



C	E
N	F

Common European Numeracy Framework Implications for Policy

EBSN annual conference 2021

Numeracy is a human activity
Numeracy is functional and highly practical

Kees Hoogland (HU); 27th October 2021



Key message of this short presentation

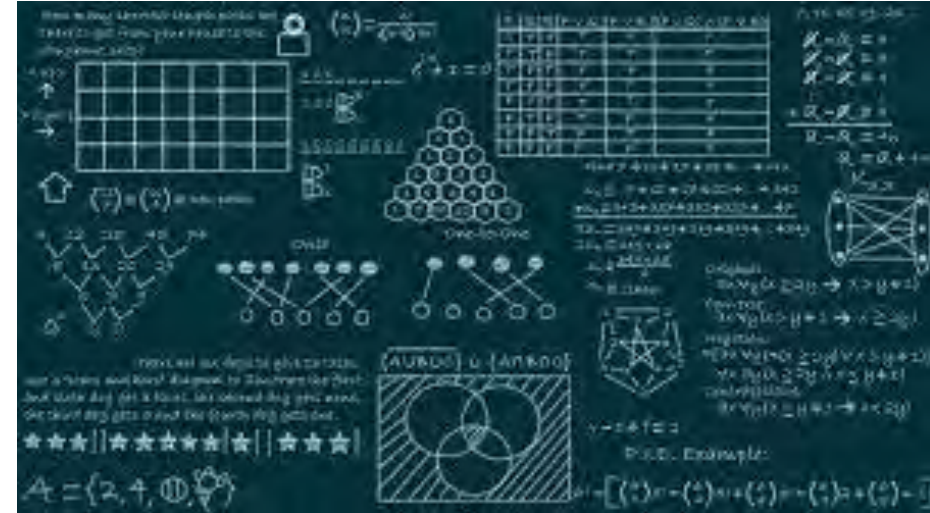
- Numeracy, Literacy and Digital Competences are crucial and connected basic skills for individuals coping with the digitalised and technologised 21st-century society.
- This is true if and only if N., L, and DC are defined and implemented as multifaceted, social and 'holistic' concepts which are intertwined, and integrated in human behaviour.
- This means that numeracy in the major policies of almost all European countries must be upgraded

The Mathematisation of Society

Situations



	Renogy Wanderer 30A Li PWM Charge Controller	Renogy Rover 20A Li MPPT Charge Controller	Renogy Rover 40A Li MPPT Charge Controller
Battery Type	Sealed, gel, flooded, and lithium	Sealed, gel, flooded, and lithium	Sealed, gel, flooded, and lithium
Charge Stage	4	4	4
LCD Display	-	✓	✓
Grounding Type	Negative	Negative	Negative
Nominal system voltage	12 VDC	12V/24V DC	12V/24V DC
System Capacity	400W	200W (12 Volt) / 400W (24 Volt)	400W (12 Volt) / 800W (24 Volt)
Bluetooth Module Compatible	✓	✓	✓
Dimensions	6.5 x 4.3 x 1.8 in.	5.9 x 8.3 x 2.3 in.	6.8 x 9.4 x 2.8 in.



Microsoft Excel - Book1

File Edit View Insert Format Tools Data Window Help Adobe PDF

A1 Expense

	A	B	C	D	E
1	Expense	Jan	Feb	Mar	
2	Phone	\$45.65	\$56.83	\$42.58	
3	Insurance	\$75.80	\$75.80	\$75.80	
4	Rent	\$750.00	\$750.00	\$750.00	
5	Totals	\$871.45	\$882.63	\$868.38	
6					

Sheet1 Sheet2 Sheet3

Wallpaper Calculator

Wall width (m)

Wall height (m)

Wallpaper width (cm)

Roll length (m)

Pattern Repeat (cm)



The Mathematisation of Society

Individuals acting in numeracy/mathematical situations



Mathematisation of Society - minidoc as part of Inaugural Lecture
Kees Hoogland (2nd June 2021)

Numeracy • 10 weergaven • 1 week geleden

Mathematisation of Society - minidoc as part of Inaugural Lecture Kees Hoogland (2nd June, 2021)

Producer: Marleen Stoker at Mokermedia marleenstoker.com

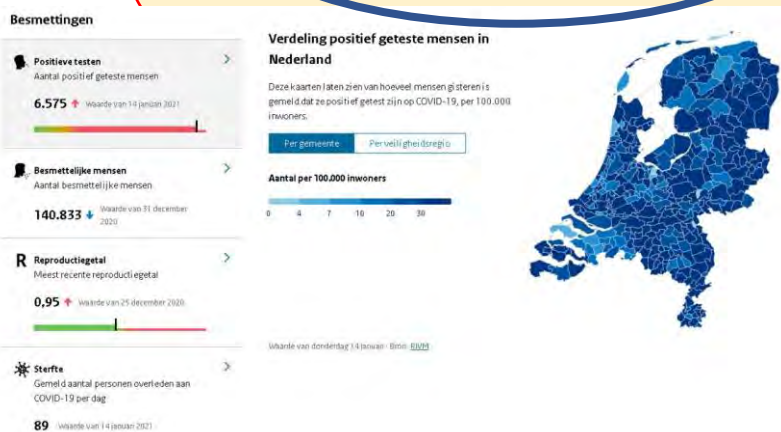
Three essential basic skills to participate in the 21st century

Digital competences

calculations
Numeracy

language

Literacy



Three perspectives to look at basic competences to participate in the 21st century

