



ELIXIR-EXCELERATE

Train The Trainer

Why are we here?

- Learning principles
- Training techniques
- Lesson, session, course, and material design
- Assessment and feedback

- **Session 1:** Principles of learning and how they apply to training
- **Session 2:** Training techniques that can be used to enhance learner engagement and participation
- **Session 3:** Session, course, and materials design
- **Session 4:** Assessment and feedback in training

Learning results from what the student does and thinks and only from what the student does and thinks. The teacher can advance learning only by influencing what the student does to learn

[H.A. Simon](#) (one of the founders of the field of [Cognitive Science](#) and Nobel Laureate) 1916-2001



We cannot talk about teaching, teaching practices or effective teaching techniques if we don't understand first how people learn

How learning works

Challenge: How do you go about learning something new ? How do you approach learning new things? (3 min + 5 min)

- Read about it
- Attend a training session !
- Have a go ?
- Do, reflect, process, further understand?

Which is the most effective approach for *you* to learn?

Make a list of three approaches that work for you when you want to learn something new (from the most to the less effective one). Discuss it with your partner and compare.

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From Willingham (2009) "Why don't students like school?":

- Learning is a change in the long term memory

How learning works

- [What is learning?](#)
- [Which learning theory?](#)

How learning works: Seven research-based principles for smart teaching (Ambrose, et al. 2010)

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- **Principle P7:** To become self-directed learners, students must learn to monitor and adjust their approaches to learning.

Our pedagogical model is based on the following concepts, ideas, and models:

- The difference between teaching and training
- Adult learning or andragogy
- The Bloom's six categories of cognitive skills
- How thinking and memory work
- The acquisition of skills: novices, competent practitioners, experts
- Cognitive development and mental models
- The importance of the learning environment
- Active learning

Teaching or Training?

Challenge: Based on your experience, what are in your opinion the differences between teaching and training? (5 min)

- Make a list of three main differences. Discuss with your partner(s). Write each on a different sticky note.

Adult learning or andragogy

Challenge: what learner are you today?

- Think about your experience as a learner when you were at school, and the learner you are now in this course.
- Write one thing in which you feel different as a learner today from the learner you were at school.
- Write it on a sticky note

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prefer learning what is authentic and directly relevant to their work or existing interests

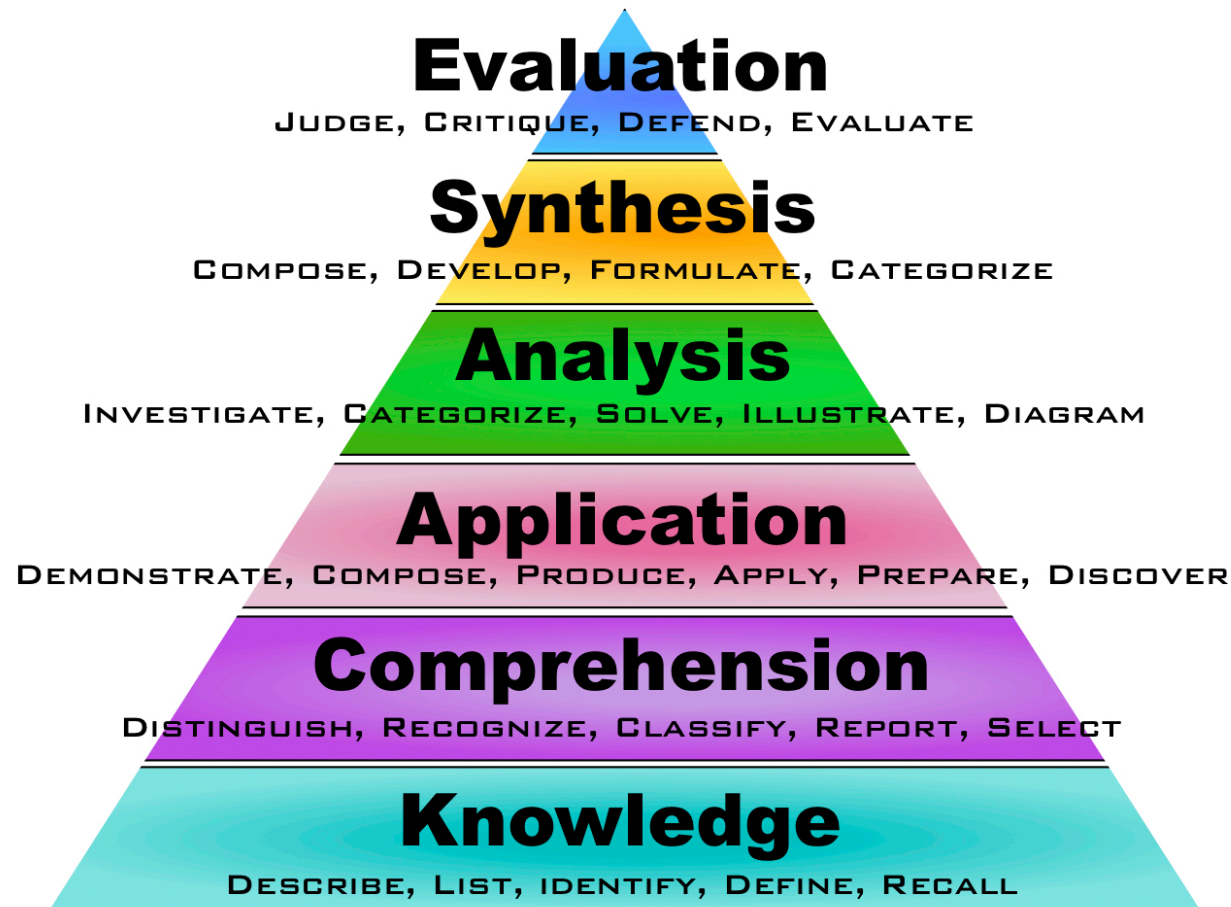
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- prefer to be treated as partners in the learning experience

