

Multimedia “Just in time” Numeracy Toolkit



Crossing borders of personal countries

- Head of Knowledge Centre of APS, largest Dutch school improvement institute.
- International consultant on (mathematics) implementation projects
- Designer of education(al settings) => always connecting to the primary processes of (mathematics) education.



Fascination

■ How do people cope with the quantitative aspects of the world around us?

OR

■ How do people cope quantitatively with aspects of the world around us?



School for the Future

About School for the Future

Vision/Philosophy

Co-operations

Meetings

Contact

Zoek

Go!

Nederlandse versie

Blended Learning

School for the Future stands for creative thinking and blended learning: learning by means of the computer in combination with more traditional ways of learning. The courses are arranged in four categories: e-learning, new media tools, creativity and competences.

Research and Development

Center for Teaching and Learning

International Business Studies

Center for Jobtraining

Seminars / Thematical meetings

Masterclasses / Workshops

Courses Trainings

Virtual Library

Blended Learning

Creative Thinking



School for the Future for a solid future

's-Hertogenbosch, the Netherlands



School situation:

Regional Education Centres (20,000 students)

Koning Willem 1 College

School for the future

Target group:

16-19 Vocational Education

Basic stream

Competency based curriculum.

XXX

They wanted advice:

We have a problem.

Students lack skills in basic arithmetic operations
skills: multiplication division, fractions, et cetera
and they lack skills in doing arithmetic with basic
mathematics concepts: area, volume,





School for the Future®

The educational renaissance of the 21st century will be built on two pillars: creativity and technology. For some time now education has no longer been just a question of knowledge transfer and one-sided attention to logical and analytical thought processes. Today, education is recognised as a process that involves emotions, interaction between the senses, behavioural changes, and creative thought processes. For the development of this 'new education', **Koning Willem I College** has set up a separate organization - School for the Future. Here high-quality technology and purposeful creativity form the basis for trail-blazing learning processes.



Their solution:

Assess all the students with computer graded test items.

Chart for every individual student the deficiencies.

Remediate the deficiencies with made to measure computer computerized exercises in a maximum of a 40 hours module.





My analysis:

This kind of solutions are rather useless.
It could well be quite a waste of time and money to design it.

It would be for the 5th time in their educational career that they undergo the same procedure, with hardly any transfer at all.

My advice:

Take a completely other approach that is more consistent with your educational vision and more consistent with the students characteristics.



Een gecijferheid benadering

A numeracy approach

- Always look through a “world around you” lens
- Use research results
- Take in account the characteristics of these students
- Use a consistent metaphor in designing:
 - Iceberg metaphor





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)





Multiplication

Realistic

formal notation

building stones;
number relations

model material

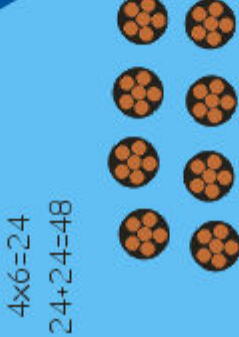
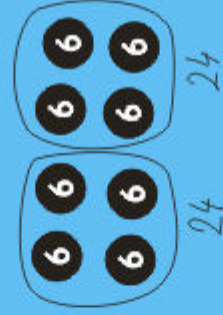
mathematical
world
orientation

the top of the iceberg!

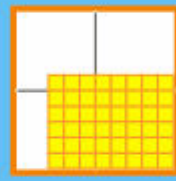
$$8 \times 6 =$$

$$4 \times 6 =$$

$$10 \times 6 =$$



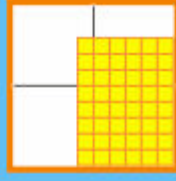
invest in floating capacity



$$8 \times 6$$

is

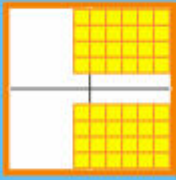
$$6 \times 8$$



$$8 \times 6$$

is

$$2 \times 4 \times 6$$



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)



Numeracy

- **Work definition:**
“Numerical competency is the intertwined knowledge, skills and dispositions (attitudes) necessary to adequately and autonomously cope with the quantitative aspects of the world around us.”



Results from earlier research

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

- Window
- Flowerbed 0: Outside
- Flower bed 1: Ik ben niet zo'n rekenaar
- Flower bed 2: Haakse hoek
- Garbage bin



