Beyond Word Problems

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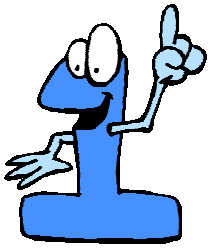
How many chicken are there in the shed?


APS: investeren in krachtig leren
Verbinden van de vraag van de klant met onze expertise en kennis. Pendelen tussen de praktijk en de nieuwste inzichten. Ontwerpen van een op maat gesneden oplossing, samen met de klant.
APS 40 JAAR toonaangevend
KIJK OP WWW.APS.NL VOOR DE ACTUELE VACATURES

What is the biggest problem in numeracy education?

Word problems

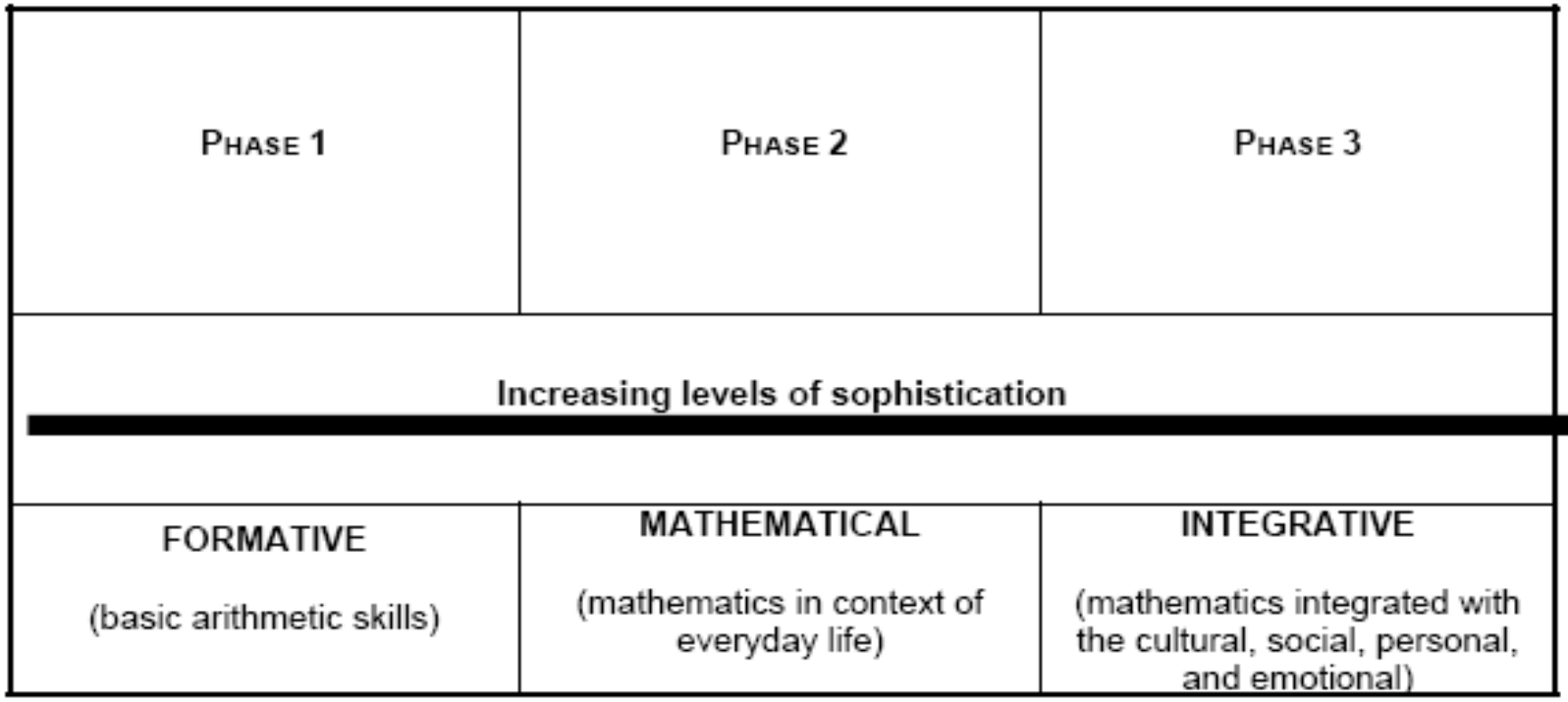


Beyond Word Problems

or is it:

Beyond WP4.2 problems?

