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 methodologies
- Has to deal with the differences between the children
Speciaal Rekenen (Special Arithmetic)

- History
- Vision
- An example
How do children learn?

Step 1: Assemble Part A to Part B. Step 2: Glue these pieces securely. Step 3: Find Part C and connect to Part D...
top of the iceberg

floating capacity
formal notation

5 + 2 = 7

top of the iceberg

floating capacity
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
How many?
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
‘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 + 8 + 3 = 81

8 3
1
50 + 3 = 53  
20 + 11 = 31  
70 + 11 = 81  

58 + 23 = 81  
50 + 20 = 70  
8 + 3 = 11  
70 + 11 = 81  

70 + 11 = 81 eieren
Subtracting

57 - 25 = 32
57 - 25 = 32

45 - 27 =

40 - 20 = 20
5 - 5 = 0 nog 2 eraf halen
20 - 2 = 18
formal notations

$\frac{3}{4}$

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

$\frac{1}{2} + \frac{1}{4}$

3 out of 4

floating capacity

$\text{PLATFORM } 9\frac{3}{4}$
$\frac{1}{2} = \frac{1}{4} + \frac{1}{4}$

De helft van 12

Helft van een taart van 12,50
Wereld in Getallen
GROEP 3

Rekenen tot 20
Getalverkenning tot 100
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

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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

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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 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