

# Children

## The mirrors of the teacher



# What photographs can tell about students



Focus on the result or on the child?



# How to be 'inclusive'



# The teacher

- Must know how learning processes develop
- Must know how children learn mathematics
- Has to look at and listen to children and interpret their behaviour in the right way during maths lessons
- Develops goal oriented and diagnostic teaching methods
- Has to deal with the differences between the children



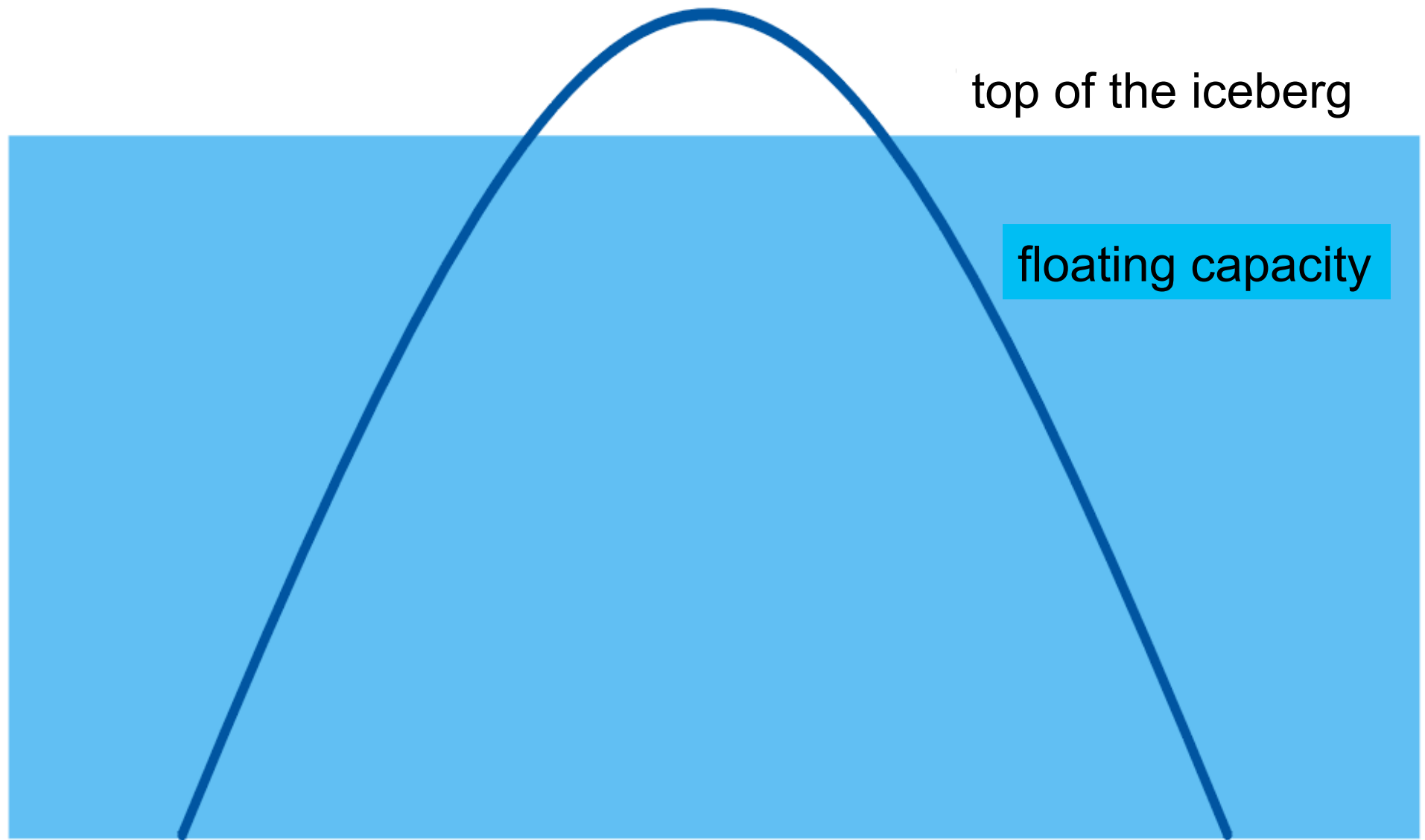


# Speciaal Rekenen (Special Arithmetic)

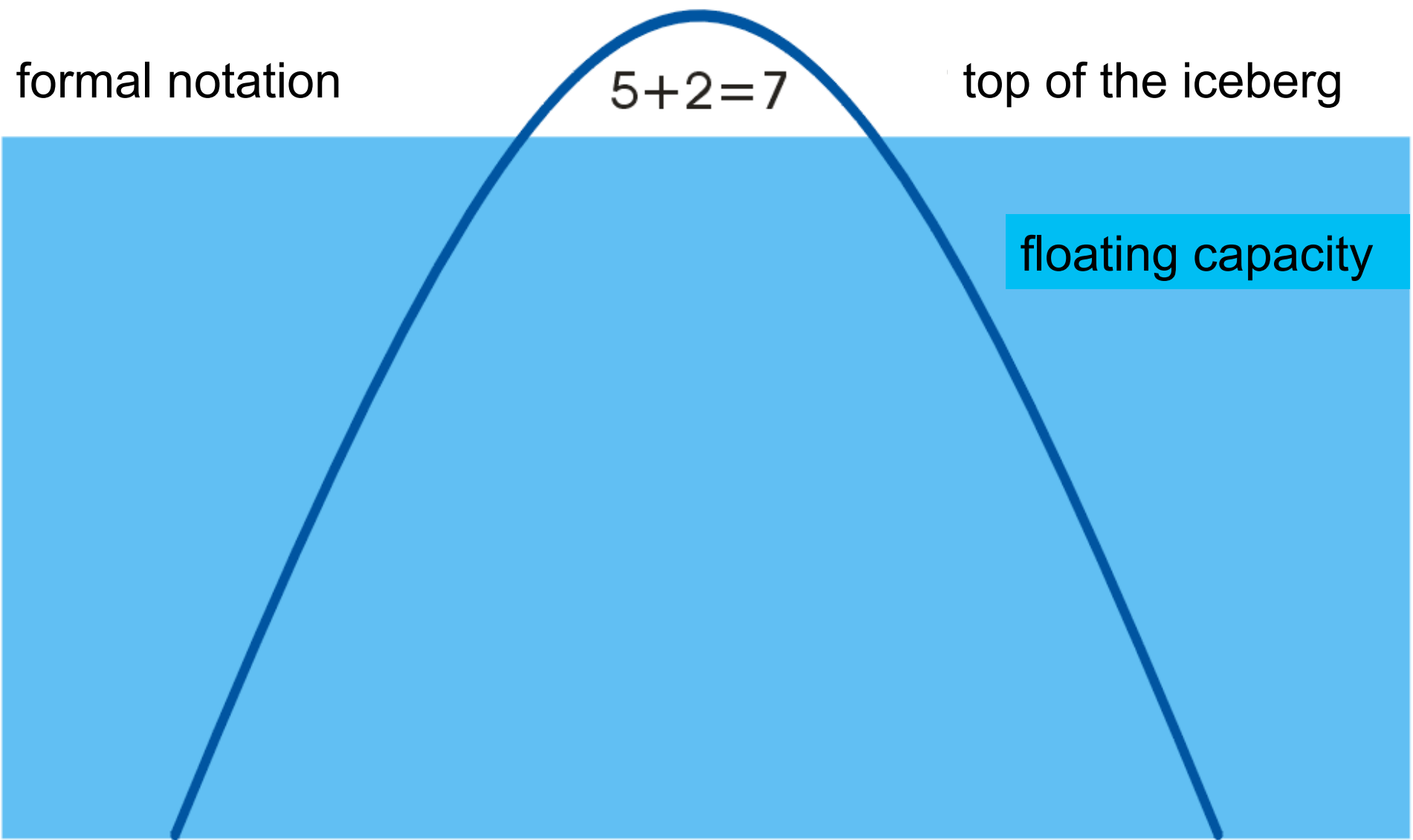
- History
