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3 Numeracy
in Practice

Teaching and
learning material



USER'S GUIDE
TEACHER'S GUIDE



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Hi! Let me guide you!

You have already gone through some examples and need further information on how to implement them in your teaching?

You want to meet your adult learners' concrete needs and now you look for some inspiration for your classes?

Or maybe you are just curious about the *Numeracy in practice* concept and want to know about the basics?

 Click the appropriate button below or read the whole text.

 Check the NIP platform: <https://husite.nl/cenf/>

I want to take
action. Give me
some inspiration
for my classes!

ACTION

I want to benefit
from the concept.
Give me the
basics!

BASICS

I feel inspired by
the examples. Give
me some further
information!

INSIGHTS

Part 1: ACTION



80 MATERIALS

You can find 80 inspiring examples for teaching and learning situations on our website.

All 80 examples can be found in English, some have been translated to different languages. The translations can be found in the respective language sections.



8 UMBRELLA TOPICS

The 80 examples are organised in different umbrella topics that we estimate relevant for adult learners, e.g.:

“Enjoy eating and drinking with numeracy”
“Stay safe and healthy with numeracy”
“Numeracy within my family”
“Be green with numeracy”.

1 SOLUTION?

A numeracy situation or problem never offers only one possible solution or consideration.

Thus, the umbrella topics only serve as a kind of thematic guidance and the individual learning materials are not “ready to print and use” for all learners or situations.

∞ POSSIBILITIES

The exemplary material provided is just a starting point: feel free to use, adapt und think further.

For more ideas you just need to go through the streets and your life with numeracy eyes, take photos of numeracy all around and listen to adult learners.



The best way of teaching adults is:

Don't start teaching

Start with posing a „problem“ in a real context

*Ask questions to analyze
and give meaning to the math in the problem*

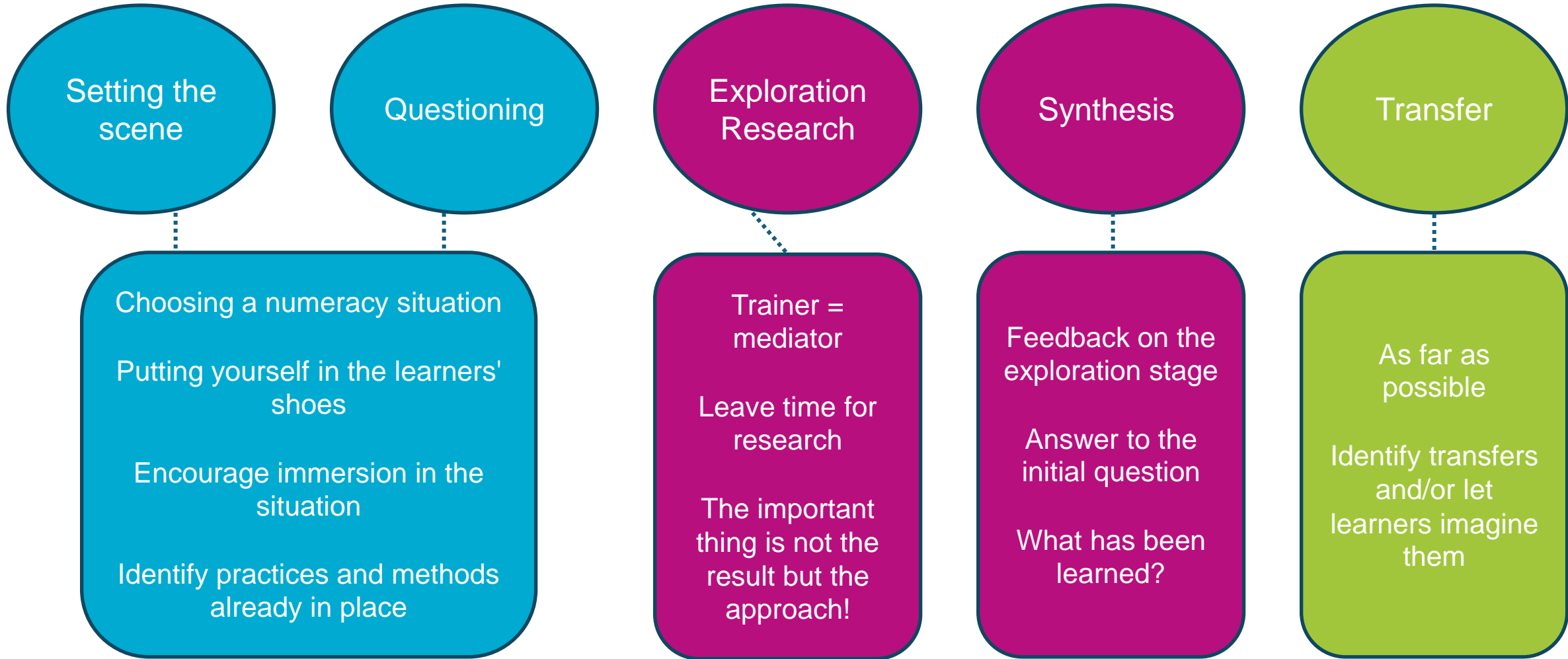
*Challenge the participants to discuss,
collaborate and solve the problem*

