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## Modelling and Applications in Mathematics Education

The 14th ICMI Study

Series: New ICMI Study Series , Vol. 10

Springer 2007

(524 p., 87 illus., Hardcover, 123 €, ISBN-10: 0-387-29820-7, ISBN-13: 978-0-387-29820-7)

### About this book

The overall goal of *Modelling and Applications in Mathematics Education* is to provide a comprehensive overview of the state-of-the-art in the field of modelling and applications in mathematics education. Key issues are dealt with, among which are the following:

**Epistemology** and the relationships between mathematics and the "rest of the world"; the meaning of mathematical modelling and its process components; the respect in which the distinction between pure mathematics and applications of mathematics make sense

**Authenticity and Goals** dealing with modelling and applications in mathematics teaching; appropriate balance between modelling activities and other mathematical activities; the role that authentic problem situations play in modelling and applications activities

**Modelling Competencies:** characterizing how a student's modelling competency can be characterized; identifiable sub-competencies, and the ways they constitute a general modelling competency; developing competency over time

**Mathematical Competencies:** identifying the most important mathematical competencies that students should acquire, and how modelling and applications activities can contribute toward building up these competencies; the meaning of "Mathematical Literacy" in relation to modelling

**Modelling Pedagogy:** appropriate pedagogical principles and strategies for the development of modelling courses and their teaching; the role of technology in the teaching of modelling and applications

**Implementation and Practice:** the role of modelling and applications in everyday mathematics teaching; major impediments and obstacles; advancing the use of modelling examples in everyday classrooms; documenting successful implementation of modelling in mathematics teaching

**Assessment and Evaluation:** assessment modes that capture the essential components of modelling competency; modes available for modelling and applications courses and curricula; appropriate strategies to implement new assessment and evaluation modes in practice

The contributing authors are eminent members of the mathematics education community. *Modelling and Applications in Mathematics Education* will be of special interest to mathematics educators, teacher educators, researchers, education administrators, curriculum developers and student teachers.

### Table of contents

Introduction.- Plenaries.- Issues.- Epistemology.- Authenticity and Goals.- Modelling Competencies.- Applications and Modelling for Mathematics.- Modelling Pedagogy.- Implementation and Practice.- Assessment and Evaluation.- Levels.- Primary.- Lower Secondary.- Upper Secondary.- Tertiary.- Teacher Education.- Cases.- Bibliography.

That applications and modelling have been important themes in mathematics education can be inferred from the wealth of literature on these topics, including material generated from a multitude of national and international conferences. In particular let us mention firstly the ICMEs (the International Congresses on Mathematical Education), with their regular working or topic groups and lectures on applications and modelling; and secondly the series of ICTMAs (the International Conferences on the Teaching of Mathematical Modelling and Applications) which have been held biennially since 1983. Engineering: mathematics, modelling, applications (T194) starts once a year " in October. This page describes the module that will start in October 2020. We expect it to start for the last time in October 2024. As additional affordability checks are required when processing joint loan applications, unfortunately, an instant decision cannot be given. On average the processing time for a joint loan application is five working days from receipt of the required documentation. Read more about Open University Student Budget Accounts (OUSBA). Likewise, research on the role of models and modelling in mathematics education has also surfaced (Confrey & Doerr, 1994; Doerr & English, 2003; Doerr & Tripp, 1999; Lesh & Doerr, 2003). Support for educational research involving modelling promises to continue (Blum, Galbraith, Henn, & Niss, 2007) and will likely answer many important questions related to student learning of mathematics and science through inquiry. We claim that learning with mathematical models not only has practical applications, but also has philosophical and historical relevance in the construction of mathematical and scientific knowledge (Dear, 1995; Sepkoski, 2005).