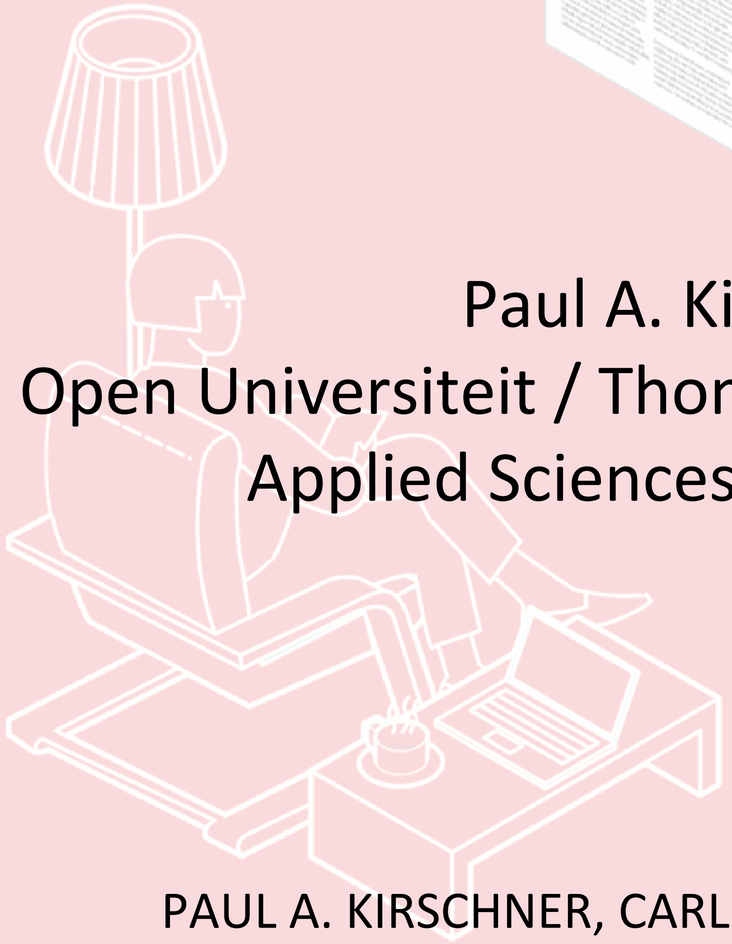
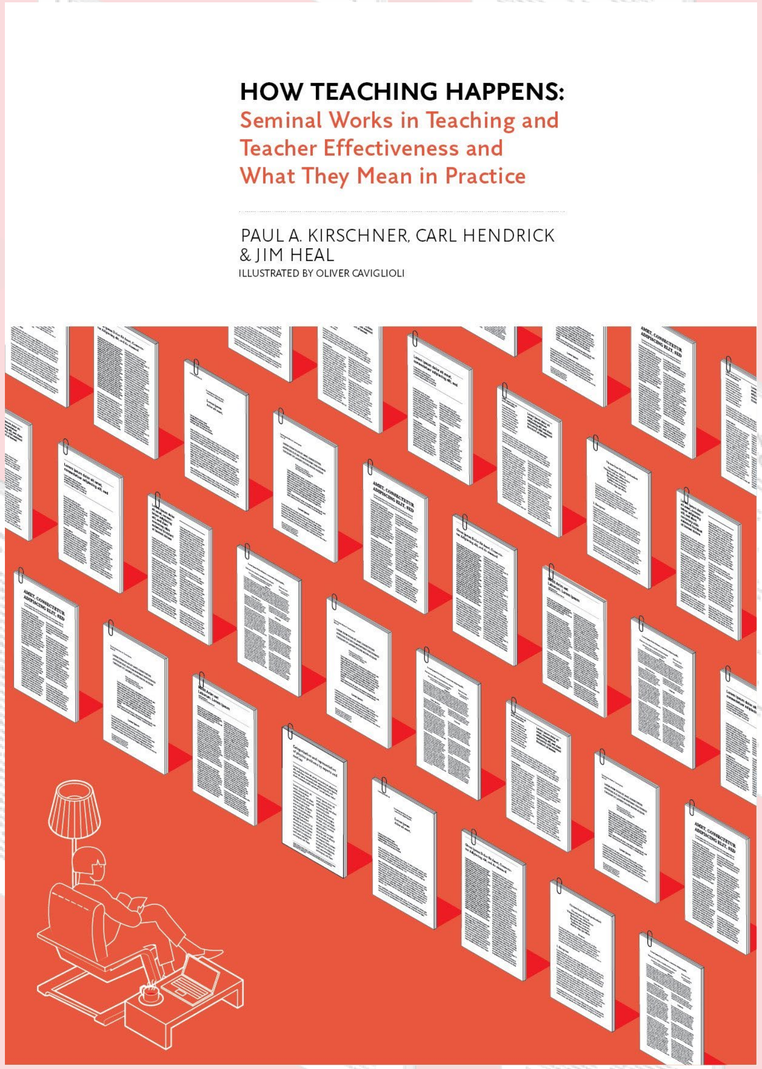
HOW TEACHING HAPPENS