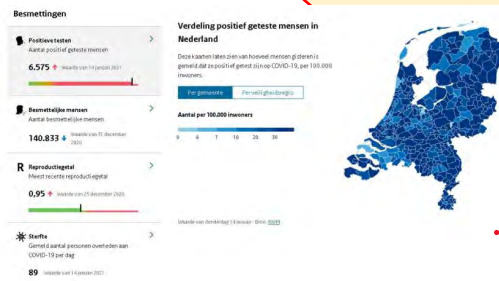
Themes

The world

Digital competences

Numeracy

Literacy

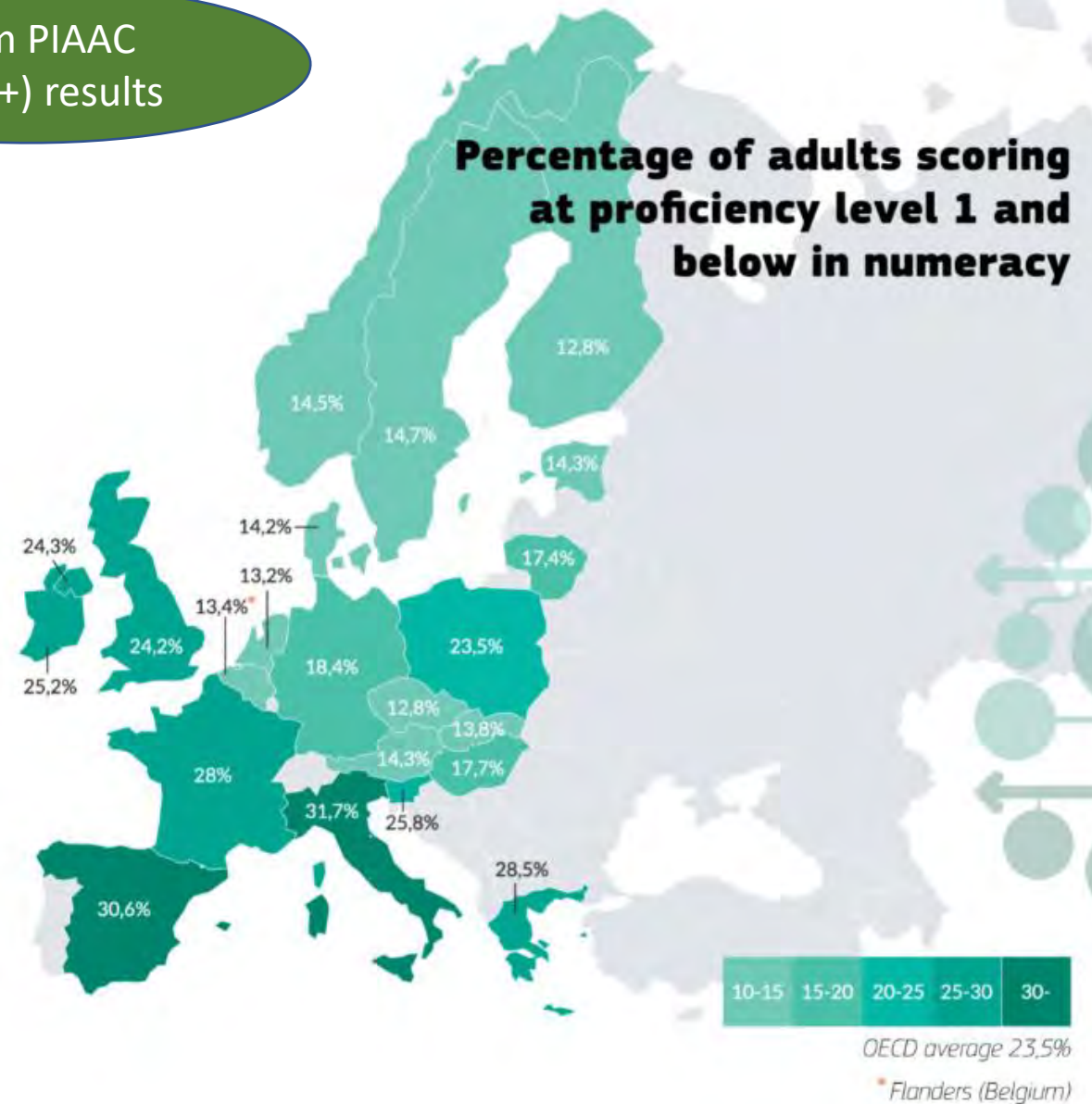


Serious challenges

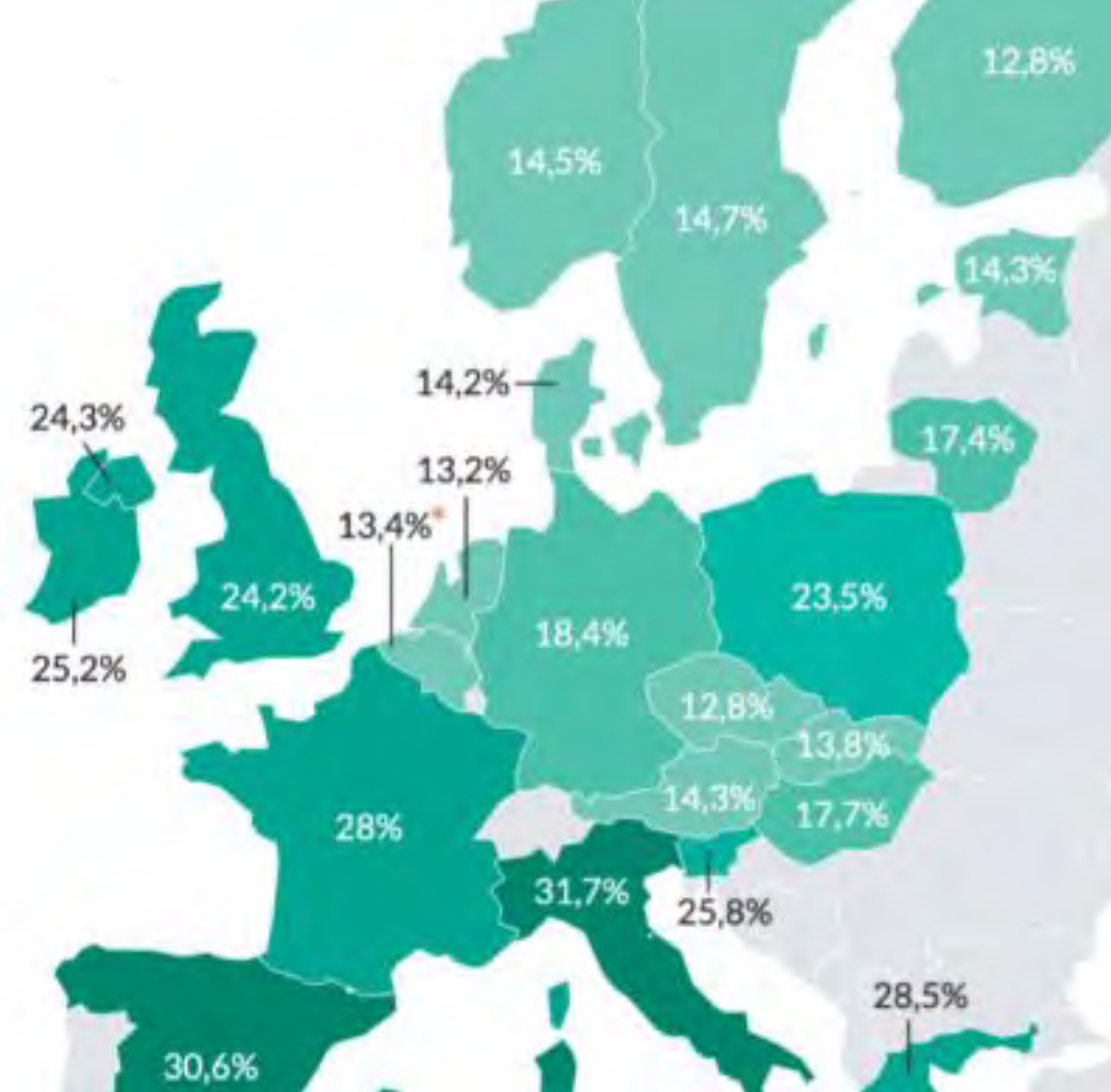
From PIAAC
(2012+) results

Too many European citizens lack the necessary numeracy competencies to participate autonomously and effectively in our technologized and number-drenched society.....