Adult Numeracy Concept Continuum of Development



A continuum of development of the concept of numeracy showing increased level of sophistication from left to right (from Maguire & O'Donoghue, 2002)

Research base:
- my own research

- existing literature

Adult Numeracy Concept Continuum of Development

PHASE 1	PHASE 2	PHASE 3
Increasing levels of sophistication →		
FORMATIVE (basic arithmetic skills)	MATHEMATICAL (mathematics in context of everyday life)	INTEGRATIVE (mathematics integrated with the cultural, social, personal, and emotional)

A continuum of development of the concept of numeracy showing increased level of sophistication from left to right (from Maguire & O'Donoghue, 2002)

Numeracy and Mathematical literacy

- (…) one thing everyone more or less has come to agree on is that mathematical literacy cannot be defined in terms of mathematical knowledge.

  Mathematical literacy is in fact mainly about the functional aspect of mathematical knowledge. It is about individual competencies to use mathematical knowledge in a practical, functional way; mathematical literacy in order to …. or mathematical literacy for … (…)

  (Jablonka, 2003)

School Mathematics versus Numeracy

- Avoid the typical school mathematics in adult mathematics / numeracy education.

  (FitzSimons, 2002)

  (and many others)

- Design pre-vocational education, where you treat the students as adults. With real life assignments and real life responsibilities.

  (Koops, 2000)

Complexity and depth

- Find the complexity not in abstraction of the mathematics used, but in the richness of the situations.
  (Lynn Arthur Steen e.a., 1995)

- Do not hide the toolkit “mathematics” in a blur of thematic assignments or thematic approaches.
  (Hoogland, 2009, ALM)

Results from earlier research

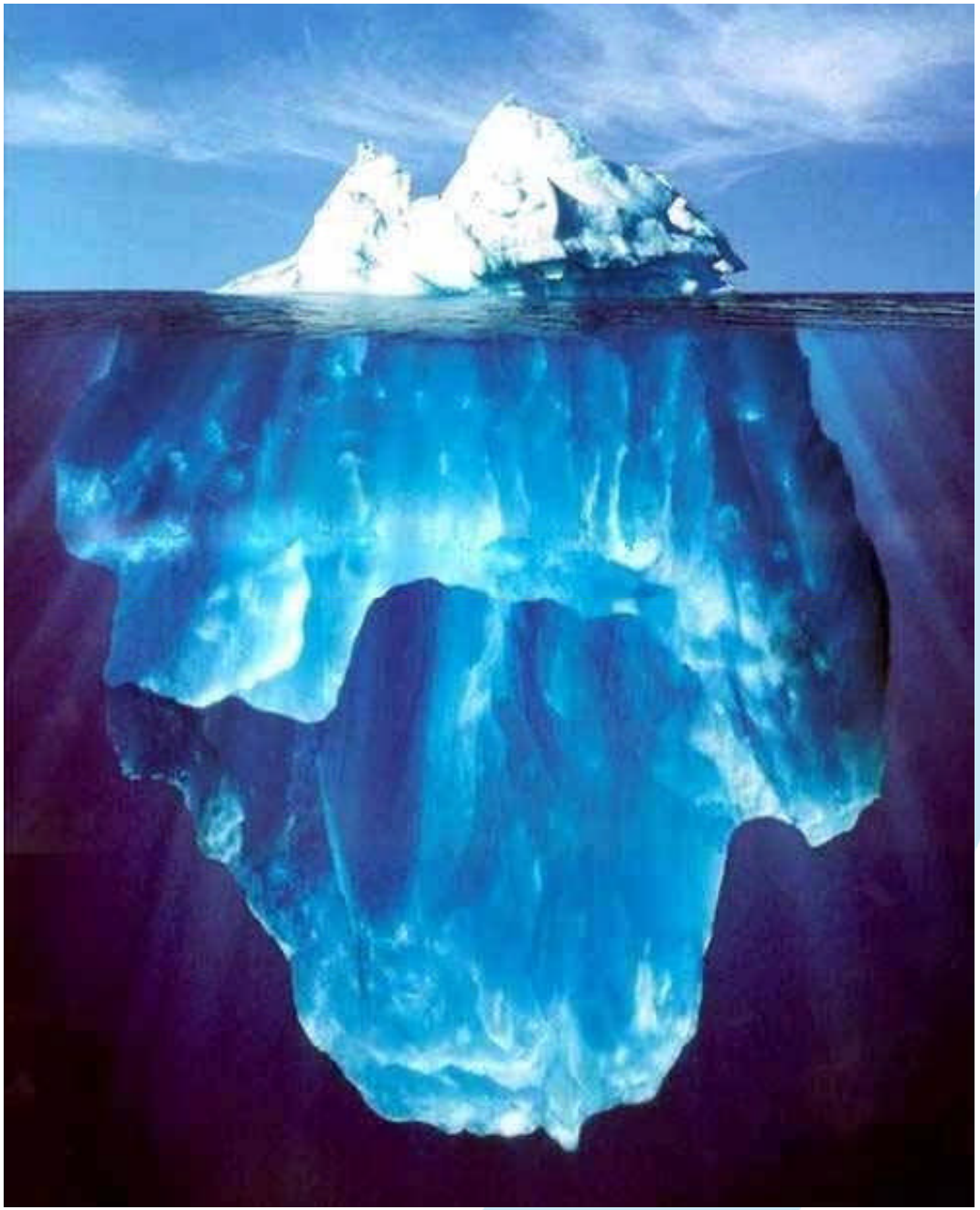
- Real life assignments
- Observations, pictures
- Stimulated recall
- Analyzing the video’s