The Bloom's six categories of cognitive skills



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1. **Remember/Reiterate** - performance is based on recognition of a seen example(s);
2. **Understand/Summarise** - performance summarizes information already known/given;
3. **Apply/Illustrate** - performance extrapolates from seen examples to new ones by applying rules;
4. **Analyze/Predict** - performance requires analysis and prediction, using rules;
5. **Create/ Synthetise** - performance yields something innovative and novel, creating, describing and justifying something new from existing things/ideas;

How can we use the Bloom's hierarchy of cognitive skills in teaching and training?

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- How? We can use it to:
 - identify teaching objectives and learning outcomes
 - design instruction and learning experiences
 - assess learning

Teaching objectives and Learning Outcomes

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- 5) Keep in mind that learning outcomes can be as specific as you want. You may even think about a different learning outcome for each task you assign to learners.

Measurable verbs to assist you in writing and assessing learning outcomes

<https://github.com/ppalagi/EXCELERATE-TtT/blob/master/docs/learning-outcomes.md>

Teaching objectives and Learning Outcomes

Challenge

- Write a Teaching Objective AND a Learning Outcome for a lesson or a session you usually deliver.

The acquisition of skills: novice, competent
practitioner, expert

Dreyfus model of skill acquisition





Novice

“

I'm not sure what
questions to ask

”



Competent
Practitioner

“

I'm pretty confident,
but I still look stuff up
a lot!

”



Expert

“

I've been doing this
on a daily basis for
years!

”

Experience level

The acquisition of skills: novice, competent practitioner, expert

- **Novice:** someone who doesn't even know what questions to ask
- **Competent practitioner:** someone who has enough understanding for everyday purposes
- **Expert:** someone who can easily handle situations that are out of the ordinary