Discuss the math in it

Evaluate the process



Source: Hoogland, Kees / Van Groenestijn (Ed.) (2021): Common European Numeracy Framework. Aspects and Levels. Available online: [2021_11_30_CENF_Aspects_and_Levels_IO3_.pdf \(europa.eu\)](https://www.europa.eu/eu-press/infographic/2021-11-30-CENF-Aspects-and-Levels-IO3.pdf) [20.06.2024]



Navigating the exemplary material – Structure of an example

Each material follows a certain structure:

1. **Numeric situation** and overview
2. **Main information** that summarizes the most important details of the overview (1) and the working plan (3)
3. **Working plan** suggesting concrete learning activities and materials
4. **Suggestions for the teacher**, in addition to the basic information here in the user's guide
5. **Appendix** with concrete or inspirational resources (videos, diagrams, articles, pictures, worksheets) corresponding to the working plan

Numeracy in practice
teaching and learning examples

CLEANING IS DANGEROUS!
Be aware of household accidents.

Homes are among the most dangerous places to be. Statistically, it is more likely to get injured at home than at work. Most accidents happen in our kitchens and in our living rooms while cooking or cleaning. We easily cut ourselves while preparing the meal or burn ourselves while handling with hot oil. And it happens also frequently that people are falling from a ladder while they are cleaning. Just a small moment of inattention or distraction, and the accident happens. Understanding statistics and diagrams on household accidents can help to become aware of the risks.

Overview "CLEANING IS DANGEROUS"

Context: Everyday life, Health and care, Further learning

Cognitive processes: Managing situations, Analysing situations, Critical thinking, Problem solving

Dispositions: Self-confidence, Math anxiety, Math difficulties

Content: Quantity and number, Data and change, Charts / Diagrams, Percentage

Target group (incl. necessary prior skills and competences): Adults (familiar with numbers up to 100 and basic information on percentages), X2

Outcomes and results: Being able to take measures to make my home a safe space.

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1

The description at the top opens the **numeric learning situations**. The **overview** refers to the parameters of the CENF and points out the main working question.

Numeracy in practice
teaching and learning examples

Main information

Content	Statistics Charts / Diagrams
Target group	Adults and young adults, learners who... <ul style="list-style-type: none"> Cope with one-step, simple operations such as counting, performing basic arithmetic operations to cope with everyday situations; Recognize and understand simple, common quantitative representations and use the information to make decisions
Learning intention	<ul style="list-style-type: none"> Numeracy for personal and private purposes Numeracy to understand society Calculating and minimizing risks in everyday life
Duration	3,5 hours
Material and resources	Videos, diagrams
Group size	Range from 5 to 10 learners
Problem statement	Many accidents occur at home. The most frequent accidents occur due to falls, cuts, burns, poisoning, electrocutions, and fire. Understanding statistics and diagrams on household accidents helps to become aware of the dangers and to minimize the risks in the learner's behavior.
Working questions	<ul style="list-style-type: none"> How to learn and identify risks at home and minimize them How to estimate risks at home and compare them with official statistics. How to work with statistics and diagrams and how to analyze and interpret them on different levels.
Learning outcomes and results	The students are able to gather information from diagrams. They will become more familiar with percentages. They are able to compare and to rank the risks which can occur while doing housework. They reflect their own situation at home and finally, they avoid risky behavior in the future.
Reference to National Qualification Frame	Optional (country's decision)

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The grid with **main information** gives some details on content, target group, problem statement, materials and resources, problem statement, working questions and learning outcomes.