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

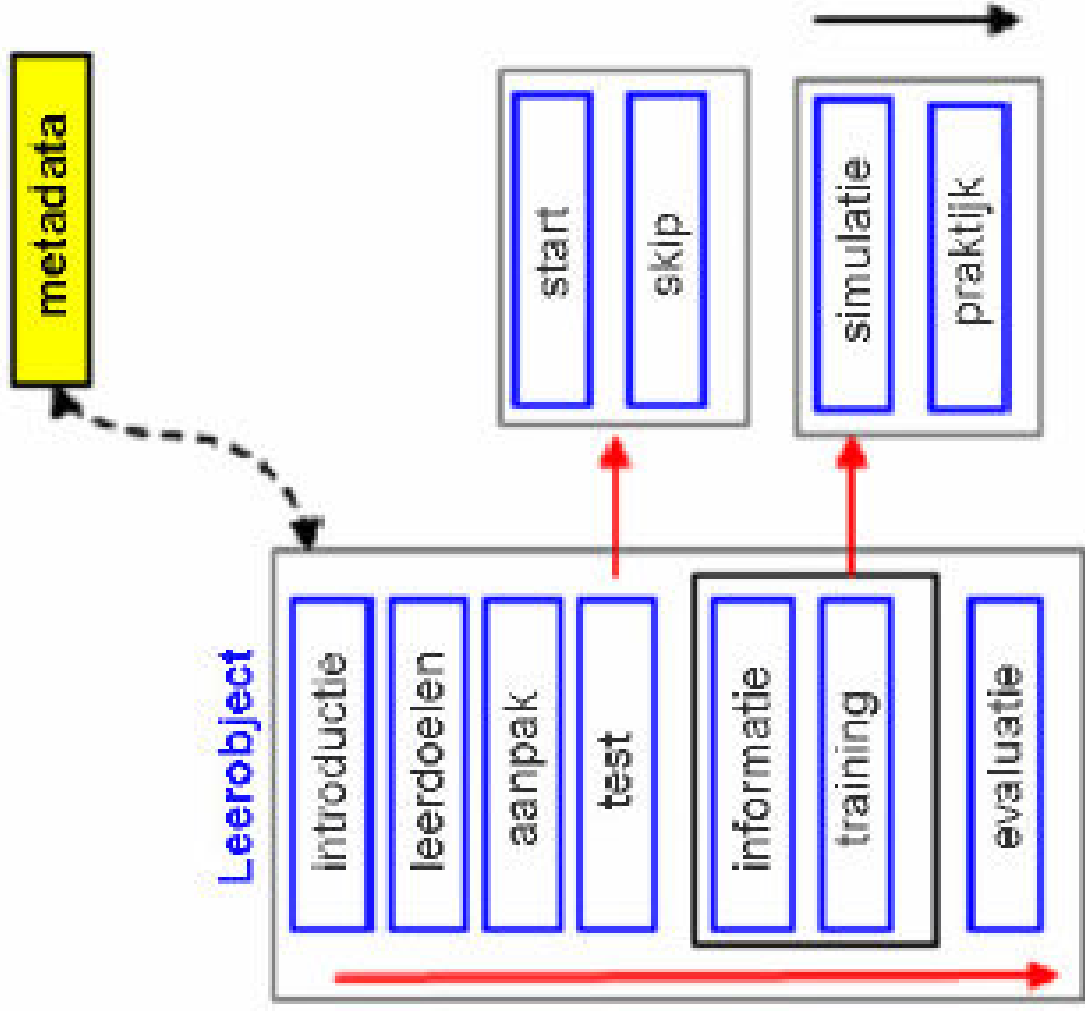
- Students have competences in a large number of areas that we can categorize as numerical or spatial competences and if-then reasoning.
- Students can reason well if they are working in the situation or if they literally have the product in hand.
- **Gestures** and physical visualizations are important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



Under construction

- J4 learning objects
 - Video's and pictures
 - Feedback in Iceberg models
 - Basic conceptual mathematical thinking (as opposite to focused on operations)
 - Counting \Rightarrow estimations \Rightarrow operations





Tot volledige beheersing
van kennis en vaardigheden

De leerfasen in een J4-Leerobject



Informatie

Hotelschool à la Carte

Hygiëne



Veelke micro-organismen leefden bij de bereiding van kaas, kaaswieg en ploggen



Net zoals wij hebben MO's voedsel nodig om te leven. Ook scheiden ze stoffen uit die ze niet meer nodig hebben. Soms maken we daar handig gebruik van bij het maken van karnemelk of schuimkaas.

Bepaalde MO's scheiden tominen, giftige stoffen, uit. Deze tominen, maar ook de MO zelf, kunnen ernstige ziekten veroorzaken die doodlijk kunnen aflopen.



Besmette structuurwieg, kaaswieg en ploggen

MO's zijn in de natuur heel belangrijk omdat ze er voor zorgen dat alle levende organismen vergaan tot stof. Hoe zou de wereld eruit zien als dode planten en dieren niet zouden vergaan?

Micro-organismen

- Orientation
- Leerdelen
- Aangepast
- Start-test
- Spel-lijst
- Informatie
- Training
- Evaluatie

- Help
- Encyclopedie
- Contact

An example: Area

- **Basic concept:**
 - **Covering with a chosen unit**

■ **Images:**

■ ..

■ ..

■ ..



Integrating numeracy and vocational

- **It is almost impossible to integrate the mathematics courses and the vocational courses if they are separated in place and time. It is hard to integrate that what is not there.**
- **Do not work on integration, but work on an integral approach (start with the tasks and not with the curricula).**



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

or

www.mathematical-literacy.eu