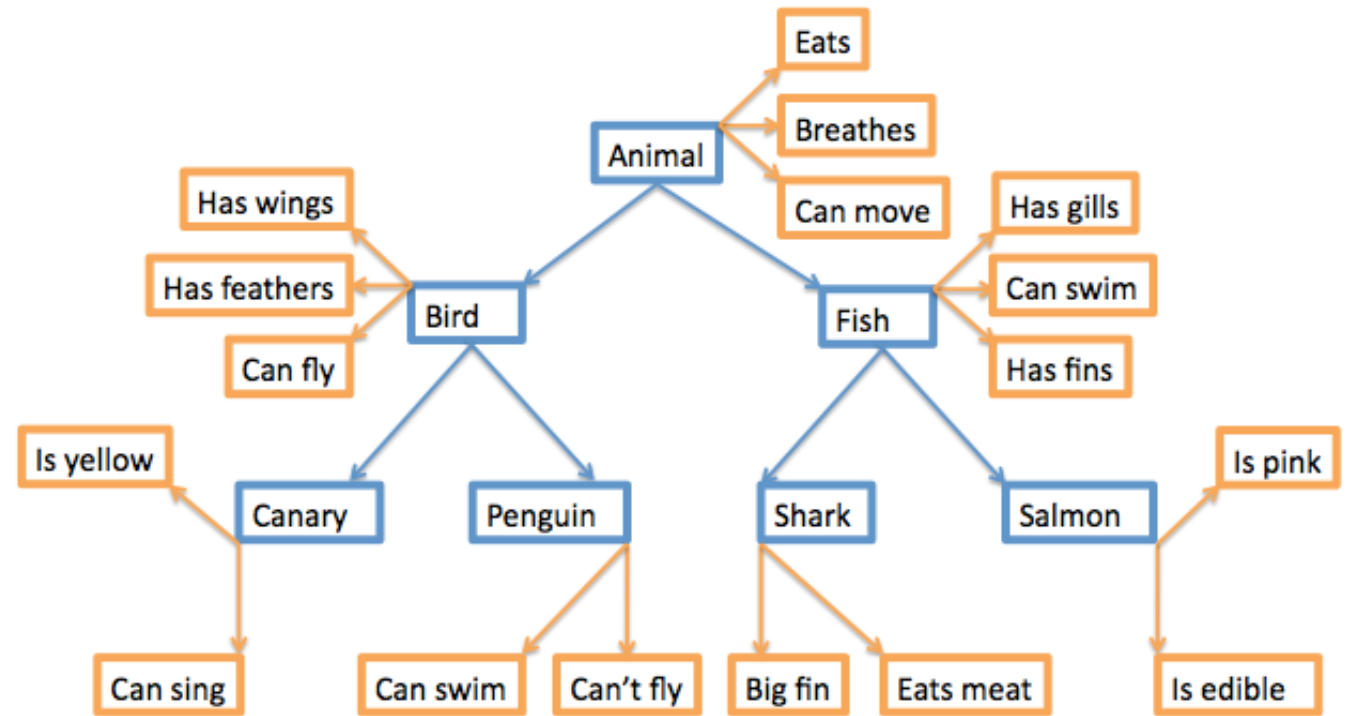
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Challenge

- Think about a topic/field you feel you are a novice, a topic you feel you are a competent practitioner, and one you feel an expert, and share this with us.

Mental models

A mental model is a collection of concepts and facts, along with the relationships between those concepts, that a person has about a topic or field.



Novice, competent practitioner, expert: in what do they differ?

Challenge: What are the main differences between a novice and an expert in terms of knowledge and learning?

