



What did we
accomplish in TSG21?

Sketching a few ideas and inviting
further discussion



3 Themes

- Conceptualizations of mathematical modelling in different theoretical frameworks and for different purposes
- Cultural differences and the importance of international co-operation in research and development on the teaching and learning of mathematical modelling
- Design of curricular experiments and didactical reflections on the teaching of mathematical modelling



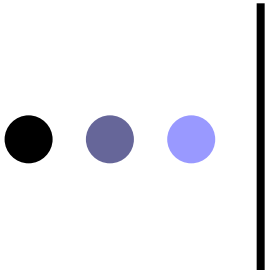
What is mathematical modelling?

- Epistemological grounds
 - What we see as mathematics and as the real world
 - What we see as a mathematical model
 - What we see as a modelling process
 - ...
- Educational grounds
 - Aims of mathematics education
 - Explicit and implicit curricular orientations
 - Teaching and learning situations
 - Classroom implementation
 - ...
- Political grounds
 - How mathematics plays a role in interpreting reality
 - How mathematics is a formatting instrument
 - How mathematics is a liberating and empowering instrument
 - ...



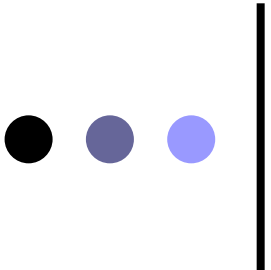
Reality and mathematics: one or two?

- When we make a division between mathematics and reality we come up with some really big problems
 - How to connect them?
 - The *real model* and the *mathematical model*: Are they separated?
 - The role of GVs: “*Without GVs modelling is a procedure without life*” (Rudolf and Alexander)
 - But where are the GVs to be placed within the modelling cycle?
 - Why is GV located there and not between the *real situation* and the *real model*? (a good question!)



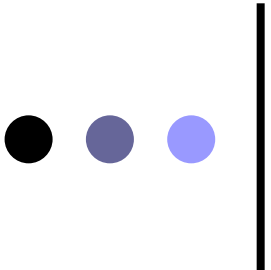
The role of assumptions in mathematical modelling

- The essential presence of the SUBJECT in the modelling process
 - What guides the modelling activity in an educational context?
 - Beliefs?
 - Purposes?
 - A Didactical Contract?
 - Different assumptions – Different results (Jonei Barbosa)
 - Yes, but is there a next step? Or is modelling actually about *ways of looking at reality*?
 - What does it mean to address the validity of a model in the context of mathematics education, especially in elementary and secondary school?
 - What does it mean to *check the model* of the water in the lake or the model of the medication for asthma or the model of peeling a pineapple?



What are good modelling activities for teaching?

- The socio-cultural context of mathematics teaching and learning
 - The pressure of the curricular content matter (modelling is kept as an extra activity)
 - The integration in the classroom practice (the modelling cycle is tackled and explained by the teacher)
 - Modelling is used as any other type of learning task in the classroom
 - Good modelling activities is a *relative notion*? Should we expect to have many teaching perspectives on any modelling task?



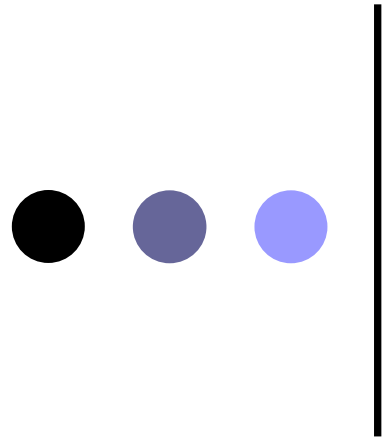
Is mathematical modelling *good* for the students?

- Why does mathematical modelling look difficult to the students (and to the teachers)?
 - What are the main obstacles? (Jussara)
 - Need of more reflective thinking?
 - What is reflective thinking? (good question from Marcelo Borba)
 - How to encourage and promote reflective thinking? (Mette, Jonei)
- Why do “good” students tend to have lower performance in mathematical modelling (Matthias & Binyan)
 - Need of practice and training in modelling?
 - What does it mean to be experienced in modelling? (the same question is possible to ask in relation to problem solving)
 - What does it mean to be competent in mathematical modelling (in elementary or secondary or tertiary)?



What did we get from this TSG?

- Not a theory but rather a conceptual view of different theoretical perspectives
- A rich diversity of research work in an international context
- The perception of the importance that modelling and applications is gaining in different countries all over the world
- New questions for research as well as some already known questions have emerged
- New ways of looking at some earlier and current problems (assessment, teaching practices, technology,...)



See you in Lyon,
in CERME!

Thank you