Numeracy in practice
teaching and learning examples

Working plan

Time (lesson)	Description of content/activities	Material	Methodical and didactic information ¹
30'	1. Activation Presentation of the topic in a short video, followed by a discussion with the students about their own experiences.	Video (appendix 1)	Information HIT Cognitive activation Questioning
30'	2. Estimation Learners estimate which are the most frequent household accidents. Based to the learner's estimation, a first statistic is compiled. Working with percentages	Cards (appendix 2) Board If necessary: Montessori material (Flamo) Worksheet (appendix 3)	Teacher assisted group work Hands on learning HITS Differentiated learning
60'	3. Learning different types of diagrams and analysis	Worksheets	HITS Explicit teaching Worked examples
60'+	4. Analysis and presentation Learners discuss in groups of two persons a diagram and present the result in plenary. They analyse, compare and rank the risks using diagrams and statistics.	Diagrams (appendix 4-6)	HITS Collaborative learning Differentiated teaching
30'	5. Transfer Reflection and discussion What are the reasons for household accidents (carelessness, haste, inattention, disorder...)? How can I minimize the risks? What are the most important emergency numbers?	Table of emergency numbers (appendix 9)	HITS Questioning Feedback

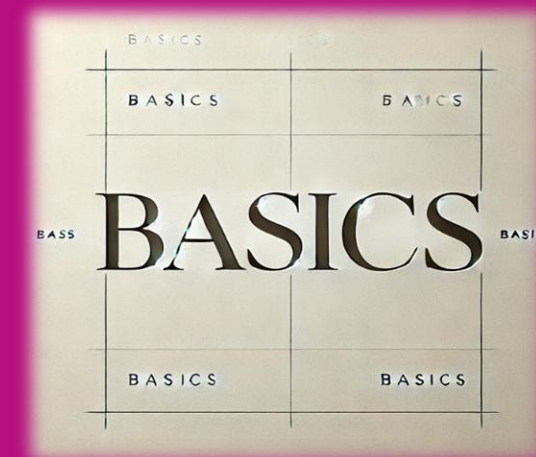
¹ for description and explanation of kinds of tasks, HITS and other background information please consult the teachers' guide

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The **working plan** shows an exemplary lesson structure with different learning activities and phases from activation to transfer. It also mentions possible material and resources to be used.

Part 2: BASICS



SKILLS
FOR
DAILY
LIFE

[... read more](#)

SKILLS
FOR
SOCIAL
SURVIVAL

[... read more](#)

SUSTAINABLE
SKILLS

[... read more](#)



SKILLS FOR DAILY LIFE

Numeracy has a great significance in our **everyday life**. The ability of using mathematics and numbers in our personal and working life is essential each and every day and at all levels and stations of our life. Numeracy helps us to think critically, to bring logic into our life, to succeed with our tasks and to **make decisions**.

There is no hot question or issue in our life that comes and goes without any numeracy aspect. In our examples we have a close look at some very urgent, contemporary, practical, and omnipresent topics we all have to face nearly every day.

Those topics **catch us** when doing our shopping and preparing dinner, when using the bus instead of the car or buying a train ticket, when running five kilometers through the park, when planning our appointments, ...

SKILLS
FOR
SOCIAL
SURVIVAL

SUSTAINABLE
SKILLS



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SKILLS FOR DAILY LIFE

SKILLS FOR SOCIAL SURVIVAL

Too many European citizens lack the necessary numeracy competences to **participate autonomously and effectively** in our technologized and number-drenched society and consequently are overlooked for certain jobs and have problems in their daily life, dealing with the abundance of number-related issues.