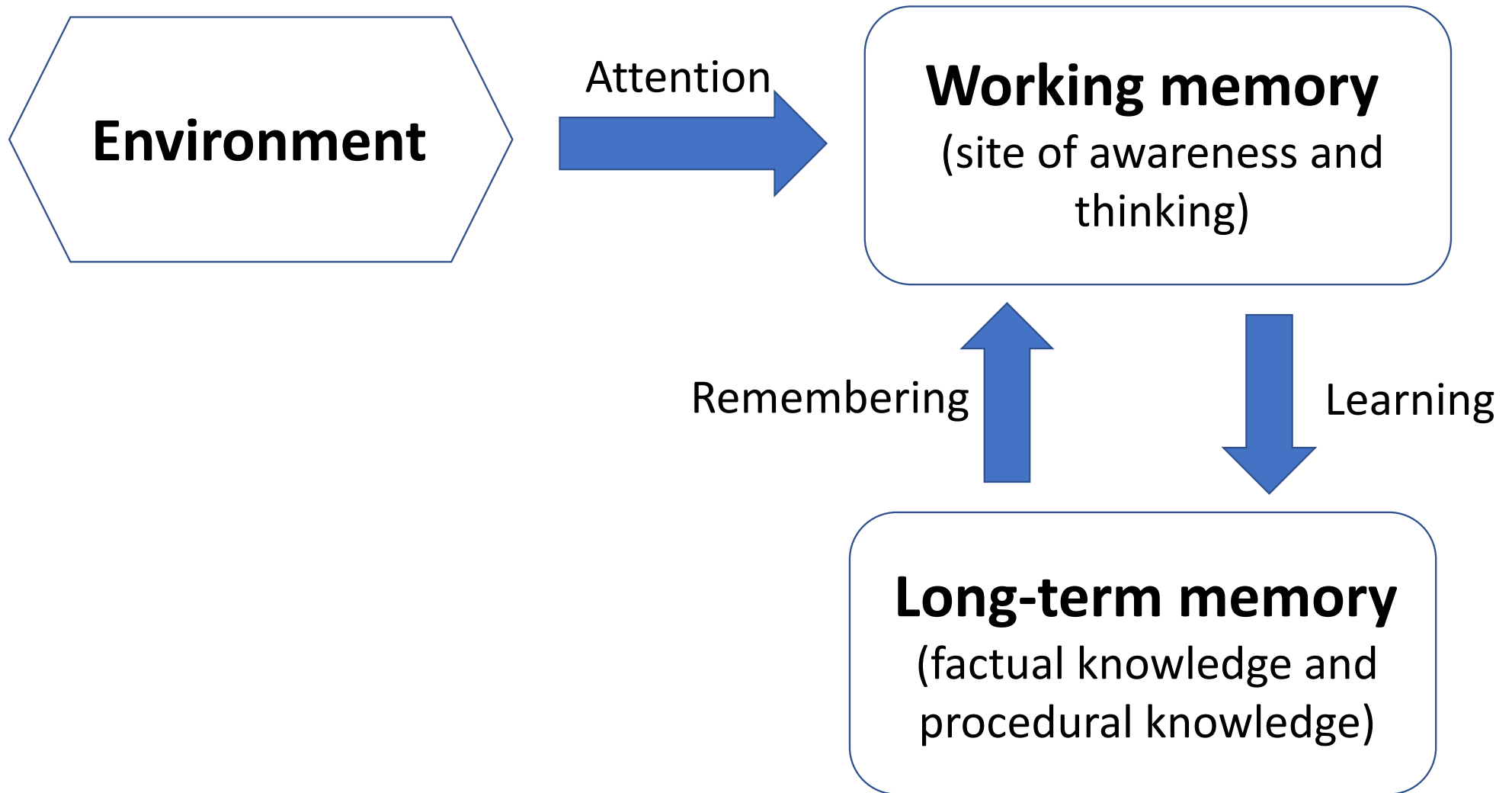
- Think about yourself as a learner.
- How did you feel about something new when you were a student? How was to be a novice? Can you remember it?
- How do you feel today when you have/want to learn something completely new to you? Does it happen sometimes?
- How do you feel when you have to learn something new *in your field*? Namely, something that is an extension of your current knowledge about something (e.g. you know well a given OS and you need to learn how a different OS works).
- Write at least two things in which novices and experts differ.

