

1. Record Nr.	UNINA9910255122703321
Titolo	Mathematical Modelling and Applications : Crossing and Researching Boundaries in Mathematics Education // edited by Gloria Ann Stillman, Werner Blum, Gabriele Kaiser
Pubbl/distr/stampa	Cham : , : Springer International Publishing : , : Imprint : Springer, , 2017
ISBN	3-319-62968-9
Edizione	[1st ed. 2017.]
Descrizione fisica	1 online resource (XI, 647 p. 139 illus.)
Collana	International Perspectives on the Teaching and Learning of Mathematical Modelling, , 2211-4939
Disciplina	510.71
Soggetti	Mathematics - Study and teaching Learning, Psychology of Teachers - Training of Educational technology Mathematics Education Instructional Psychology Teaching and Teacher Education Digital Education and Educational Technology
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Series Preface, Gabriele Kaiser and Gloria Stillman -- Boundary Crossings in Mathematical Modelling and Applications Educational Research and Practice, Gloria Stillman, Werner Blum, and Gabriele Kaiser -- Part I New Approaches in Research, Teaching and Practice from Crossing Boundaries -- Mathematical Modelling with Increasing Learning Aids – A Video Study, Deike S. Alfke (née Jütting) -- Modelling with Statistical Data: Characterisation of Student Models, Angels Aymerich, Núria Gorgorió, and Lluís Albarracín -- How Teachers Can Promote Mathematising by Means of Mathematical City Walks, Nils Buchholtz -- L'Hospital's Weight Problem: Testing the Boundaries between Mathematics and Physics, between Application and Modelling, France Caron and Kathleen Pineau. Representations of Modelling in Mathematics Education, Helen M. Doerr, Jonas B. Ärlebäck and Morten

Misfeldt -- The Primacy of 'Noticing': a Key to Successful Modelling, Peter Galbraith, Gloria Ann Stillman and Jill P. Brown -- Combining Models Related to Data Distribution through Productive Experimentation, Takashi Kawakami -- Reconciling Intuitions and Conventional Knowledge: The Challenge of Teaching and Learning Mathematical Modelling, Azita Manouchehri and Stephen T. Lewis -- A Modelling Perspective in Designing Teacher Professional Learning Communities, Nicholas Mousoulides, Marilena Nicolaidou, and Maria Evagorou -- Mathematical Modelling and Proof by Recurrence: an Analysis from a Wittgensteinian Perspective, Bárbara Palharini, Emerson Tortola and Lourdes Maria Werle de Almeida -- Quality Criteria for Mathematical Models in Relation to Models' Purposes - Their Usefulness in Engineering Education, Jacob Perrenet, Bert Zwaneveld, Kees van Overveld and Tijn Borghuis -- Ethnomodelling as the Mathematization of Cultural Practices, Milton Rosa and Daniel Clark Orey -- Enabling Anticipation through Visualisation in Mathematising Real World Problems in a Flipped Classroom, Gloria Ann Stillman -- Measuring Metacognitive Modelling Competencies, Katrin Vorhölter -- Part II Researching Boundaries in Mathematical Modelling Education -- The Mathematical Modelling Competencies Required for Solving Engineering Statics Assignments, Burkhard Alpers -- Pre-service Teachers' Levels of Reflectivity after Mathematical Modelling Activities with High-School Students, Rita Borromeo Ferri -- Context and Understanding: The Case of Linear Models, Jill P. Brown -- Difficulties in Teaching Modelling: A French-Spanish Exploration, Richard Cabassut and Irene Ferrando -- How Students Connect Mathematical Models to Descriptions of Real-World Situations, Dirk De Bock, Nele Veracx and Wim Van Dooren -- Mathematical Modelling Strategies and Attitudes of Third Year Pre-Service Teachers, Rina Durandt and Gerrie J Jacobs -- Exploring the Notion of Mathematical Literacy in Curricula Documents, Peter Frejd and Vincent Geiger -- Design and Implementation of a Tool for Analysing Student Products when They Solve Fermi Problems, César Gallart, Irene Ferrando, Lluís M. García-Raffi, Lluís Albarracín and Núria Gorgorió -- Implementing Modelling into Classrooms – Results of an Empirical Research Study, Jana Kreckler -- A Commognitive Perspective on Pre-service Secondary Teachers' Content Knowledge in Mathematical Modelling, Joo Young Park -- Mathematics Teachers' Learning at the Boundaries of Teaching, Research and Workplace, Giorgos Psycharis and Despina Potari -- Case Study of Pre-service Teachers Education for Mathematical Modelling and Applications Connecting Paintings with Mathematics, Akihiko Saeki, Masafumi Kaneko and Daisuke Saito -- Inquiry and Modelling in a Real Archaeological Context, Gemma Sala Sebastià, Vicenç Font Moll, Joaquim Giménez Rodríguez, Berta Barquero Farràs -- Students' Overreliance on Linearity in Economic Applications: A State of the Art, Daam Van Reeth and Dirk De Bock -- Part III Pedagogical Issues for Teachers and Teacher Educators Using Mathematical Modelling and Applications -- Teaching Modelling and Systemic Change, Hugh Burkhardt and Malcolm Swan -- Mathematical Modelling as a Professional Activity – Lessons for the Classroom, Peter Frejd -- Modelling Task Design: Sciences Teachers' View, Carolina Guerrero-Ortiz and Jaime Mena-Lorca -- Modelling as Interactive Translations among Plural Worlds - Experimental teaching using the Night Time Problem, Toshikazu Ikeda and Max Stephens -- The Dual Modelling Cycle Framework: Report on an Australian Study, Janeen Lamb, Akio Matsuzaki, Akihiko Saeki and Takashi Kawakami -- Implementing Mathematical Modelling: The Challenge of Teacher Educating, Azita Manouchehri -- The Velocity Concept – History of its Modelling