- Vision
- An example

# How do children learn?







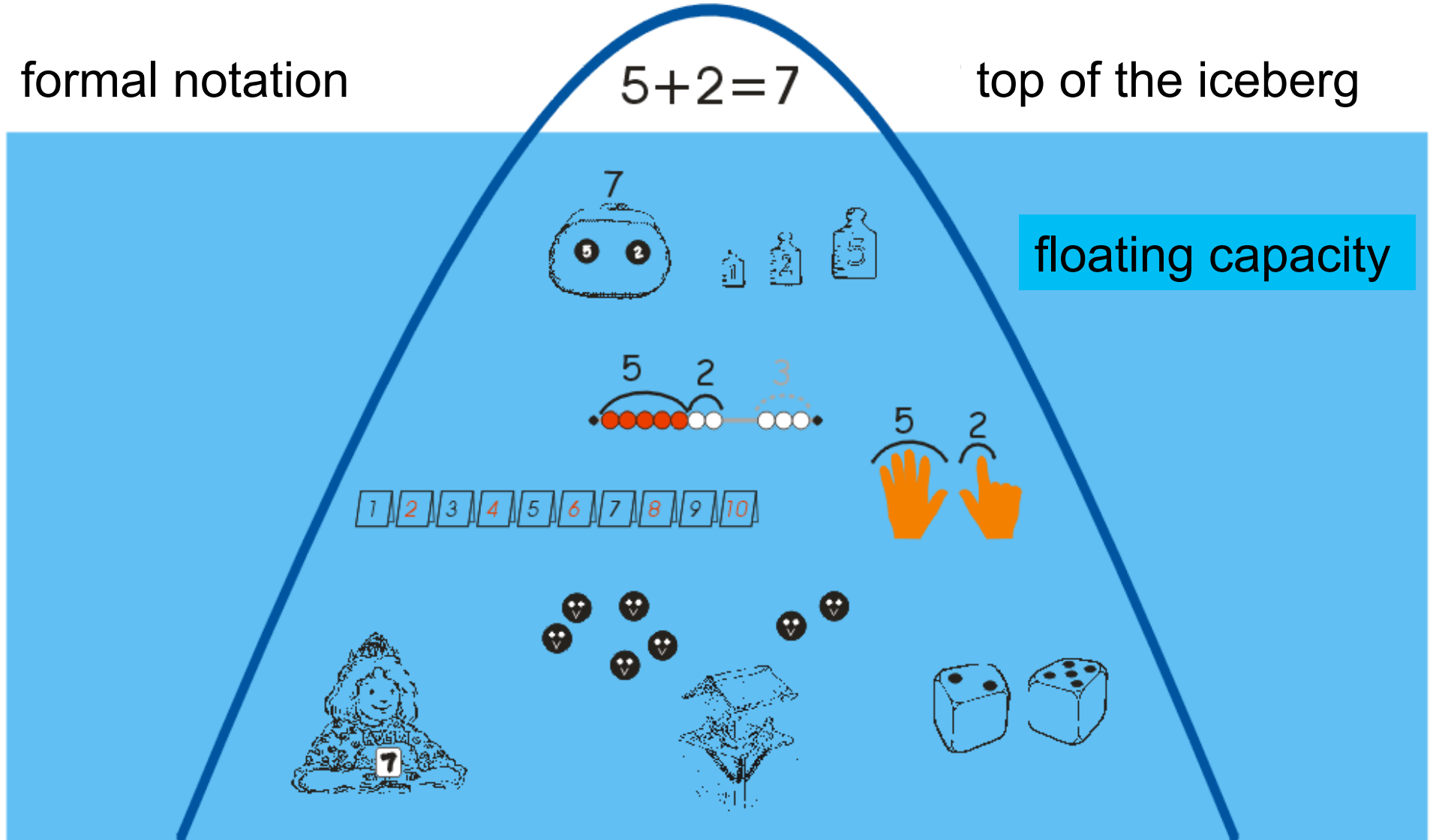


formal notation

$$5+2=7$$

top of the iceberg

floating capacity



The Iceberg Model is a visual metaphor, distinguishing the role of informal, pre-formal, and formal representations used by students. The iceberg consists of the “tip of the iceberg” and a much larger area underneath, the “floating capacity.” The tip of the iceberg represents the targeted formal procedure or symbolic representation. In the floating capacity of the iceberg, moving from the bottom layer to the water-line, informal, context-bound