Learners' prior knowledge and misconceptions

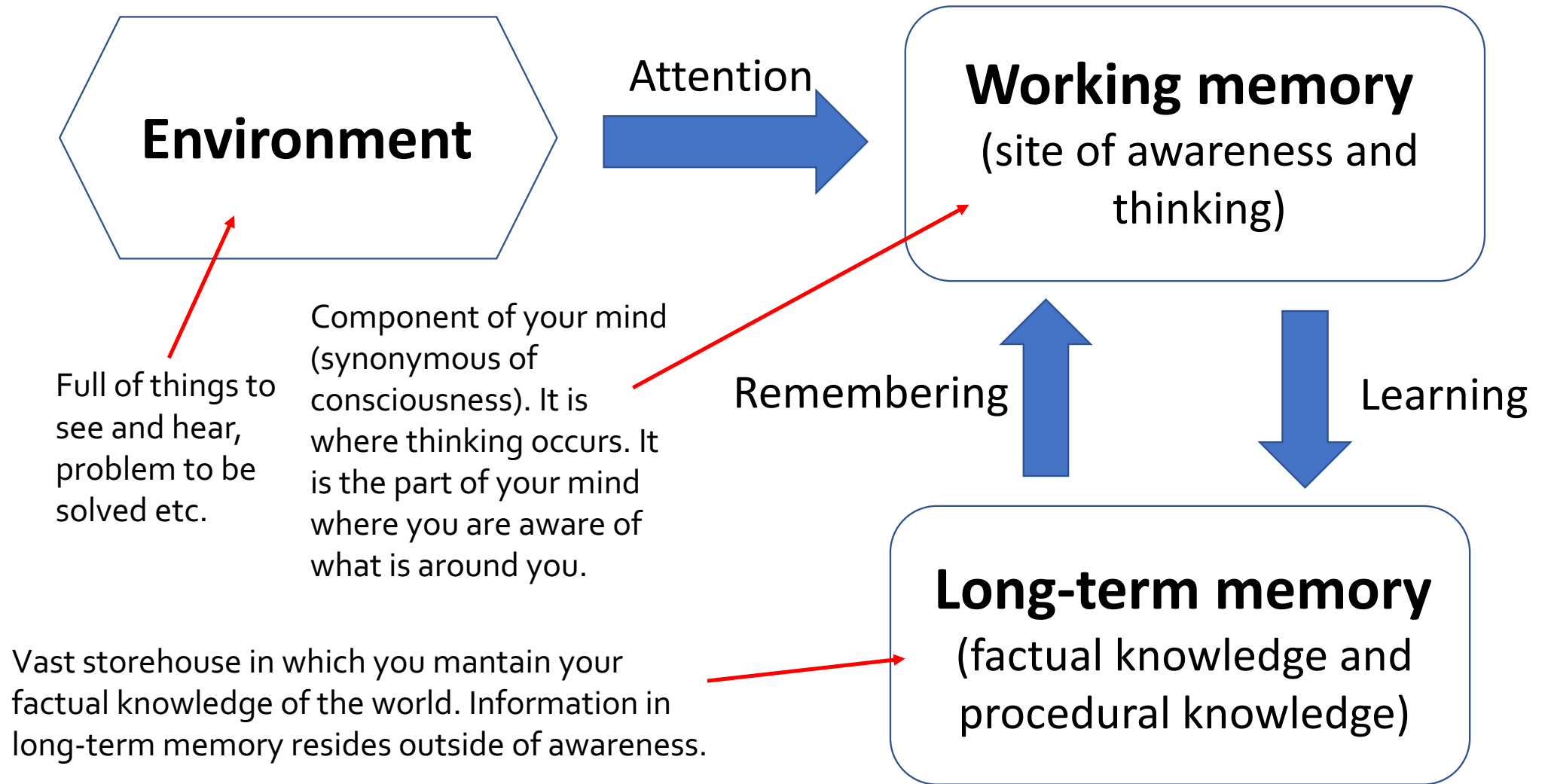
P₁: How can prior knowledge hinder learning?

- Misconceptions
 - Simple factual errors
 - Broken models
 - Fundamental beliefs

Working memory, long term memory and learning



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Long-term vs working memory

- Long-term memory is slow to access but it is essentially unbounded
- Working memory is very fast but has very limited space. Several experiments showed that we can hold in the working memory up to 7 +/- 2 items.
- <https://cat.xula.edu/thinker/memory/working/serial>

The fact that working memory has limited space, implies that thinking becomes increasingly difficult as working memory gets crowded.

What can we do to make room in working memory?

- Increase our background knowledge
- Avoid extraneous cognitive load

X C N

N P H

D F B

I C I

A N C

A A X

X

C N N

P H D

F B I

C I A

N C A A

X

Other factors facilitating memory

- things that create an emotional reaction will be better remembered, but emotion is not necessary for learning (and it is definitely not sufficient!)