SEMINAL WORKS IN TEACHING AND TEACHER EFFECTIVENESS AND WHAT THEY MEAN IN PRACTICE

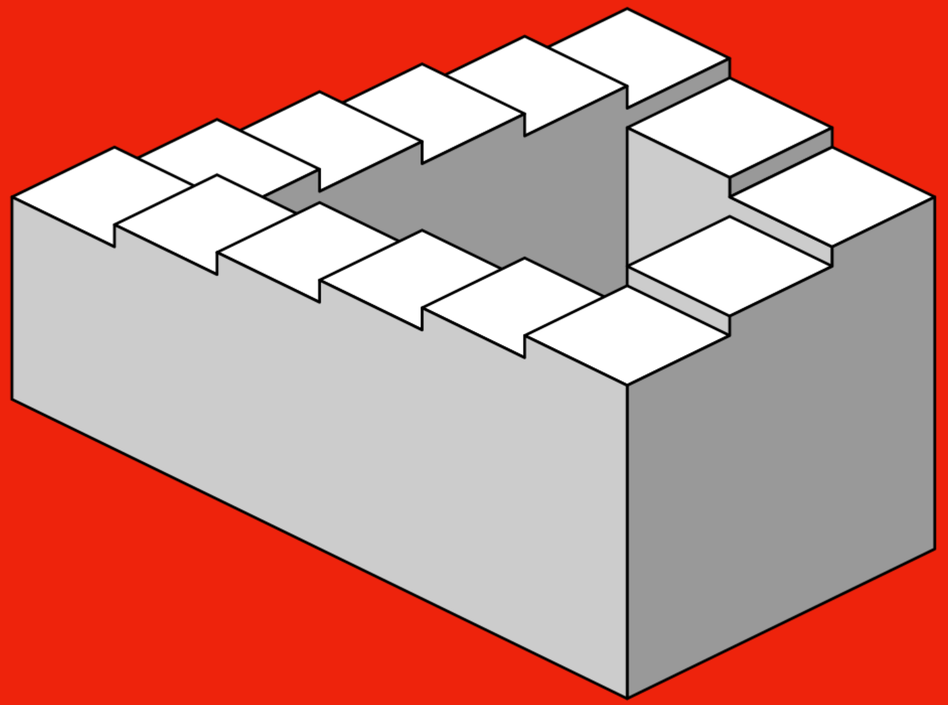


Paul A. Kirschner
Open Universiteit / Thomas More University of Applied Sciences / kirschner-ED