representations, transition to pre-formal, strategies and models that can be used across many different problems.

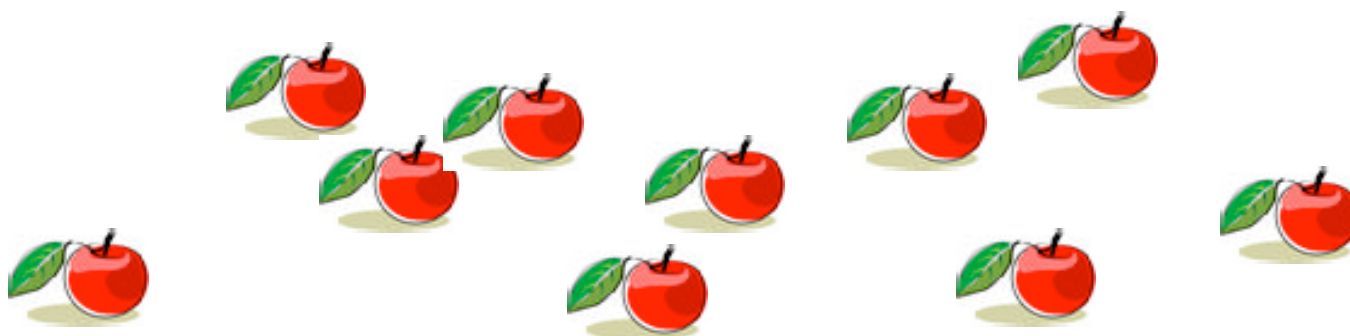


# The importance of seeing structures



Special  
Rekenen

How many?



Special  
Rekenen

How many?





Children have to see the  
advantages of structuring





# What's the problem



A puzzle  
How many pieces?



# Why do children continue counting one by one?

- It gives them certainty
- There's no necessity changing the strategy
- They don't recognize structures in their environment
- They don't know how to use structures in solving mathematical problems