- and consequently many citizens are overlooked for certain jobs and have problems in their daily life, dealing with the abundance of number-related issues (OECD, UNESCO, EU)
- Awareness of the importance of numeracy for personal empowerment and becoming a critical citizen.

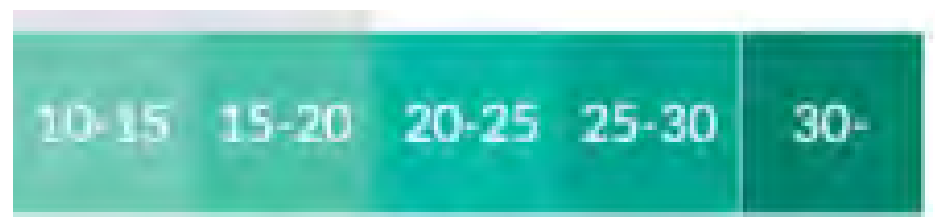


Source: Survey of Adult Skills (PIAAC) (2012, 2015, 2018) as indicated in Table A2.3 in Skills Matter Additional results from the survey of Adult skills (Annex A) – OECD 2019.



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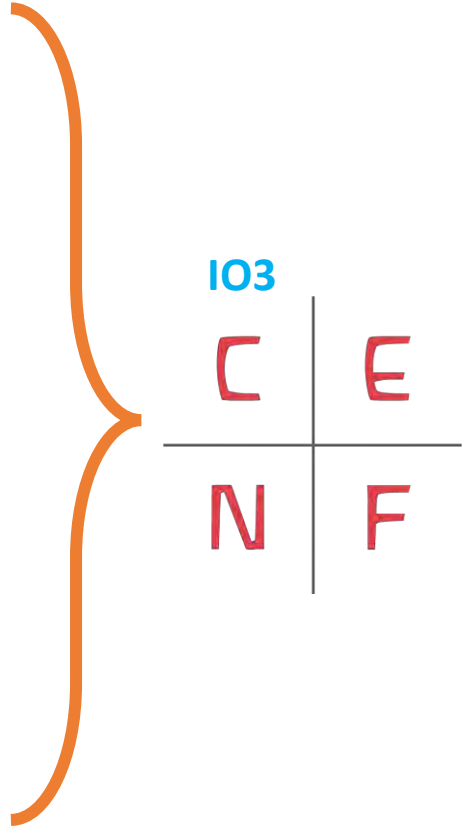
Percentage of adults scoring at proficiency level 1 and below in numeracy



