexts: Vince Geiger -- Chapter 10 Ethnomodelling as a Research Lens on Ethnomathematics and Modelling: Milton Rosa and Daniel Clark Orey -- Part II Research into, or Evaluation of, Teaching Practice --Chapter 11 Real-life Modelling within a Traditional Curriculum: Lessons from a Singapore Experience: Ang Keng Cheng -- Chapter 12 Students' Mathematical Learning in Modelling Activities: Morten Blomhøj and Tinne Hoff Kieldsen -- Chapter 13 Students' Designing an Ideal Tourism Route as Mathematical Modelling: Chan Chun Ming Eric --Chapter 14 Comparison of Mathematical Modelling Skills of Secondary and Tertiary Students: Juntao Fu and Jinxing Xie -- Chapter 15 Taking Advantage of Incidental School Events to Engage with the Applications of Mathematics: The Case of Surviving the Reconstruction: Vince Geiger, Merrilyn Goos, and Shelley Dole -- Chapter 16 The Development of Modelling Competencies by Year 9 Students: Effects of a Modelling Project: Susanne Grünewald -- Chapter 17 Evidence of a Dual Modelling Cycle: Through a Teaching Practice Example for Preservice Teachers: Akio Matsuzaki and Akihiko Saeki -- Chapter 18 Considering Multiple Solutions for Modelling Problems – Design and First Results from the MultiMa-Project: Stanislaw Schukajlow and André Krug -- Chapter 19 Challenges in Modelling Challenges: Intents and Purposes: Gloria Stillman, Jill Brown, and Peter Galbraith -- Chapter 20 Mathematical Modelling of a Real-world Problem: The Decreasing Number of Bluefin Tuna: Akira Yanagimoto and Noboru Yoshimura --Chapter 21 Mathematical Modelling of a Social Problem: Pension Tax Issues: Noboru Yoshimura and Akira Yanagimoto -- Part III Pedagogical Issues for Teaching and Learning -- Chapter 22 Pedagogical Reflections on the Role of Modelling in Mathematics Instruction: Toshikazu Ikeda -- Chapter 23 Complex Modelling Problems in Co-Operative, Self-directed Learning Environments: Gabriele Kaiser and Peter Stender -- Chapter 24 Inducting Year 6 Students into "a Culture of Mathematising as a Practice": Jill Brown -- Chapter 25 A Whole Week of Modelling – Examples and Experiences of Modelling for Students in Mathematics Education: Nils Buchholtz and Sarah Mesrogli -- Chapter 26 Teachers' Self-Perceptions of their Pedagogical Content Knowledge Related to Modelling – An Empirical Study with Austrian Teachers: Sebastian Kuntze, Hans-Stefan Siller, and Christiane Vogl -- Chapter 27 A Cross-Sectional Study about Modelling Competency in Secondary School: Matthias Ludwig and Xenia-Rosemarie Reit -- Chapter 28 Teacher Readiness in Mathematical Modelling: Are there Differences between Pre-service and In-service Teachers? Kit Ee Dawn Ng --Chapter 29 Exploring the Relationship between Mathematical Modelling and Classroom Discourse: Trevor Redmond, Raymond Brown, and Joanne Sheehy -- Chapter 30 The Role of Textbooks in Developing a Socio-critical Perspective on Mathematical Modelling in Secondary Classrooms: Gloria Stillman, Jill P Brown, Rhonda Faragher, Vince Geiger and Peter Galbraith -- Chapter 31 Pre-service Secondary School Teachers' Knowledge in Mathematical Modelling – A Case Study: Tan Liang Soon and Ang Keng Cheng -- Chapter 32 How Students Connect Descriptions of Real-world Situations to Mathematical Models in Different Representational Modes: Wim Van Dooren, Dirk De Bock, and Lieven Verschaffel -- Chapter 33 Pre-service Teacher Learning for Mathematical Modelling: Mark Winter -- Chapter 34 Initial Perspectives of Teacher Professional Development on Mathematical Modelling in

Singapore: Problem Posing and Task Design: Lee Ngan Hoe -- Chapter 35 Initial Perspectives of Teacher Professional Development on Mathematical Modelling in Singapore: Conceptions of Mathematical Modelling: Chan Chun Ming Eric -- Chapter 36 Initial Perspectives of Teacher Professional Development on Mathematical Modelling in Singapore: A Framework for Facilitation: Kit Ee Dawn Ng -- Chapter 37 Teacher Professional Development on Mathematical Modelling: Initial Perspectives from Singapore: Vince Geiger -- Part IV Influences of Technologies -- Chapter 38 Reality Based Test Tasks with Digital Tools at Lower Secondary: Gilbert Greefrath and Michael Rieß -- Chapter 39 On Comparing Mathematical Models and Pedagogical Learning: Janeen Lamb and Jana Visnovska -- Part V Assessment in Schools -- Chapter 40 Formative Assessment in Everyday Teaching of Mathematical Modelling: Implementation of Written and Oral Feedback to Competency-Oriented Tasks: Michael Besser, Werner Blum, and Malte Klimczak -- Chapter 41 Assessment of Modelling in Mathematics Examination Papers: Ready-made Models and Reproductive Mathematising: Pauline Vos.-Part VI Applicability at Different Levels of Schooling, Vocational Education, and in Tertiary Education -- Chapter 42 Complex Modelling in the Primary and Middle School Years: An Interdisciplinary Approach: Lyn D. English -- Chapter 43 Modelling in Brazilian Mathematics Teacher Education Courses: Maria Salett Biembengut -- Chapter 44 The Development of Mathematical Concept Knowledge and of the Ability to use this Concept to Create a Model: César Cristóbal Escalante and Verónica Vargas Alejo -- Chapter 4 Problem Posing: A Possible Pathway to Mathematical Modelling: Ann Downton -- Chapter 46 A Study of the Effectiveness of Mathematical Modelling of Home: Delivery Packaging on Year 12 Students' Function Education: Tetsushi Kawasaki and Yoshiki Nisawa -- Chapter 47 How to Introduce Mathematical Modelling in Industrial Design Education? Geert Langereis, Jun Hu, and Loe Feijs -- Chapter 48 Rationality of Practice and Mathematical Modelling - On Connections, Conflicts, and Codifications: Lars Mouwitz -- Chapter 49 Extending Model Eliciting Activities (MEAs) beyond Mathematics Curricula in Universities: Mark Schofield -- Chapter 50 Building Awareness of Mathematical Modelling in Teacher Education: A Case Study in Indonesia: Wanty Widiaia -- Part VII Modelling and Applications in Business and the Lived Environment -- Chapter 51: Mathematics and the Pharmacokinetics of Alcohol: Michael Jennings and Peter Adams. - Chapter 52 Beyond the Modelling Process: An Example to Study the Logistic Model of Customer Lifetime Value in Business Marketing: Issic K. C. Leung -- List of Corresponding Authors -- Refereeing Process -- Index.

Sommario/riassunto

This book provides readers with an overview of recent international research and developments in the teaching and learning of modelling and applications from a variety of theoretical and practical perspectives. There is a strong focus on pedagogical issues for teaching and learning of modelling as well as research into teaching and practice. The teaching of applications of mathematics and mathematical modelling from the early years through primary and secondary school and at tertiary level is rising in prominence in many parts of the world commensurate with an ever-increasing usage of mathematics in business, the environment, industry and everyday life. The authors are all members of the International Community of Teachers of Mathematical Modelling and Applications and important researchers in mathematics education and mathematics. The book will be of interest to teachers, practitioners and researchers in universities, polytechnics, teacher education, curriculum and policy.