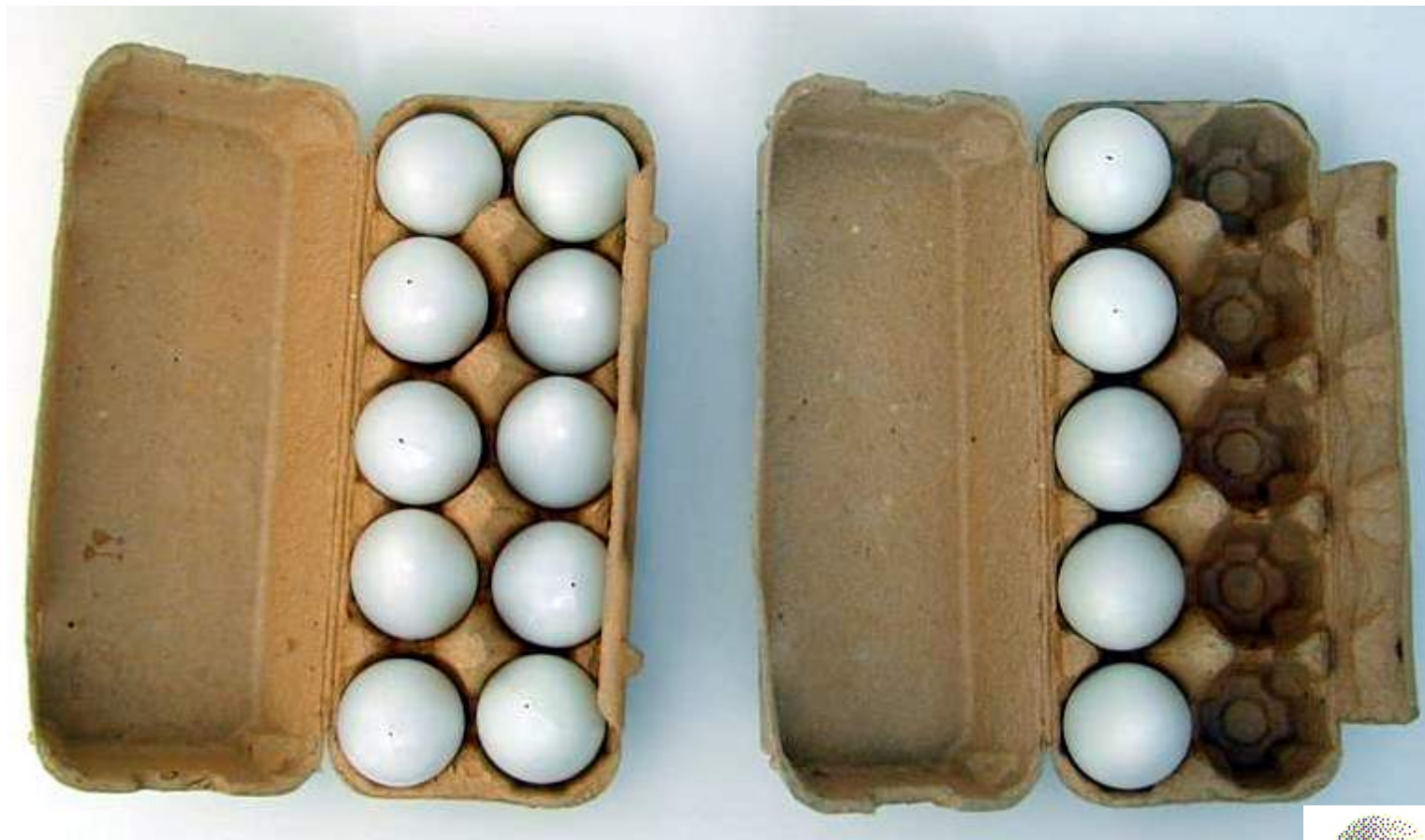
# How can we help?

Egg-boxes



# Speciaal Rekenen

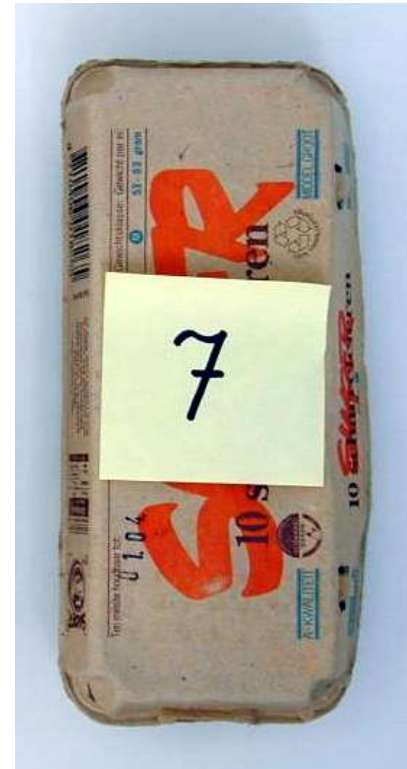
‘Fifteen eggs. I see a box of ten and a row of five eggs’.



# Pre-formal



# If necessary one step back



What is eight again?