OECD average 23,5%

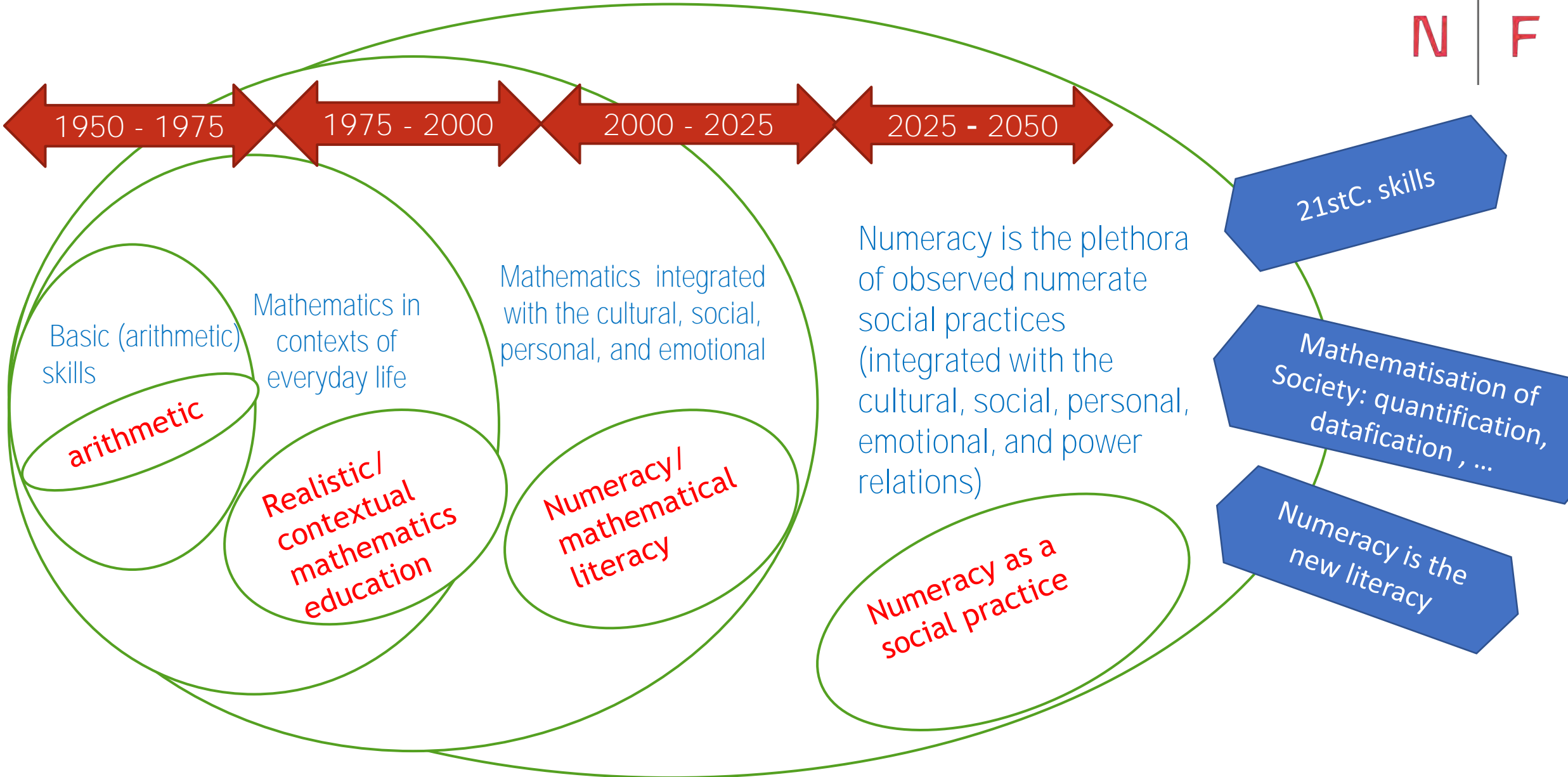
Developing the CENF in Erasmus+

- Policy input
 - The **2019 European Numeracy Survey** across Europe (UL, Ireland) ^{IO2/4}
 - Personal en professional networks around adult numeracy education
- Theoretical input
 - **Systematic Literature Review** on Numeracy (UB, Spain) ^{IO1}
 - Existing supranational frameworks
 - PIAAC (1st and 2nd cycle), PISA, IALS, ALL
 - Principles and Standards (NCTM, USA)
 - ACARA, Australia
- Empirical Input
 - **Professional development modules and trials** (BFI, Austria) ^{IO5/6}



Numeracy conceptual development

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Numeracy as social practice (NSP)

“... **aggregate** of skills, knowledge, beliefs, dispositions, habits of mind, communication capabilities, and problem-solving skills that individuals need in order to **autonomously engage and effectively manage** numeracy situations that involve numbers, quantitative or quantifiable information, or visual or textual information that is based on mathematical ideas or has embedded mathematical elements”. (See Gall, 2000, p.6)

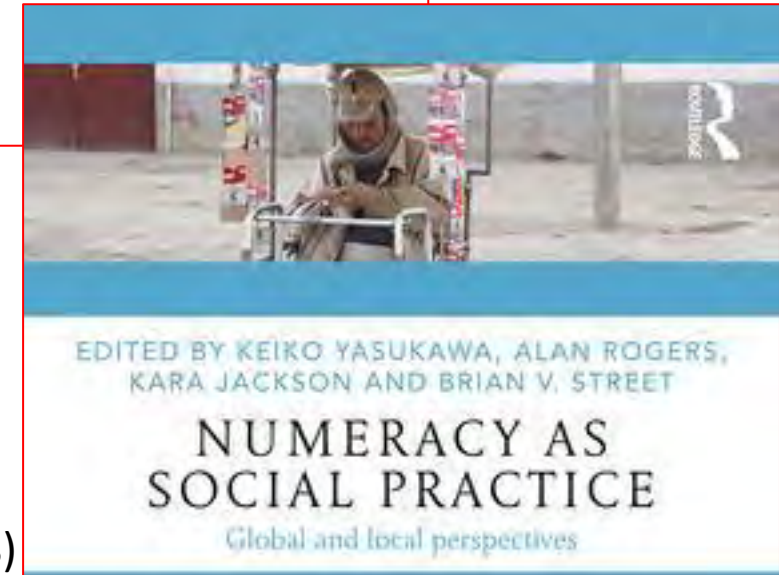
The framework acknowledges the great efforts from the past:
ALL, IALS, PIAAC, ACER, ..., ..., ...
It will be developed further by many.

Conceptually inspired by:

- Situated cognition
- Cultural-historical activity theory (CHAT)
- Literacy as social practice (LSP)
- Ethnomathematics

“A **social practice view of numeracy** not only takes into account the different contexts in which numeracy is practised, such as school, college, work and home, but also how people’s life and histories, goals, values and attitudes will influence the way they carry out numeracy”.

(See Oughton, 2013)



(See Yasukawa et al., 2018)

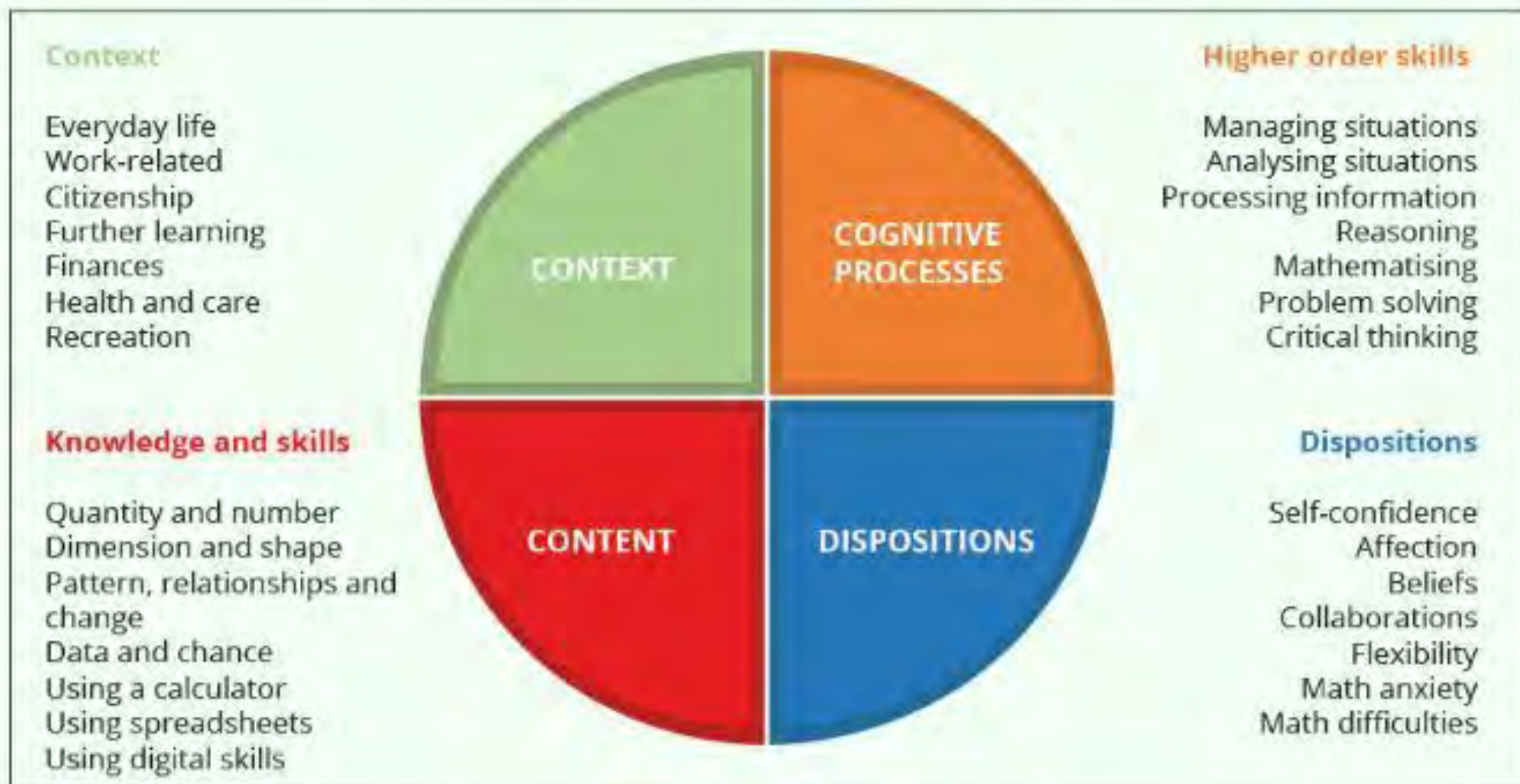
Design principles for a numeracy framework