Numeracy, literacy and digital skills are the **pillars of basic skills** for adults in the 21st century skills. In dealing with daily life situations, adults use a mixture of these abilities and skills. Numeracy is a social practice and necessary to participate in our digital and numeric world. A **social practice view of numeracy** not only considers the different contexts in which numeracy is practiced, but also how people's lives and histories, goals, values and attitudes will influence the way they carry out numeracy.

SUSTAINABLE SKILLS



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SKILLS
FOR
DAILY
LIFE

... read more

SKILLS
FOR
SOCIAL
SURVIVAL

... read more

SUSTAINABLE SKILLS

Mathematics and numeracy are inherently linked to **real-life contexts** and need to be functional. This principle serves as our didactic and pedagogical foundation when developing, adapting and implementing numeracy teaching and learning materials for the adult learners.

We must know that adults use literacy, numeracy and digital skills to **deal with problems and challenges in everyday life**. By fostering sustainable skills, we ensure that learners can continuously apply, adapt, and refine their knowledge in a wide range of contexts. This sustainable approach not only enhances their confidence but also equips them for long-term success in both **professional and personal realms**, enabling them to navigate an ever-changing world with greater ease and competence.



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NUMERACY
to encourage
adult learners



NUMERACY
for adults
must address adults

OUR NUMERACY
APPROACH



NUMERACY
is
functional




NUMERACY
to involve
adult learners

NUMERACY to encourage adult learners

One important fact to remember is that individual with developing numeracy skills often underestimate and undermine their existing skills and abilities.


Therefore, teaching and learning activities should also aim to help learners recognize their skills and become aware of successful numeracy decisions they already make in their everyday lives, in a private and professional context.

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NUMERACY for adults must address adults

Successful educational numeracy activities for adults can't be found in schoolbooks for kids or in abstract worksheets, but must meet the adults' realities, needs and challenges.


Our teaching and learning activities must therefore be connected to learners' realities, follow a holistic approach (literacy, numeracy and digital skills), aim for an improved numerate behaviour and must therefore be learner-centric.

... go back 

NUMERACY is functional

Numeracy involves the practical application of mathematical skills in everyday life. It must enable individuals to make informed decisions, solve real-world problems, and perform essential tasks.


Thus, we must teach skills for practical use. If they are only learned and practiced, but not applied in real situations, they will fade quickly, and math anxiety will increase. Learning and practice must be followed by a functional use with concrete material in authentic situations such as daily life, vocational situations, or social media.

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NUMERACY to involve adult learners

Adults often struggle with numeracy due to math anxiety, bad experiences during their school careers and a lack of practical application in their daily lives.

We must accompany adults within their numeric worlds by enabling numeracy conversations, counteracting math anxiety, exploring the quantitative world around, working on awareness of successful numeracy behaviour, discussing numeracy themes like health or finances and by supporting a critical and sensible use of tools.

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Part 3: INSIGHTS



Every learner and every teacher have their **specific needs, requirements, dispositions and preferences**. This is what we need to accept and make possible by offering inspirational material with basic model examples open for individual use and adaption.

Thus, the examples of learning resources should be considered and used as **exemplary and inspirational material** presenting a guideline with a high range of possibilities of adapting those suggestions to a specific group of learners or an individual learner with their very personal requirements.

Those examples are not designed for immediate print and use but **require active adaption** to the needs of the learners.

Most of the examples come with specific suggestions for the user/teacher to guide a possible adaption.

The mentioned possibility of adapting and reshaping the materials is valid for different aspects of the exemplary material, e.g.:

- **INDIVIDUALIZATION:** The suggested characteristics of the tasks can and should be varied in accordance with the needs of the learners.
- **TIME/DURATION:** The respective indications are only rough guidelines and can be varied by reinforcing or skipping details, introductory exercises, and reflections.
- **DISPOSITIONS:** The dispositions taken into account can be varied by putting special (other) emphasis on the learners' needs.
- **MATERIAL:** It may be necessary to supplement, adapt or even replace materials with others.
- **LEARNING SETTING:** We need to be aware that everyday situations that require numeracy skills (e.g. finances) might be sensitive for some learners and therefore we need to ensure a harmonious and safe learning environment.

