

## NEW POWERFUL METHOD TO LEARN MATH

VISUAL SUPPORT:  
Subitization

COMMUNICATIVE APPROACH:  
Four languages of math in use \*

### PARTICIPATION

Pupil has an active role in  
numberconcept  
learning-  
interaction

### METACOGNITION

Pupil becomes aware of his/  
her ability to count by  
grouping and think flexibly

### INDIVIDUALIZING

Assesment and support  
according to the level of  
pupil's thinking

### DEEP LEARNING OF NUMBER CONCEPT

### ENGAGEMENT

Pupils self-efficacy is  
confirmed by deeper  
understanding  
and structural conceptins

- From prosedural thinking and counting by ones to structural thinking and flexible use of numbers
- "Seeing" number relations via subitization
- Visual support to "seeing by mind's eyes" (Sfard 1991;2008)

# Do you speak math?

\*Four languages of math

(Joutsenlahti & Kulju 2014)



Bob eats  
2 bananas  
and....

I know that  
 $2 + 4$  is equals 6,  
because...

Natural  
language

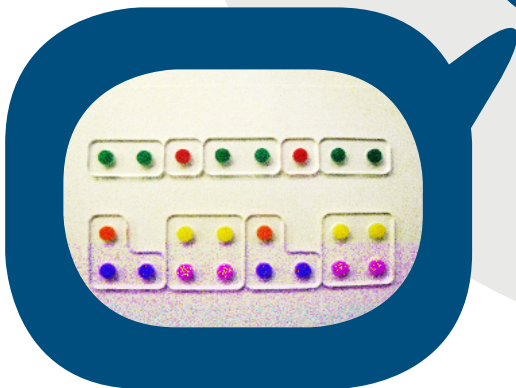
Tactual  
language of  
doing

Discussion

Pictorial  
language

Symbol  
language

$4 + 2 = ?$



Algebraic  
thinking:

$$2 + \_ = 10 - 4$$

$$12 ? 2 > 14 - 5$$

Do you  
understand  
numbers?

Innovative EMMA-materials support  
understanding of number connections  
e.g. part-whole relationship.



**The first step: cardinality.**  
**- The number of the berries is six!**  
**I know it is six! I can see it!**

# Visualization helps to participate

Visualization is used not only to support conceptual understanding but also to participate pupils in their learning processes by asking them to explain, justify and argue for their reasoning. In the beginning they do it in pictorial language with EMMA-materials.



**What number is two more than four? How do you know?  
Can you "justify" it?**

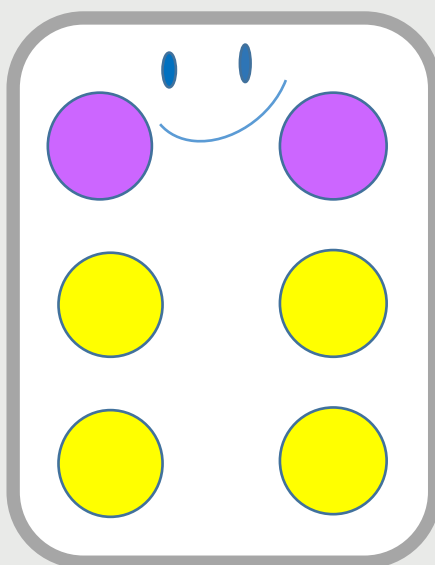
**Every child can participate.**

# EMMA- Numbers

Numbertalk: what numbers are and what can be done with them?

Basic activities:  
Explaining, justifying,  
reasoning

Subitization means our ability to see small quantities accurately and easily without counting in ones  
- Supports cardinality



6 SIX

All four languages  
in active use

Focus on quantity

Different solutions

Part-whole principle

Self-efficacy