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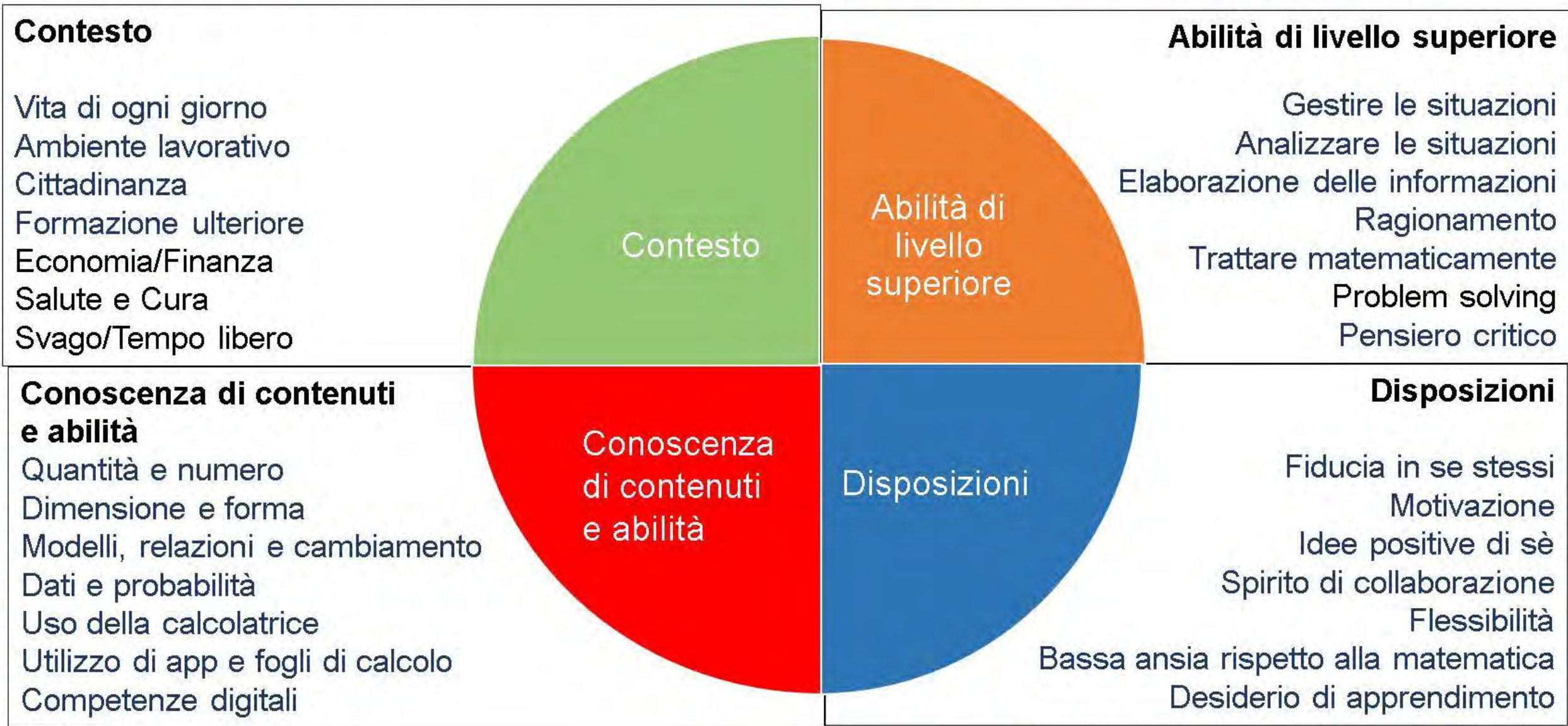
- **Many aspects , multifaceted, multidimensional**
 - Implies using cognitive and psychological **aspects**
 - Implies individuals have specific multidimensional profiles
 - implies describing behaviour in a “valued system”
- **Levels** ←
 - to define progress as a result of educational interventions
 - to categorise job requirements
 - to categorise assessment items
 - to connect to (psychological) scales
 -