Analyses of the video's

- Matching numbers with the sizes of the product of parts of the products.
- Interpreting numbers a symbol for a kind of screw, drill or other things.
- Using the numbers as a measure instruction
- Using the numbers to make a list of needed parts, counting
- Hardly any operations with numbers showed up. In cases where addition had to be made, they all use a calculator or even Excel in a very natural way.
- Matching complex plans and schemes with the real product
- Hardly any mathematical language to express their numerical or spatial competences.
- Use of gestures to support the expressions of numerical competences.

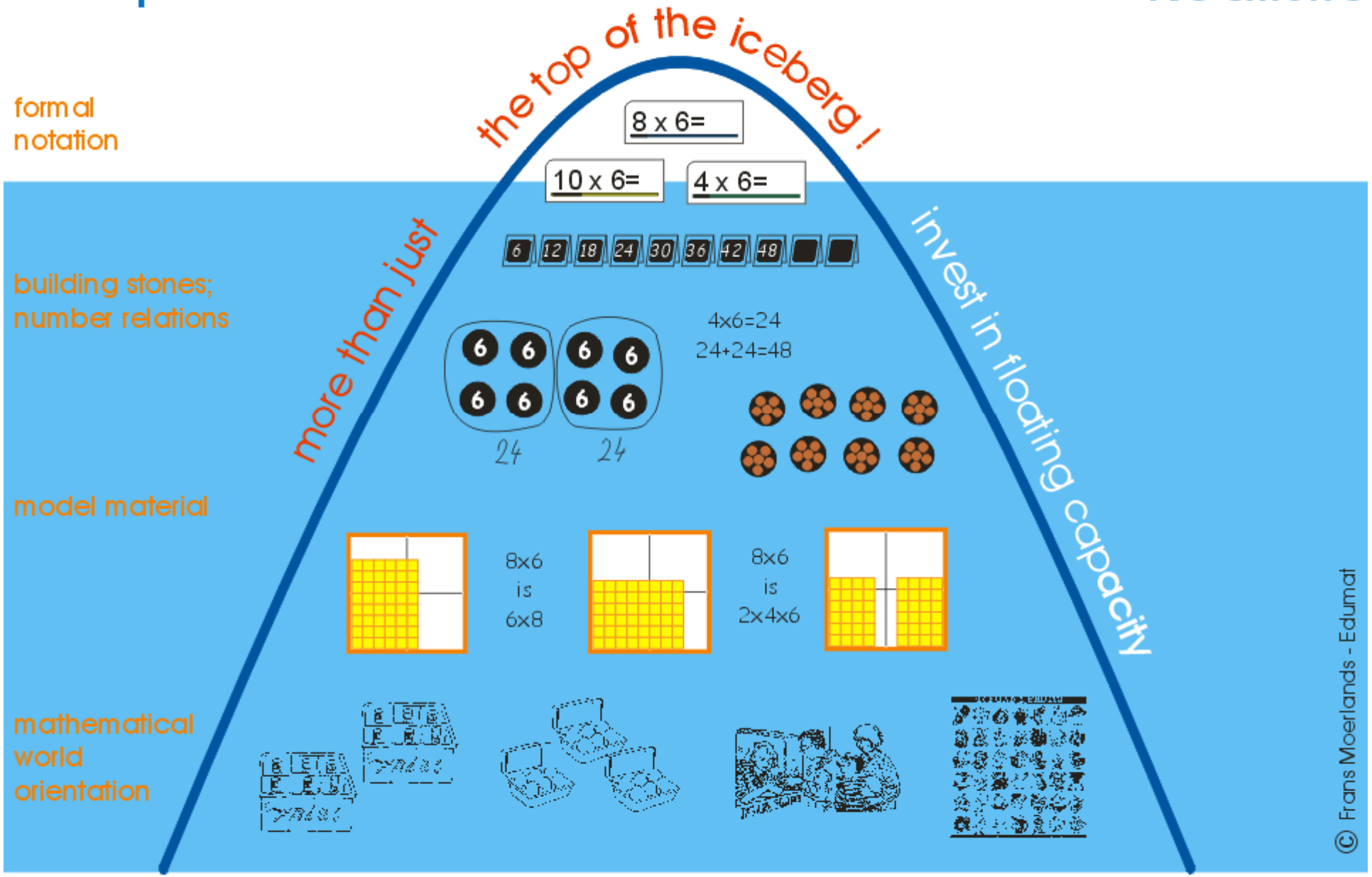
Conclusions

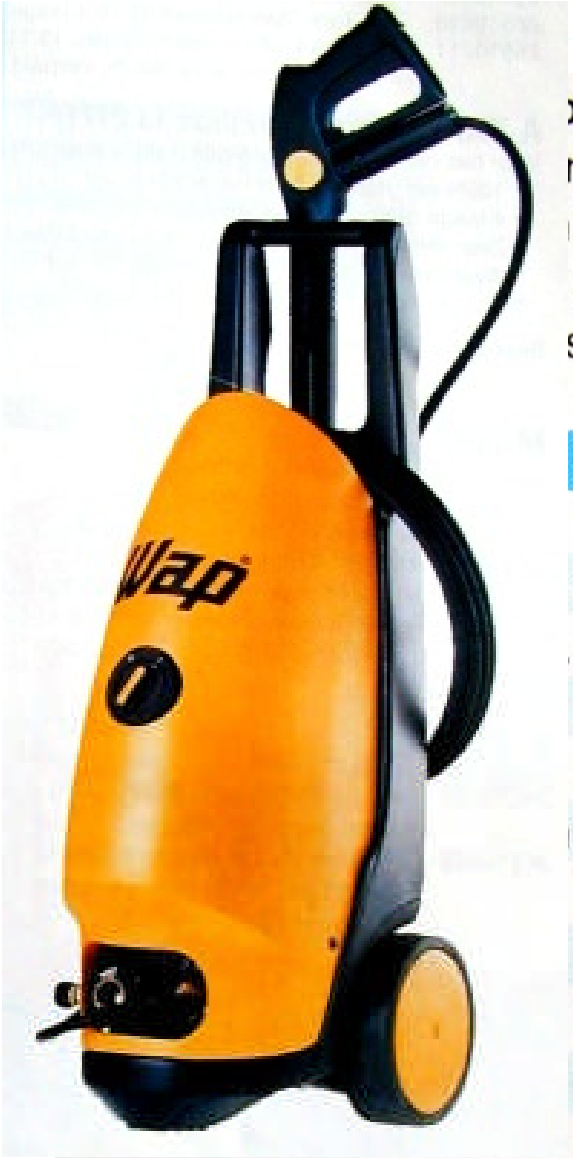
- Students have competences in a large number of areas that we can categorize as numerical or spatial competences and if-then reasoning.
- Students can reason well if they are working in the situation or if they literally have the product in hand.
- Gestures and physical visualizations are important components in the students' numeracy repertoire.



Multiplication

Realistic





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Goals of Mathematics Education

- Introduction to a deductive and abstract system
- System of tools, applications, models
- Coping autonomously and adequately with the quantitative side of the world around us.

Types of problems

- Mathematical problems
- “Hidden Mathematics” problems
- Contextual problems
- Numeracy problems

Criteria Numeracy problems

- It is **N**umeracy when …..
- ….. **I**maginable questions
- **C**onnected with the real world, but ..
- ….with a **M**inimum of language and a **M**aximum of images.

How many chicken are there in the shed?

How many chicken are there in the picture?

How many chicken are there in the picture?

Interested?

To obtain the files from the hand outs or the articles, please send an e-mail to

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Or visit the website

www.gecijferdheid.nl

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www.mathematical-literacy.eu