# Number recognition

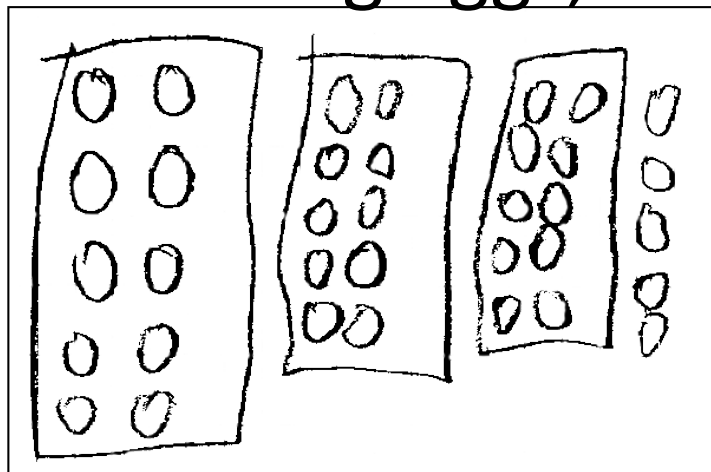
10 eggs in the box

I have seven full boxes and five eggs



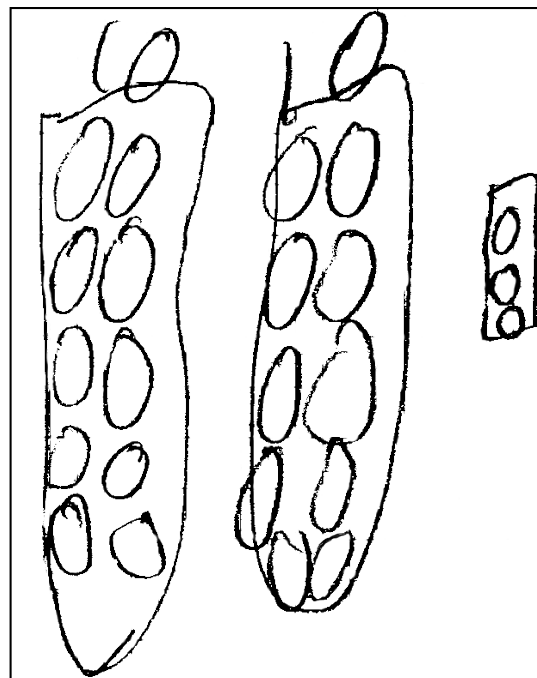


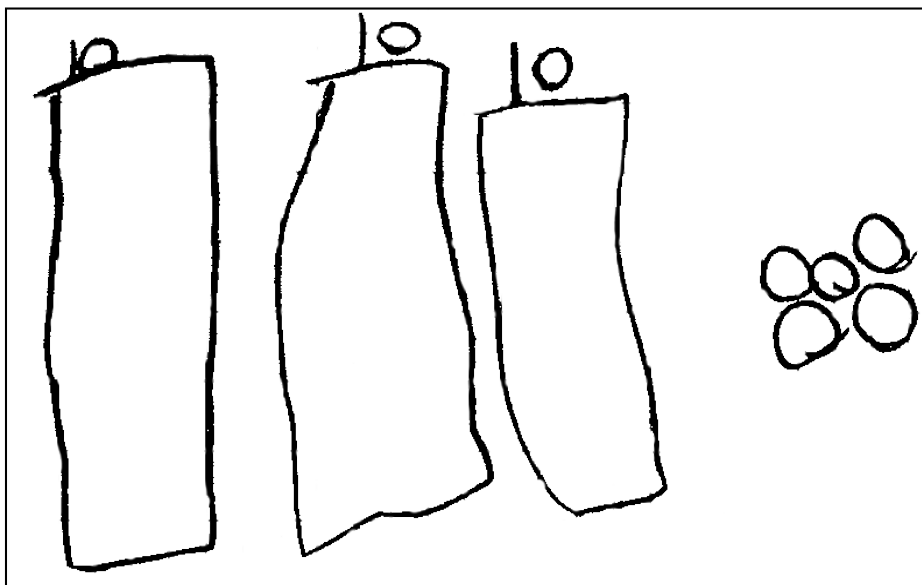
## Counting eggs, show how many



Student 1:  
All eggs countable

Student 2:  
Eggs are countable, but the 10  
is written above the box

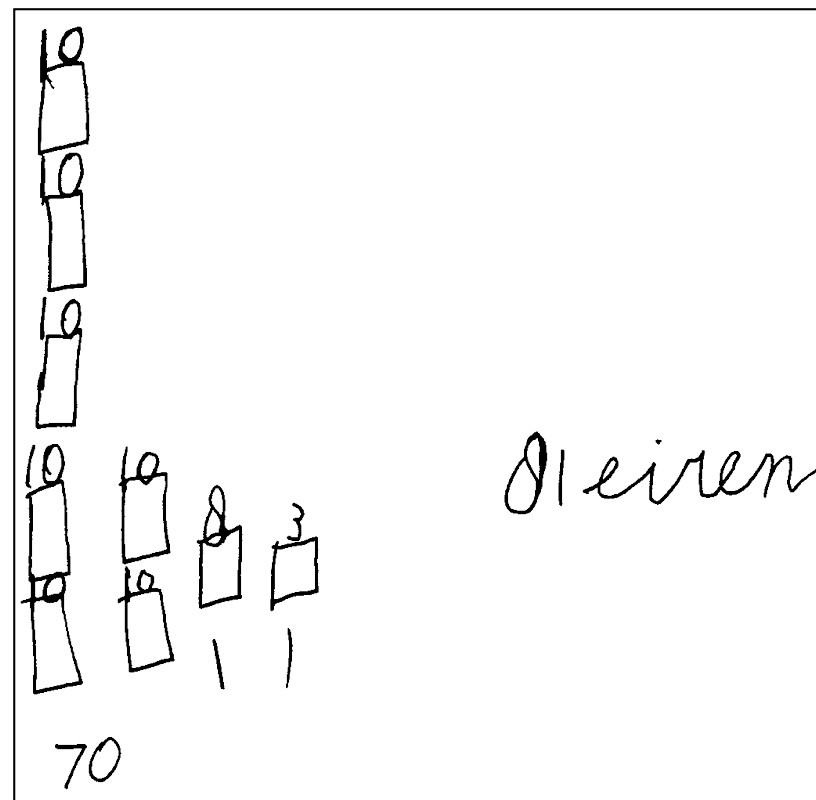
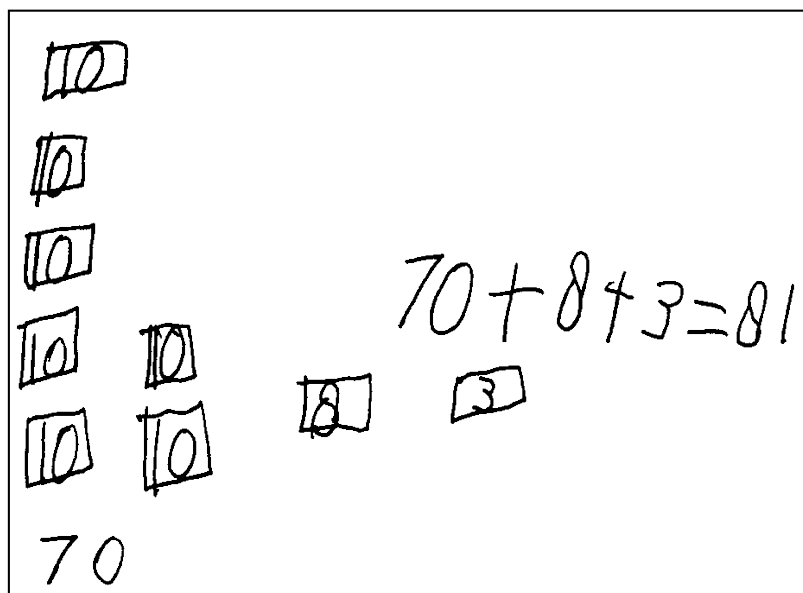