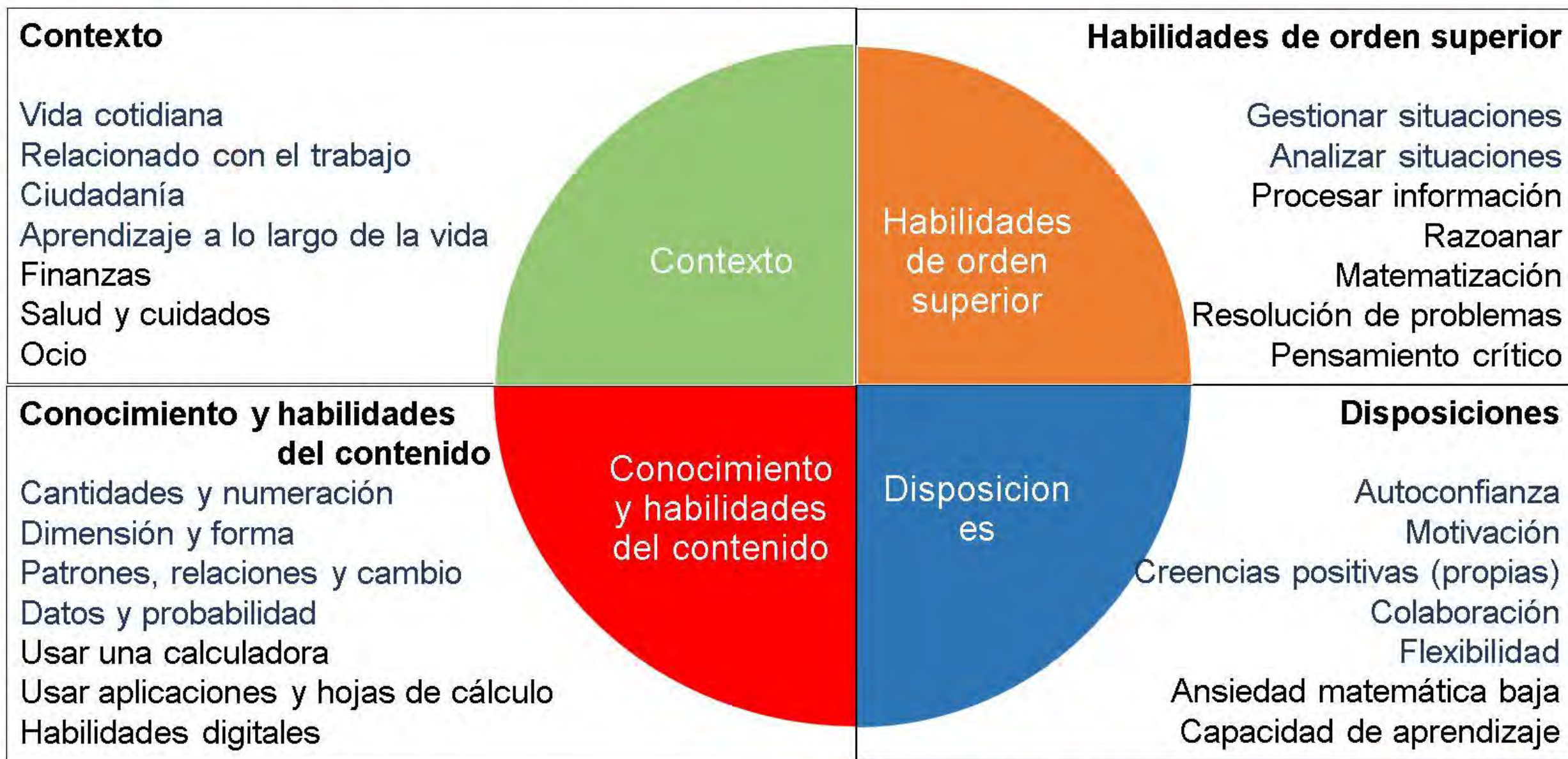
What matters to improve numerate behavior



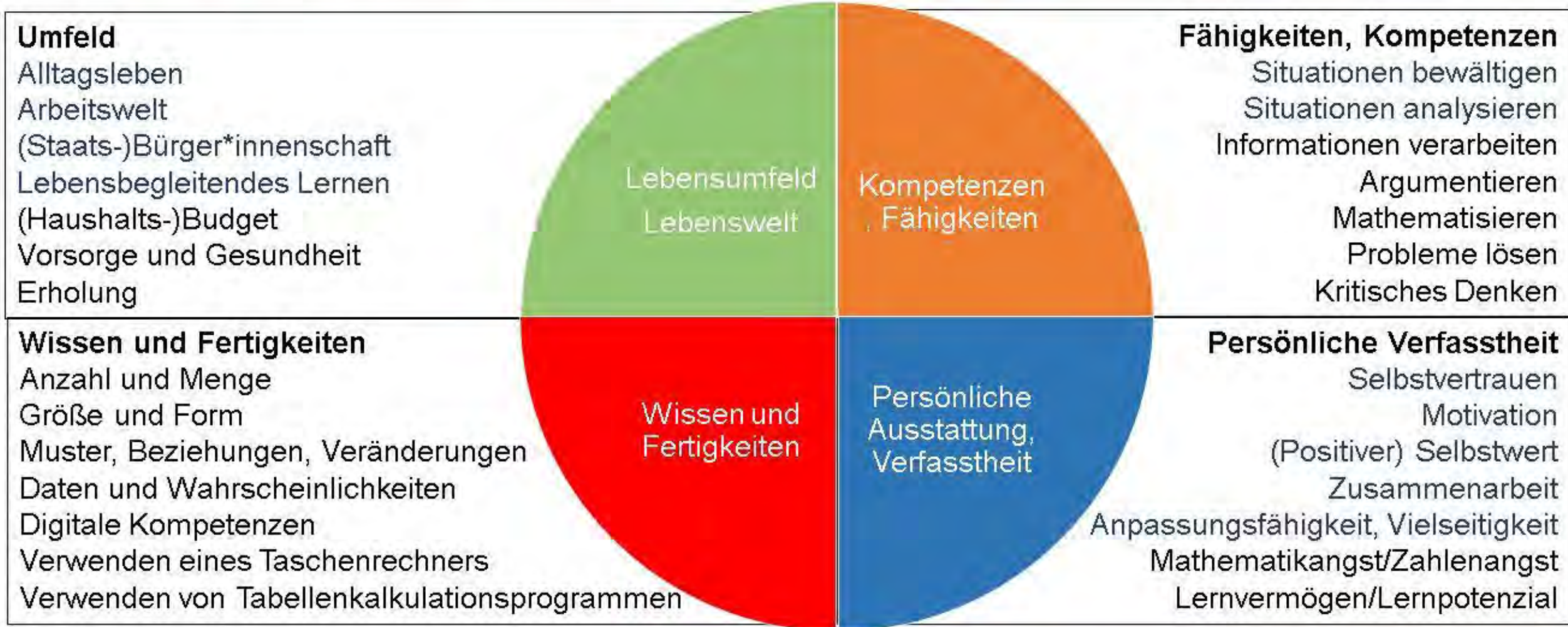
Quali aspetti favoriscono la pratica del contare