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- thinking about meaning is good for memory
- practice makes learning long lasting
- spaced practice is of great benefit for memory

Cognitive load

Cognitive load refers to the total amount of mental effort being used in the working memory

- **Intrinsic cognitive load**
- **Germane cognitive load**

- **Extraneous cognitive load**

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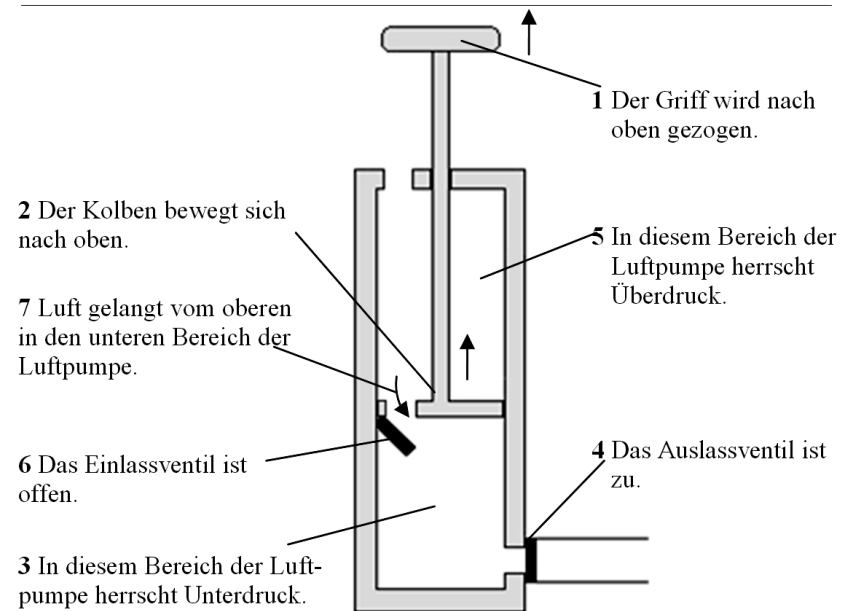