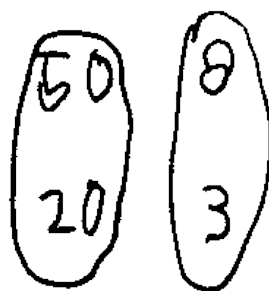


Student 3:  
Counts with tens and ones

# Addition

## 58 + 23





$$70 + 11 = 81 \text{ eieren}$$

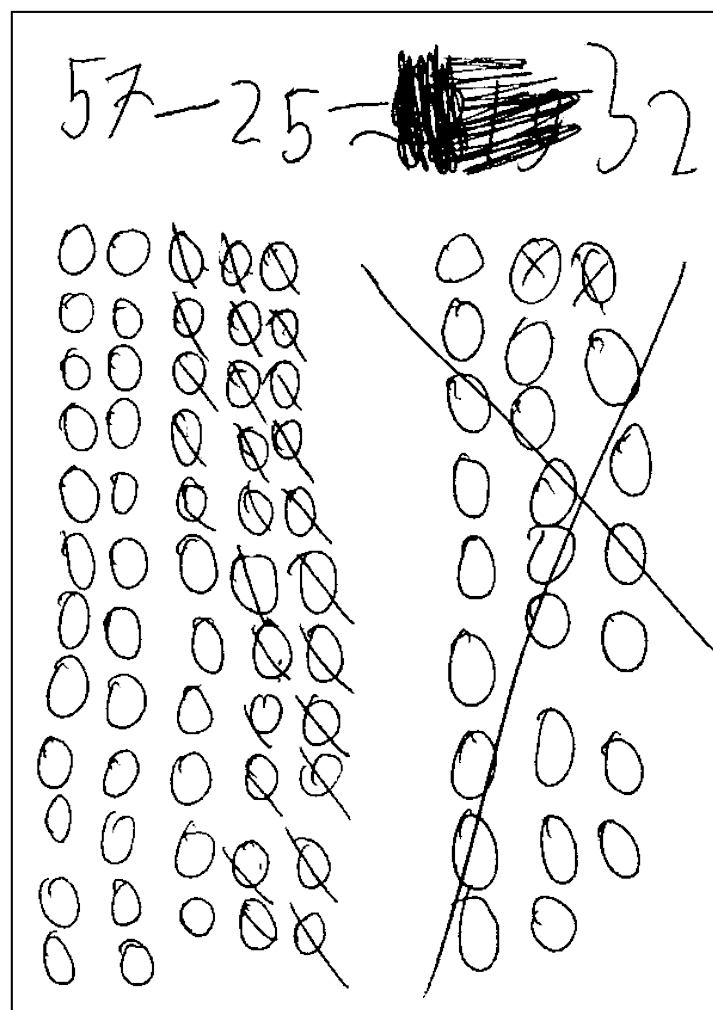
$$\begin{aligned} 58 + 23 &= \\ 50 + 20 &= 70 \\ 8 + 3 &= 11 \\ 70 + 11 &= 81 \end{aligned}$$

$$58 + 23 =$$

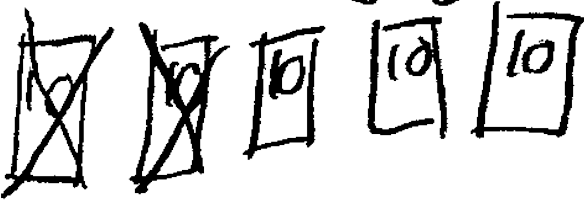
$$70 + 11 = 81 \text{ eieren}$$




# Subtracting



# Special Rekenen

$$57 - 25 = 32$$


$$45 - 27 =$$


$$45 - 27 =$$

$$40 - 20 = 20$$

$$5 - 5 = 0 \text{ nog } 2 \text{ eraf halen}$$

$$20 - 2 = 18$$

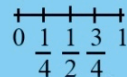
# Special Rekenen

formal notations

$$\frac{3}{4}$$

top of the iceberg

$$\frac{1}{4} + \frac{1}{4} + \frac{1}{4}$$



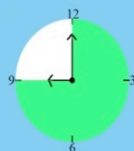
$\frac{1}{2}$  plus  $\frac{1}{4}$  pizza