Our educational activities aim at numeracy skills being not only memorized, but first of all **being practiced and functionally used** by the learners in daily life or/and vocational situations.

It is therefore recommended to implement the **idea of HITS** (higher impacts of teaching skills) as far and often as possible. In this context, it is helpful to consider the following key elements when teaching numeracy:

- Work with **concrete and authentic material** that learners will recognize from everyday life situations.
- Ask the learners **questions** and let them raise questions themselves. It can be crucial to discuss numeracy themes, contexts and numbers.
- Think of possible **ways of transfer** for your learners.
- Help learners to develop habits of **collaborative learning**.

The **HITS (High Impact Teaching Strategies)** serve as a starting point for the teaching approaches presented in the examples. These are **ten teaching practices** which enrich and improve the learning of numeracy, mathematical ideas, concepts and contexts.



learn more on HITS...



Setting goals

Each lesson is designed with specific learning objectives and goals that clearly define and illustrate what learners should understand and be able to apply. Explicit assessment criteria are a vital component of this highly effective teaching strategy. It is essential to be mindful of the dispositions, preconditions, and needs of the target group to align the learning intentions and outcomes with the learners' interests and requirements.

The learners should discover and understand the benefits and importance of the (new) numeracy skills and knowledge for solving problems and addressing situations in their everyday or professional lives.



Structuring lessons

Following a clear structure and succession of learning activities can produce or support helpful routines for the learners. Such a solid structure scaffolds learning by specific steps or activities and offers time and space for differentiation within the lessons.

Nevertheless, the structure must not be rigid – clear goals and intentions are important, but there has to be time and space for feedback and analysis and questions. It is absolutely crucial to give the learners time and space to reflect on their individual learning processes.



Explicit teaching

When explicit teaching are adopted, learners profit from clear learning intentions and transparent success criteria – allowing them to understand the goals they are working towards. Through modeling the application of knowledge and skills, teachers demonstrate these concepts, providing learners with a clear example to follow. It also helps the learners to see the connections and retain what they have learned.

KEY ELEMENTS:

- Based on the learners' (individual) needs
- Improved understanding of the background of learning activities
- Improved orientation from the learners' part

KEY ELEMENTS:

- Cognitive activation
- Time for introducing topics (pictures, story, cognitive conflict, experiment, game and others)
- Change of types of tasks
- Hands on learning
- Scaffolding

KEY ELEMENTS:

- Shared learning intentions
- Relevant content and activities
- Practice and feedback loops
- Worked examples support independent practice
- Uncover and address misunderstandings



Worked examples

A worked example illustrates the steps necessary to complete a task or solve a problem. By scaffolding the learning process, worked examples aid in skill acquisition and alleviate the cognitive load on learners. When teachers present a worked example, they explain each step in detail, providing clarity and guidance. Learners can then utilize these worked examples during independent practice, allowing them to review and solidify their new knowledge, ultimately enhancing their understanding and retention.

KEY ELEMENTS:

- Clear learning objectives
- Learners can focus on the process
- Worked examples serve as a model
- Independent practice is supported



Collaborative learning

Collaborative learning needs meaningful tasks and students who participate actively – not only when working on the numeracy tasks and contents, but also when it comes to negotiating roles and responsibilities. Of course, teachers must observe and accompany this process of negotiation. Learners collaborate in small groups where everyone participates and contributes in order to work out a learning task or to solve a numeracy problem. To do so, they will use and apply previously acquired knowledge and skills. Collaborative learning fosters peer learning and differs from teacher-centred instructions, individual learning and competitive learning.

KEY ELEMENTS:

- Learners apply previously acquired knowledge and skills
- Learners cooperatively solve problems
- Group work fosters peer learning
- Gamification and competitions within the group work may activate learners



Multiple exposures

Deep learning can be supported by multiple exposures that provide learners with different opportunities to face, engage with and elaborate on new knowledge, concepts and skills. Multiple exposures require time to space practice over several days, and different activities (e.g. spaced tasks) to examine a (numeracy) problem from different perspectives. Feedback contributes to immediate correction and improvement.