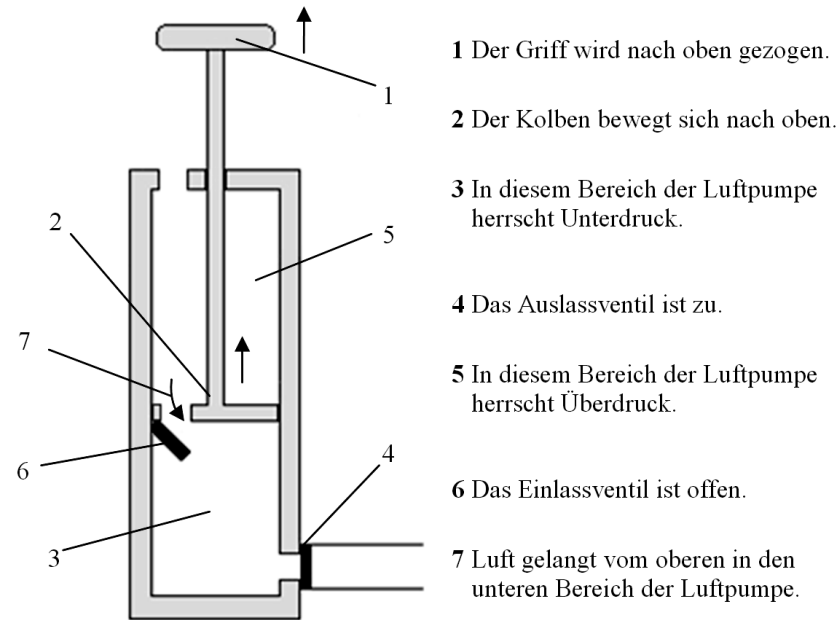
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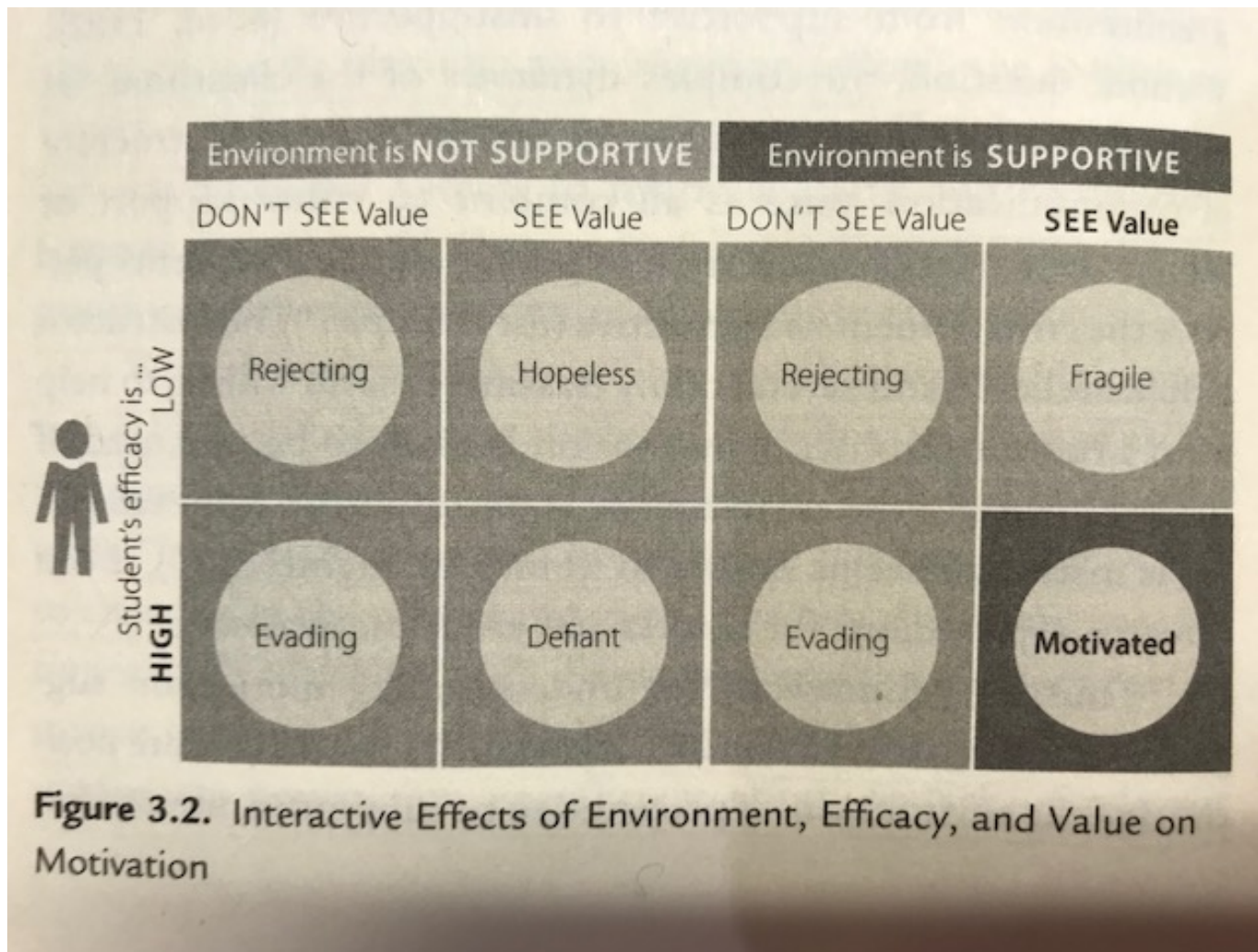
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- **Germane cognitive load** is the (desirable) mental effort required to create linkages between new information and old (which is one of the things that distinguishes learning from memorisation)
- **Extraneous cognitive load** is everything else that distracts or gets in the way.