Development, Regina Dorothea Moeller -- Developing a Mathematical Modelling Task for All Students, Edel Reilly -- Hidden Benefits of Modelling for Students with Disabilities, Rina Scott-Wilson, Dirk Wessels, Helena Wessels, and Estelle Swart -- Scaffolding Complex Modelling Processes – An In-depth Study, Peter Stender, Nadine Krosanke and Gabriele Kaiser -- Long-term Development of How Students Interpret a model; Complementarity of Contexts and Mathematics, Pauline Vos and Gerrit Roorda, Exploring Aspects of Creativity in Mathematical Modelling, Helena Wessels -- Mathematical Modelling in Dutch Textbooks: Is it Genuine Mathematical Modelling? Bert Zwaneveld, Jacob Perrenet, Kees van Overveld and Tijn Borghuis -- Part IV Influences of Technologies on Modelling and Applications -- Initial Results of an Intervention Using a Mobile Game App to Simulate A Pandemic Outbreak, Peter Frejd and Jonas B. Årlebäck -- Modelling and Simulation with the Help of Digital Tools, Gilbert Greefrath and Hans-Stefan Siller -- Mathematical Modelling for Engineering Diploma Students: Perspectives on Visualisation, Hanti Kotze, Gerrie J. Jacobs, Erica D. Spangenberg -- Interactive Diagrams Used for Collaborative Learning Concerning Mathematical Models of Motion, Elena Naftaliev -- Using Modelling and Tablets in the Classroom to Learn Quadratic Functions, Miriam Ortega and Luis Puig -- Mathematical Modelling in a Long Distance Teacher Education in Brazil: Democratising Mathematics, Daniel Clark Orey and Milton Rosa -- Part V Assessment of Mathematical Modelling in Schools -- Six Principles to Assess Modelling Abilities of Students Working in Groups, Piera Biccard and Dirk Wessels -- Assessing Mathematizing Competences through Multiple Choice Tasks: Using Students' Response Processes to Investigate Task Validity, Brikena Djepaxhija, Pauline Vos and Anne Berit Fuglestad -- Part VI Applicability at Different Levels of Schooling -- How to Build a Hydrogen Refuelling Station Infrastructure in Germany – an Interdisciplinary Project Approach for Mathematics Classrooms, Irene Grafenhofer and Hans-Stefan Siller -- Authentic Mathematical Modelling Experiences of Upper Secondary School: A Case Study, Kerri Spooner -- Refereeing Process -- Index.

Sommario/riassunto

This volume documents on-going research and theorising in the sub-field of mathematics education devoted to the teaching and learning of mathematical modelling and applications. Mathematical modelling provides a way of conceiving and resolving problems in the life world of people whether these range from the everyday individual numeracy level to sophisticated new problems for society at large. Mathematical modelling and real world applications are considered as having potential for multi-disciplinary work that involves knowledge from a variety of communities of practice such as those in different workplaces (e.g., those of educators, designers, construction engineers, museum curators) and in different fields of academic endeavour (e.g., history, archaeology, mathematics, economics). From an educational perspective, researching the development of competency in real world modelling involves research situated in crossing the boundaries between being a student engaged in modelling or mathematical application to real word tasks in the classroom, being a teacher of mathematical modelling (in or outside the classroom or bridging both), and being a modeller of the world outside the classroom. This is the focus of many of the authors of the chapters in this book. All authors of this volume are members of the International Community of Teachers of Mathematical Modelling (ICTMA), the peak research body into researching the teaching and learning of mathematical modelling at all levels of education from the early years to tertiary education as well as in the workplace.
