

## INTRODUCTION TO WORKING GROUP 14: EARLY YEARS MATHEMATICS

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The working group met for the first time at CERME 6 and we found many similarities but also considerable differences in our countries and individual contexts. Most countries represented were reappraising Early Years' education and due to recent research (Clements and Sarama 2007a) were also re-considering the curriculum offered to the youngest children in mathematics.

One of the most significant changes observed in Germany, UK and Israel has been to look at the ways in which children are being taught and what they are being taught. A few years ago, mathematics did not play an official role in German kindergarten. Learning mathematics was reserved for school. Kindergarten teachers were not confronted during their job training with mathematics education. Now different documents in matters of educational policy are raised, where mathematics learning now is included. But the curricula of the single federal states of Germany differ in the explicitness of the statements made concerning mathematics. It ranges from very in-depth descriptions of mathematical contents in kindergarten, to others, where mathematics does not play an important role. Schooling for 3-6 year olds is not compulsory and is paid for.

In England there is full time free education for all children from the age of four and part time for all children from three. There is now a prescribed curriculum for this age group containing problem solving, reasoning and numeracy ? as the mathematics strand of the new curriculum document named as 'The Early Years Foundation stage' for ages from 0-5. The curriculum is compulsory but there are no specific ways of doing it. Training for the teachers is seen as very important largely due to research ( The Effective Provision of Pre-School Education (EPPE) Project: Final Report A Longitudinal Study Funded by the DfES 1997-2004) highlighting that the best practice in Early Years settings was with qualified teachers.

In Israel school is compulsory from the age of 6 and the new curriculum here is compulsory. It covers the basic ideas in maths with some free play but is also teacher orchestrated.

In Denmark the thinking about mathematics is similar to the German thinking. The philosophy is on the development of the whole child. There are no specific goals for children and the emphasis is on play but there is a movement towards a specific curriculum. There is a raising awareness of mathematics pedagogy and how to it but there are problems with the cost.

In New Zealand children begin school at 5. The curriculum document for 0-8 is Te Whariki and it advocates a holistic approach to teaching and learning

In Finland all teachers have Masters in early education. There is pre-school until 6. Skills are taught to develop mathematical thinking.

In Portugal education for 3-6 year olds is not compulsory but the majority attend.

In Poland there are not enough pre school places for those who want them and it is not obligatory. Fees are paid for pre school therefore there are financial reasons why some children do not attend. Children attend school at 7. In the 0-6 kindergarten there is preparation for school. In mathematics this consists of numbers, counting, and shapes. There is no special training for pre school teachers but all teachers are educated with masters.

Cyprus has a system where children attend Nursery from 3 years old. The formal curriculum begins between 5 and 6. The EY maths curriculum consists of free play, building structures, numeracy, and geometric shapes. All teachers have to have a degree and maths education is part of this. There are a huge number of people who want to do the job.

In Norway 80-90% from 1yr. at 3 yrs more than 90% of children attend the kindergarten. It is felt that all children should be able to go to kindergarten. School begins at 6 years old. In 2006 there were official documents mentioning mathematics – numbers, space and form. The training is 3 yrs at university.

There were many papers submitted and we organised them into the following themes

- Discussion of theoretical concepts and models and how they are used in analysis
- Research methods/methodologies: discussions on how very young children are able to articulate their understanding of mathematics/mathematical thinking e.g. drawings, gestures and recordings (written notations).
- Discussion on how parents can contribute to our perspective of what children are doing.
- Our challenges: we are working in different paradigms, a discussion on what we mean by learning to make that explicit in our papers and discussions
- Many perspectives are observed: very young children, teachers, other adults

After discussion of the papers the following challenges emerged for the group in the future:

- Impact on policy makers
- Cooperation and collaboration between members of the group
- Gender! Teachers (salary, role models, social standing) Children (differences in teaching and learning outcomes)
- What is mathematics in the early years and what does it look like?
- How can we support children's mathematical thinking in the early years?

Clements, D.H. and Sarama, J. (2007a) Effects of a preschool mathematics curriculum : summative research on the building blocks project in *Journal of research in Mathematics Education* 2. 136-163.