Split attention effect



The Learning Environment

Motivation



Value

- attainment value
 - satisfaction that one gains from mastery and accomplishment of a goal or task
- intrinsic value
 - the satisfaction that one gains simply from doing the task rather than from a particular outcome of the task
 - It is the source of intrinsic motivation
- instrumental value/extrinsic rewards
 - praise
 - public recognition
 - money
 - material goods
 - an interesting career
 - a high-status job, etc.)

Efficacy

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- growth vs fixed mindset
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- In order to hold a positive expectancy for success, learners must not only believe that doing the assigned work can earn a passing grade (growth mindset), **they must also believe that they are capable of doing the work necessary to earn a passing grade**

Environment

- complex dynamics of the classroom
- its tone
- the interpersonal forces at play
- the nature and structure of communication patterns.
- e.g. "The instructor is approachable and several of my classmates seem willing to help me if I run into troubles".

People generally
remember...
(learning activities)

People are able to...
(learning outcomes)

10% of what they read

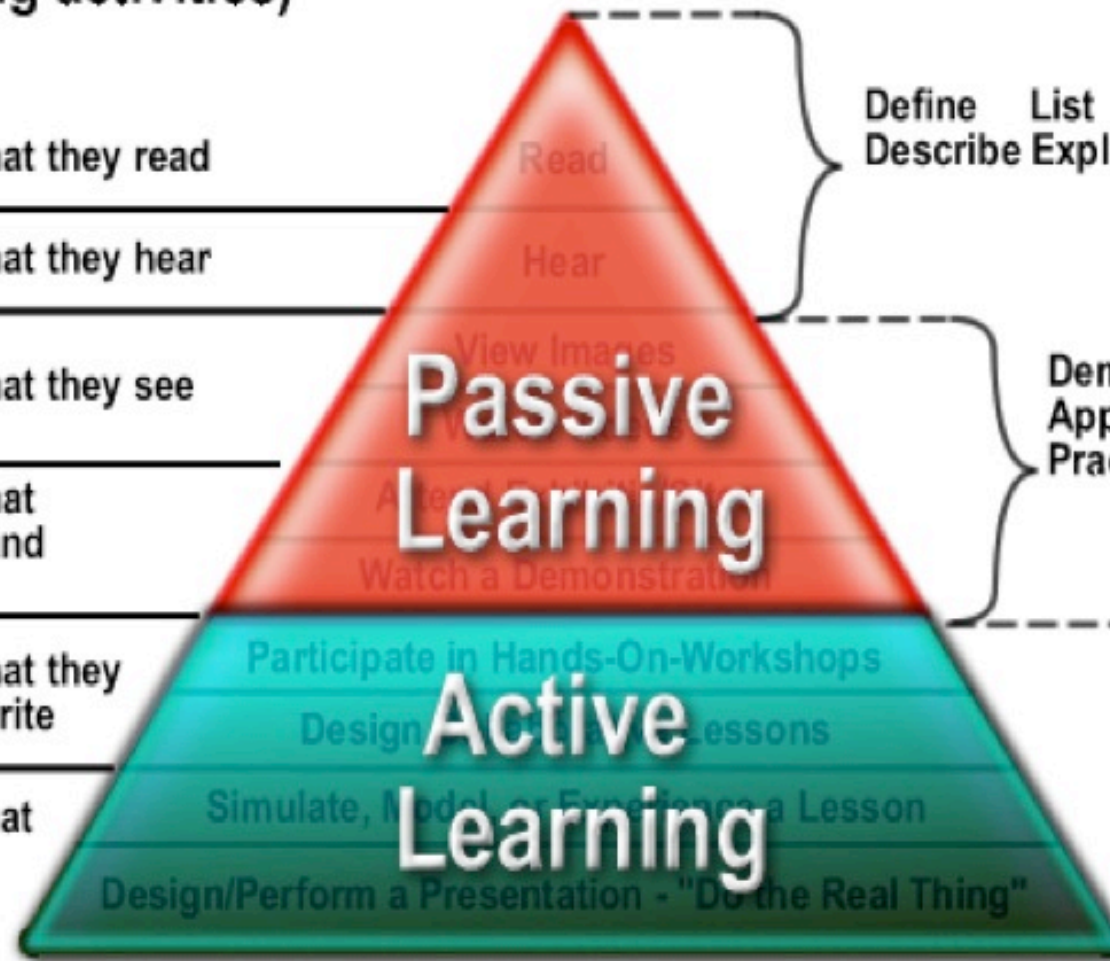
20% of what they hear

30% of what they see

50% of what
they see and
hear

70% of what they
say and write

90% of what
they do.



Define List
Describe Explain

Demonstrate
Apply
Practice

Analyze
Define
Create
Evaluate