PAUL A. KIRSCHNER, CARL HENDRICK & JIM HEAL

Teaching is Paradoxical



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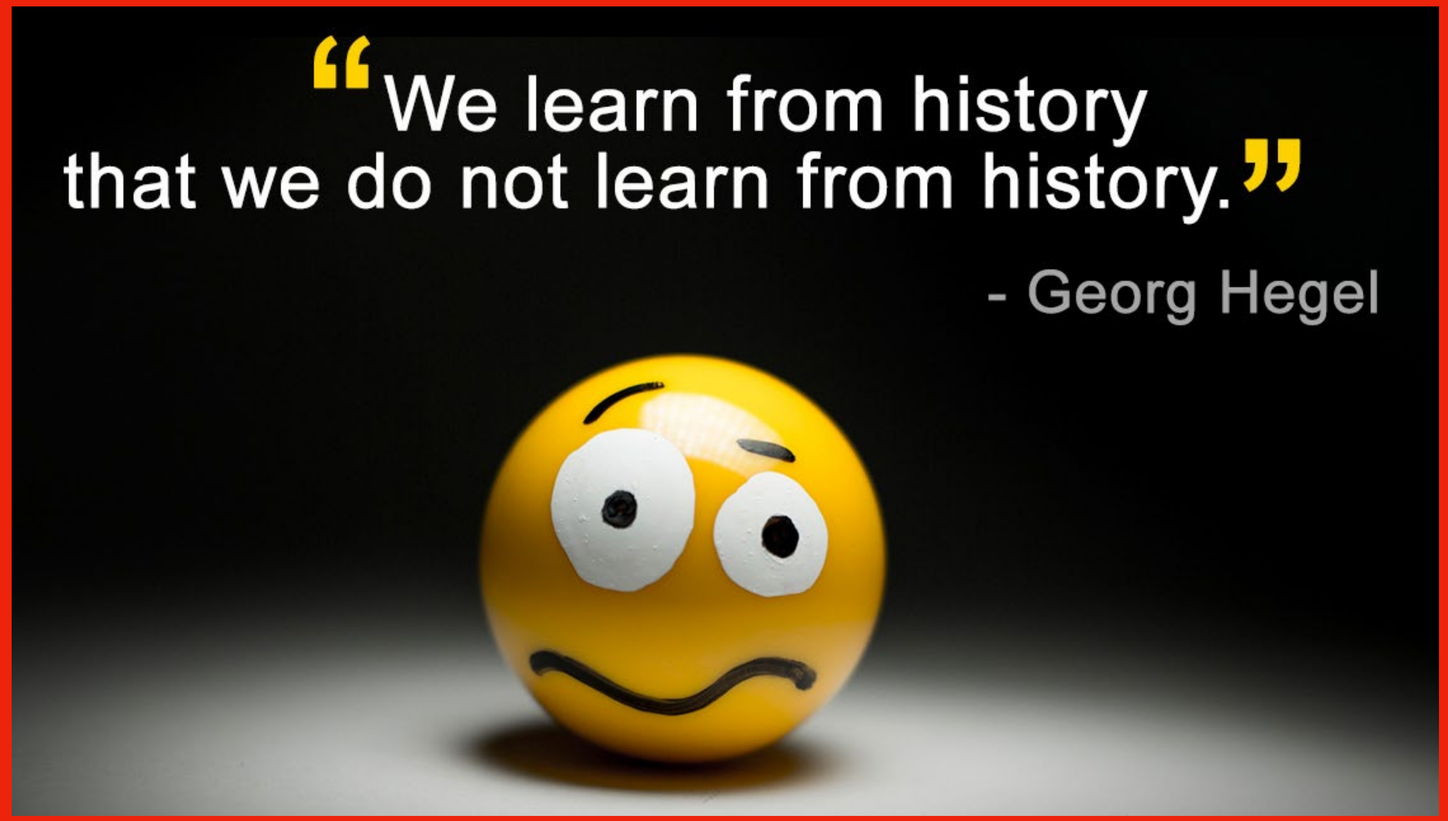