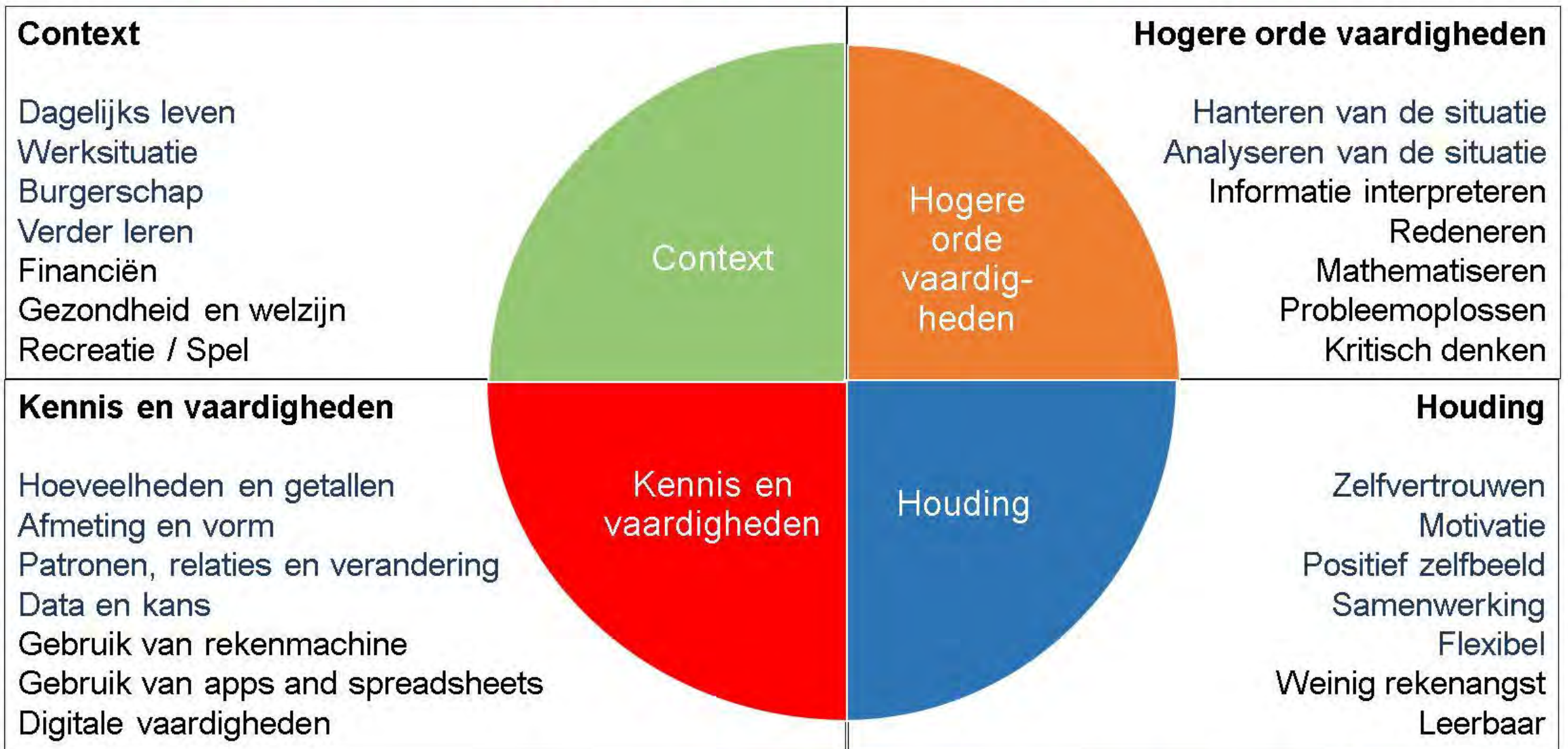
¿Qué es lo que importa para mejorar el comportamiento numérico?



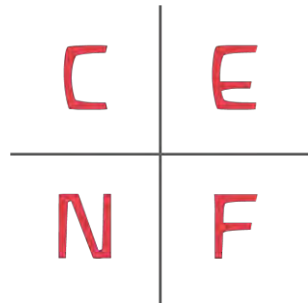
Worauf es ankommt, den Umgang mit zahlenbezogenen Sachverhalten zu verbessern



Factoren die gecijferd gedrag verbeteren



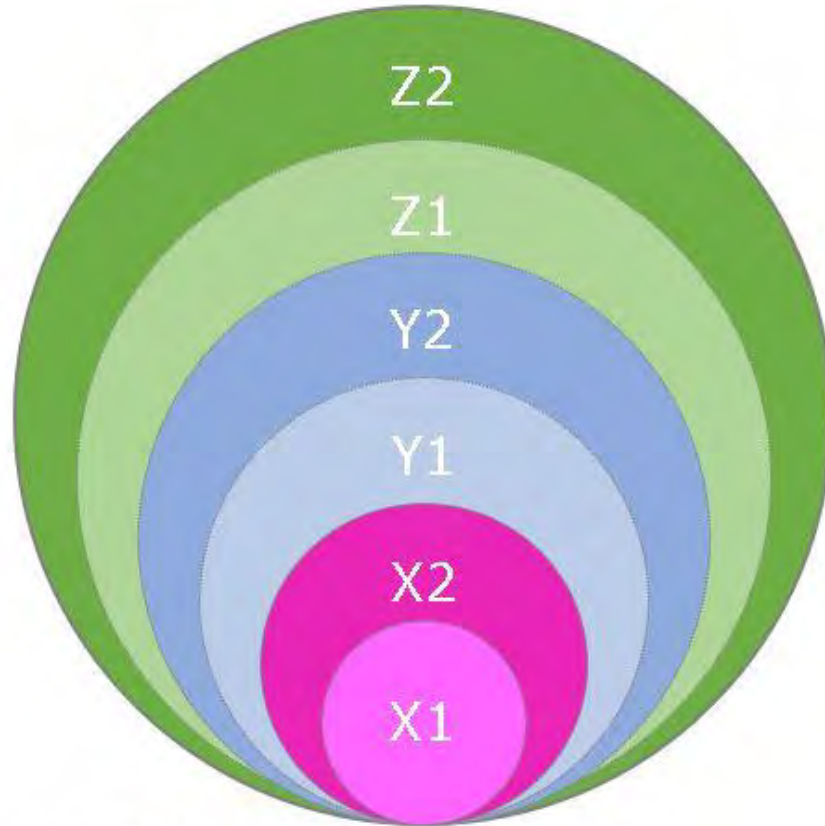
CENF - Overall levels (= categories \neq thresholds)