KEY ELEMENTS:

- Learners are given time to practice and reinforce their learning
- Timely feedback



Feedback

Feedback informs both teaching and learning performance in relation to goals. There are various forms and ways of giving feedback: It can come from peers, teachers, or self-assessment, and be formal or informal, oral or written, formative or summative. The best feedback is precise, timely, specific, accurate, and actionable.

KEY ELEMENTS:

- Precise, timely, specific, accurate and actionable
- Questioning and assessment is feedback
- Use learners' voices



Questioning

Questioning has various benefits, for both learners and teachers. It engages students, stimulates interest and curiosity in the learning, and makes links to students' lives. Questioning opens up opportunities for students to discuss, argue, and express opinions and alternative points of view. Effective questioning also gives teachers an immediate feedback on learning goals and understanding; it supports assessment.

It can be helpful for teachers to plan questions for different purposes just like probing, revising or reflecting. Regardless of the type of questioning (open questions, cold call, strategic sampling e.g.), teachers must always guarantee that learners are never exposed by any kind of questioning.

KEY ELEMENTS

- Plan questions in advance
- Use open questions
- Questions can be an immediate source of feedback to track



Metacognitive strategies

Metacognitive strategies empower learners on their way to think about their own thinking and help them conscious of learning processes and outcomes. As a result, learners gain control of their learning, improve study skills, reduce anxieties and manage their own learning motivation. Metacognitive activities, just like modeling, reasoning, problem solving, questioning, (classroom) discussions, concept mapping and learning diaries promote deep and sustainable learning.

KEY ELEMENTS:

- Enable problem solving
- Enable study skills
- Promote self-questioning
- Uses concept mapping
- Classroom discussion is an essential feature



Differentiated teaching

Differentiated teaching are methods that aim for an individual extension of knowledge and skills of each and every student, irrespective of the different starting positions (behind or ahead) of learning they have. Lesson planning therefore has to include modifications and adaption for content, process and results.

Individualization has to be a key element in order to achieve deep learning. This does not only concern individualization with regard to the starting points of learners, but also includes different interests of learners and requires a diversity of tasks, material and resources.

KEY ELEMENTS:

- High quality, evidence based group instruction
- Regular supplemental instruction
- Individual interventions



NUMERACY
is
context based



NUMERACY
has a
useful content

HOW TO TEACH
NUMERACY?



NUMERACY
is
interactive and dialogical




NUMERACY
needs time for
activation and discussion

NUMERACY is CONTEXT BASED

It is a fact that adults need to manage situations and solve problems that deal with numbers. A development of numeracy competences with adult learners needs authentic lived-in situations of the learners – as this helps learners to understand the usefulness of numbers for their very personal and individual needs.


This also means that some of the provided materials might not be applicable for some countries, cultures or target groups.

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NUMERACY has a USEFUL CONTENT

Successful educational numeracy activities for adults can't be found in schoolbooks for kids or in abstract worksheets, but must meet the adults' realities, needs and challenges.


Our teaching and learning activities must therefore be connected to learners' individual realities, follow a holistic approach (literacy, numeracy and digital skills), aim for an improved numerate behaviour and must therefore be learner-centric.

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NUMERACY is INTERACTIVE and DIALOGICAL

An interactive and dialogical learning setting enables adults to activate their prior knowledge and skills and helps them to find ways to solve a mathematical problem and therefore manage a situation.


Within a (mathematical) discussion, adult learners are invited to locate the situation as a mathematical one. They need to identify the mathematics in it and furthermore, analyse, structure and interpret the information to find possible procedures to solve the problem.

... go back 

NUMERACY needs time for activation and discussion

It is crucial that learners are given enough room and time for identifying (numeracy) problems in a authentic situation as well as for problem solving procedures.

Having time for being an active part in the learning process helps adults to develop key competences they need to succeed in our modern society, just as critical thinking, communication, collaboration, creativity and flexibility.

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