floating  
capacity

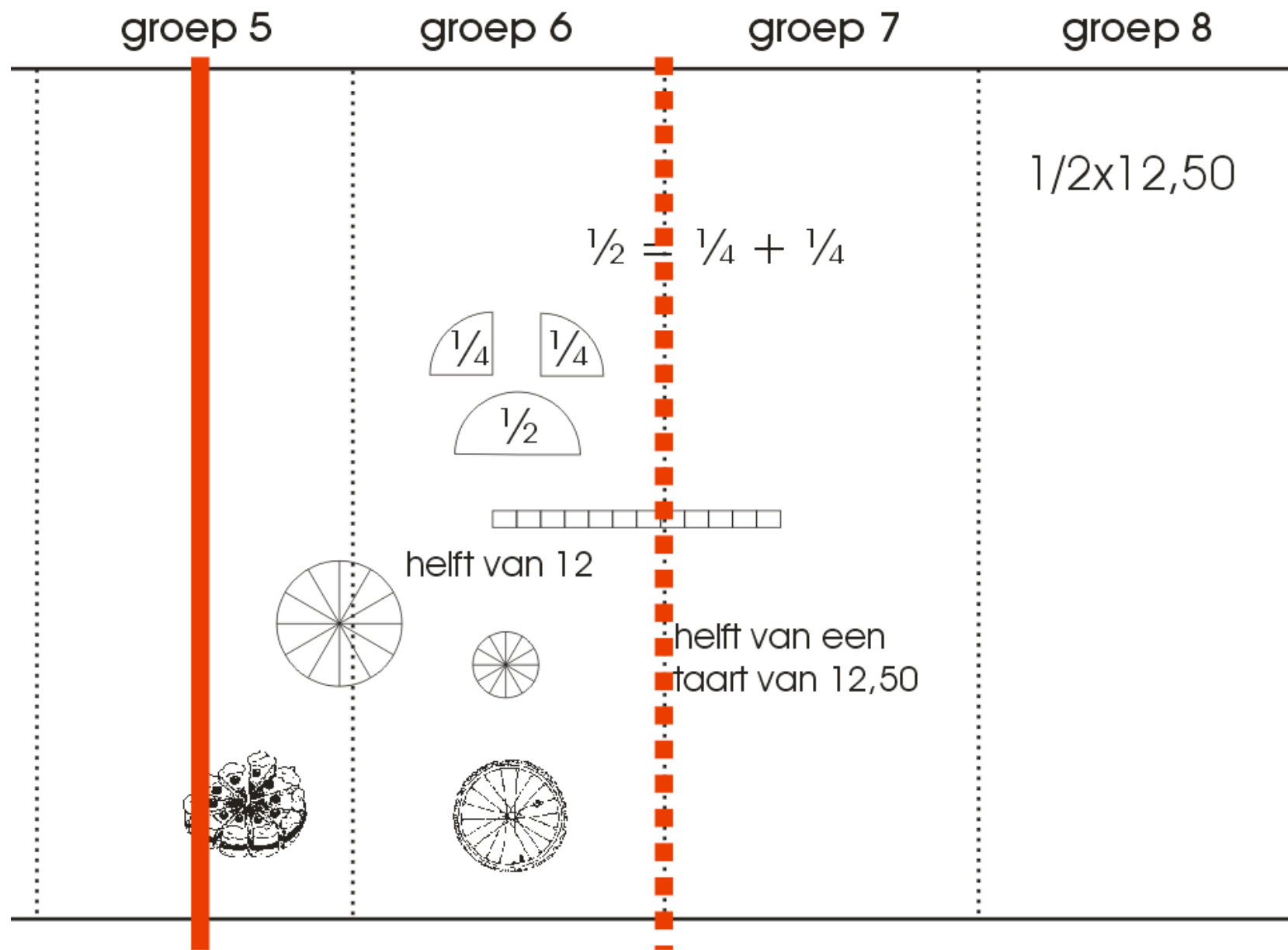


3 out of 4



PLATFORM  $9\frac{3}{4}$





k  
e  
r  
n  
d  
o  
e  
-  
n



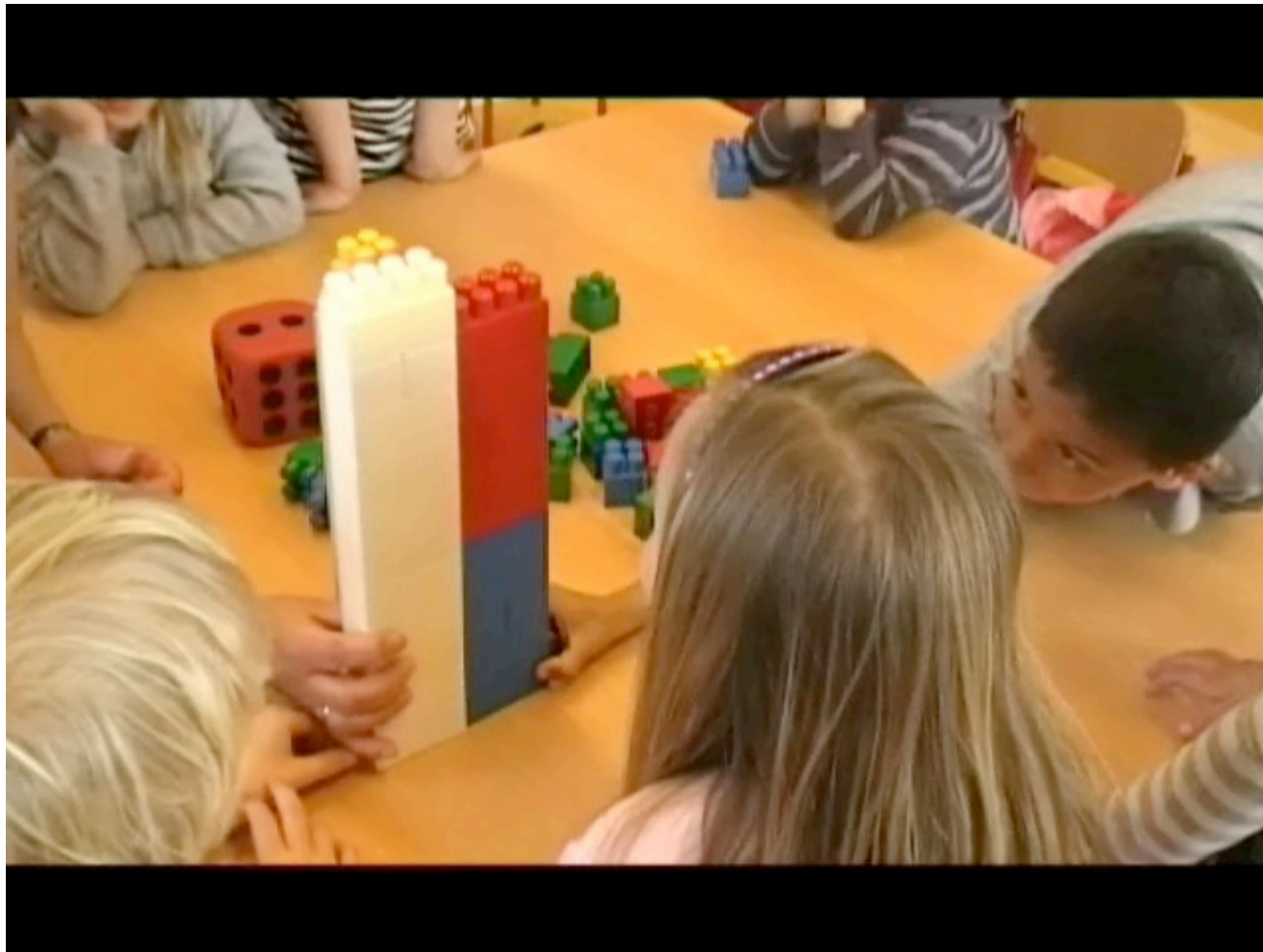
# How to teach the teachers?

- Making them aware of their own concepts of teaching
- Invite them to make a conceptual change
- Help them to professionalize
- Help them to reflect
- Help them to implement new concepts and materials

# Teachers working on the design of representational pathways



Stick to your target and ask the  
right questions



# Connections in a conceptual change

<b>Vision</b>	<b>Urgency</b>	<b>Plan</b>	<b>Means</b>	<b>Competences</b>	=	<b>Change</b>
	<b>Urgency</b>	<b>Plan</b>	<b>Means</b>	<b>Competences</b>	=	<b>Confusion</b>
<b>Vision</b>		<b>Plan</b>	<b>Means</b>	<b>Competences</b>	=	<b>Resistance</b>
<b>Vision</b>	<b>Urgency</b>		<b>Means</b>	<b>Competences</b>	=	<b>Chaos</b>
<b>Vision</b>	<b>Urgency</b>	<b>Plan</b>		<b>Competences</b>	=	<b>Frustration</b>
<b>Vision</b>	<b>Urgency</b>	<b>Plan</b>	<b>Means</b>		=	<b>Fear</b>

# The teacher trainer

- Teach as you preach
- Furnish the students with theory-enriched practical knowledge
- Invite them to explore, to reflect and to explain.  
Awareness grows and insights can be used in other situations
- Teach them to look at and listen to their children.
- Teach them to ask the right questions and use the right materials at the right time



# Inclusive education

What do students need to learn to  
construct such education?

# Investigation

- Who are my children?
- What do they have to learn?
- What are their capabilities?
- What do they need?
- How to organize education in which there's respect for differences between children
- How to provide education in which children learn from and with each other

- In written observations and diagrams

[illegible]

# And then...

- Draw conclusions
- What are the targets?
- Construct activities
- Use the children as mirrors of your own efforts  
(by using photographs, videoclips, written observations, etc.)

# First a estimation



# Count a little



Everything has to come out of the pot  
in order to count precisely



# Spontaneously using the colours





Not an effective way of counting...they got confused



# Using boxes



Mmm, where were we...?



# Egg-boxes! So you can't get confused





$$50 \text{ and } 8 = 58$$



# Afterwards

- Evaluate
- Reflect on your own role: What did you do and what was the effect?
- Insights and improvements

Teaching the child ...  
by teaching the teacher...  
by theaching the teacher trainer...



It's the same story on every level

What are the possibilities instead of  
what handicaps do they have



Blind children building together