

# Theme 4

## How to teach and assess WNA

### Co-chairs

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### ----- Participants -----

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# The Focus of the Paper Presentations

- Teaching Approaches
- Knowledge of Teachers
- Curriculum
- Curriculum and Textbooks
- Assessment of WNA

All 14 papers presented are in the proceedings for reference. We shall focus on the outcomes of the Discussion Sessions

# Discussion Themes

- 1. Teachers' knowledge of pupils and mathematics for the teaching of WNA**
- 2. Multi-cultural approaches and traditions of teaching WNA**
- 3. The role of textbooks and custom made materials related to teaching of WNA**
- 4. Assessment and the teaching of WNA**

# Teachers' knowledge of pupils and mathematics for the teaching of WNA

- The importance of *a priori* analysis; the teacher cannot anticipate everything; how does (s)he reacts in case of non-anticipated situations? → the role of different types of teachers' knowledge → important consequences for teacher education
- The importance of in-service courses, cooperation of teachers, observations in classrooms → the importance of discussions after the observation (with the teacher, other observers, researchers) → importance for having a methodology for such an approach
- Teachers' work in heterogeneous classes (talented pupils, pupils with special needs) – choice of tasks with different level of complexity, more challenging tasks etc.

# Teachers' knowledge of pupils and mathematics for the teaching of WNA

The WG noted that the following were of paramount importance for the teaching of WNA

- teachers' knowledge of mathematics
- teachers' ways to diagnosing pupils' understanding of mathematics
- teachers' approaches to the work with pupils' incorrect/correct answers
- knowing diverse types of suitable materials and artefacts suitable for WNA teaching and developing pupils' understanding
- planning, esp. the long-term planning (we are not teaching for the present moment only, the gained knowledge will be needed later) → different types of learning trajectories
- The Concrete → pictorial → abstract shift is difficult to make

## **Teachers' knowledge of pupils and mathematics for the teaching of WNA**

- **A side issue raised was the role of understanding pupils' family background, family's attitudes towards education and cooperation with school, ...**

### **Open question**

- **What we mean by effective teaching?**

# **Multi-cultural approaches and traditions of teaching WNA**

## **The role of algorithms in teaching of WNA**

- **Algorithm as an end result of a work of investigative nature vs. Algorithm as a tool of acquiring mathematics**
- **Danger of teaching WNA algorithms too early**
- **Mathematics education consists of three interrelated but indispensable parts: Understanding of mathematics, mathematical routine (including knowing algorithms), and applications of mathematics**
- **Changes influenced by the use of calculators and spreadsheets**

# **Multi-cultural approaches and traditions of teaching WNA**

## **Open question:**

- **The importance of developing procedural fluency**

## **Issue for further deliberations**

- **How to judge high/poor quality of teaching**



# **The role of textbooks and custom made materials related to teaching of WNA**

- **Curriculum – standards (covering at least concepts, mathematical thinking, student activities, basic skills)**
- **Different approaches for computations**

## **Broader questions:**

- **Differences in approaches based on traditions, cultural background, in textbooks ...**
- **How to deal with these differences in the present global world?**
- **Variety of variables influencing teaching, learning and assessing WNA**

# Assessment and the Teaching of WNA

- CATS offer deep insights to pupil learning but have been shown to be more successful in some settings compared to others (teachers need to acquire the know-how of how to design, implement and use data)
- Pupils “Journal of Number Productions” (writing and making sense of numbers) piloted by some researchers in France have shown positive outcomes about the development of number concepts in young children.

Open question:

Assessment techniques used in a specific context need to be carefully examined for transferability to another context as their success is often shaped by several contributory factors.