Z
Specialized
societal and
work situations

Y
Societal and
regular work
situations

X
Daily-life
situations



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- Z2** ... Manage situations which require integrating multiple types of mathematical information where considerable translation or interpretation is required to come to decisions, draw inferences, and develop or work with mathematical arguments or models.
... Understand and use complex representations and abstract and form mathematical and statistical ideas, possibly embedded in applications, tools and texts.
... Justify, evaluate, and critically reflect upon problem assumptions, solutions, and choices
... Use sophisticated statistical and mathematical software in complex professional situations
- Z1** ... Manage situations which require analysis and more complex reasoning about quantities and data; statistic and chance; spatial relationship; and change, proportions, and formulas
... Understand and use a broad range of mathematical information that maybe complex, abstract, or embedded in unfamiliar contexts. These tasks involve undertaking multiple steps and choosing relevant problem -solving strategies and processes
... Communicate arguments and well-reasoned explanations for answers or choices.
... Use standard statistical and mathematical applications for all kind of work situations.
- Y2** ... Manage situations which require several steps to interpret the situation and involves the choice of problem -solving strategies and relevant processes, such as the application of number sense and spatial sense; recognizing and working with mathematical relationships, patterns, and proportions expressed in verbal or numerical form.
... Identify and act on mathematical information that maybe less explicit, embedded in familiar and unfamiliar contexts, tools and applications and use them to decide and actively communicate.
... Use various applications for work, householding, and leisure
- Y1** ... Manage situations which require the application of two or more steps or processes involving calculation with whole numbers and common decimals, percentages, and fractions; simple measurement and spatial representation; estimation.
... Identify and act on mathematical information and ideas embedded in a range of familiar contexts, tools, and applications consisting of relatively simple data and statistics in texts, tables and graphs and use them to decide and further communicate.
... Use some standard applications for work, householding, and leisure
- X2** ... Manage everyday life situations which require one-stop or simple processes involving counting, sorting, performing basic arithmetic operations required to decide and further communicate.
... Interpret elements of simple or common numerical, graphical, or spatial representations and use them to decide and further communicate.
... Use familiar and common digital devices, like mobile phones and some default applications.
- X1** ... Manage concrete, familiar situations where the mathematical problem is explicit with little or no processes required to decide.
... Interpret elements or simple numerical representations and use the to decide.
... Perform processes involving either counting, sorting, and basic arithmetic operations with whole numbers or money
... Use some digital devices occasionally

www.cenf.eu

Professional development modules

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+ Challenges of the 21st century

+ Aspects of Numeracy

+ Prior knowledge (Teachers and Participants)

+ Modeling problems in everyday life

+ Analysing situations

+ Managing situations

+ Reasoning

+ Problem Solving

+ Further Learning

+ Motivation and affection

+ Math anxiety

+ Vulnerable groups

Set up:

- Introduction
- Relation to CENF
- Key issues
- Suggestion for PDM meetings
- Self study
- Resources
- Literature / References

Can be
used as a
MOOC (?)

Common European Numeracy Framework

This is an Erasmus+ project

In the Erasmus+ project Common European Numeracy Framework (CENF) a comprehensive numeracy framework was developed to identify key factors in improving the quality of numerate behaviour of individuals. HU University of Applied Sciences Utrecht, The Netherlands, is in charge of the project and works closely together with project partners BFI-OÖ, Linz, Austria, University of Barcelona, Spain, and University of Limerick, Ireland. A first draft of the framework will be published in November 2021. In follow-up projects the framework can be elaborated and validated through activities in the (internatiuonal) practice of numeracy education of adults.

- Introduction
- Rationale
- Project outputs

Under construction

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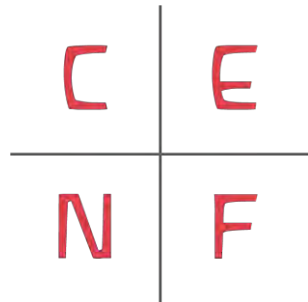
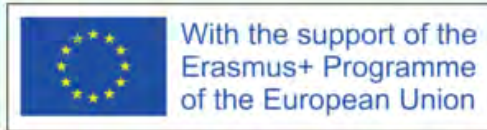
Project Partners

HU University of Applied Sciences Utrecht, The Netherlands

BFI-OÖ, Linz, Austria

University of Barcelona, Spain

University of Limerick, Ireland



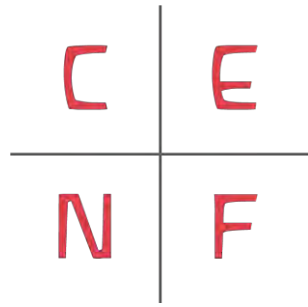
Sneak preview

Under construction

Delivery date:
November 2021

- [Link to the website](#)

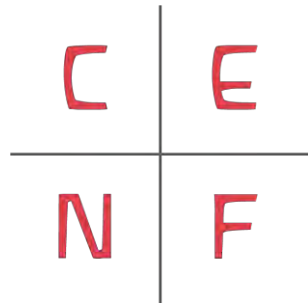
Common European Numeracy Framework



- Erasmus+ project 1 CENF
 - running from December 2018 - November 2021
 - 4 countries + networks e.g., ALM and EBSN
 - Developing a framework and professional development modules (PDM)
- Erasmus+ project 2 Numeracy in Practice NiP (**granted!**)
 - running from January 2022 – December 2024
 - 11 countries + networks e.g., ALM, EBSN, ...
 - Upscaling provisions and professional development
 - Working on awareness and critical mass



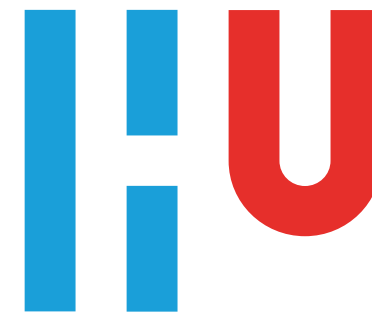
Call for action, looking for partners



- A. to work on **awareness** of the important role **numeracy** plays for the inclusion and wellbeing of European citizens by outreach activities using the CENF.
- B. to **enhance the quality and quantity of adult numeracy education** (in formal and informal settings) by using and piloting the CENF and the accompanying professional development modules.
- C. to further **validate** and **enhance** the Common European Numeracy Framework (CENF).

For information, collaboration, and
comments, please contact Kees Hoogland

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<https://www.gecijferdheid.nl/kees-hoogland-appointed-professor-of-mathematical-and-analytical-competences-of-professionals/?lang=en>

- Programme manager of Erasmus+ project: Common European Numeracy Framework
- Member of the OECD - Numeracy Expert Group - PIAAC 2nd cycle
- Trustee of Adults Learning Mathematics – A research Forum
- Fellow of the International Society for Design and Development in Education
- Chair of the Thematic Working Group - Adult Mathematics Education - at CERME 12 (Bolzano, Italy, 2-6 February 2022)

Just published:

- ALM: key-note <https://www.gecijferdheid.nl/adult-numeracy-practices-imperative-implications-for-education/>
- Springer: National Reflections on the Netherlands Didactics of Mathematics: <https://link.springer.com/book/10.1007/978-3-030-33824-4>
- ZDM: "Computer-based assessment of mathematics into the twenty-first century: pressures and tensions" <https://rdcu.be/Oz4e>



Mathematisation of Society - minidoc as part of Inaugural Lecture Kees Hoogland (2nd June 2021)

Numeracy • 10 weergaven • 1 week geleden

Mathematisation of Society - minidoc as part of Inaugural Lecture Kees Hoogland (2nd June, 2021)

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