HOW TEACHING HAPPENS

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Teaching Paradoxes

- Teachers should make things difficult but in a good way
- What's good for performance often isn't good for learning
- Activity isn't always productive
- Experts aren't always good at teaching their expertise domain
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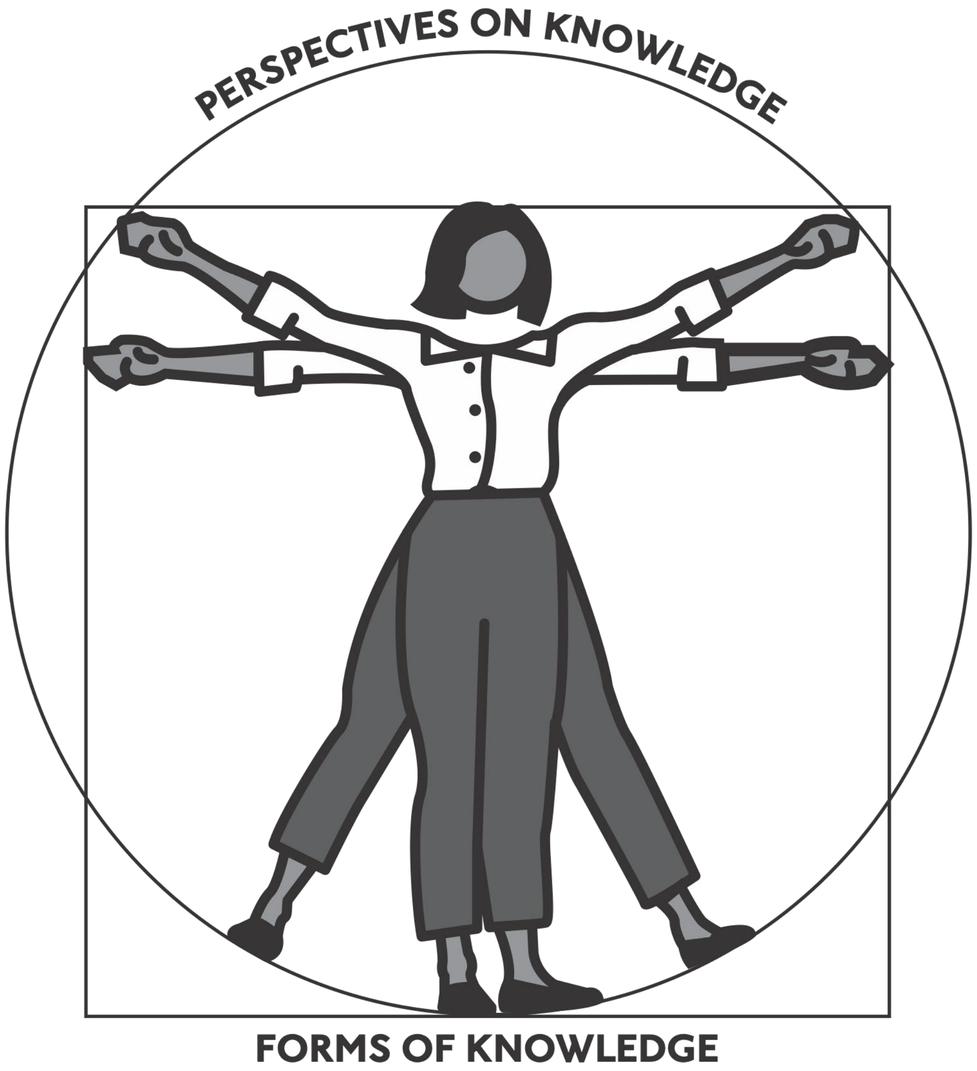


Those who understand teach

Knowledge growth in teachers

Lee Shulman

George Bernard Shaw

“He who can, does.
He who cannot, teaches.”

Comparison of Certification Requirements

1875: primarily content- and pedagogy related

1975: primarily process- and management related

Certification Requirements 1875

1. Written Arithmetic
2. Mental Arithmetic
3. Written Grammar
4. Oral Grammar
5. Geography
6. History of the United States
7. Theory and Practice of Teaching
8. Algebra
9. Physiology
10. Natural Philosophy (Physics)
11. Constitution of the US and California
12. School Law of California
13. Penmanship
14. Natural History (Biology)
15. Composition
16. Reading
17. Orthography
18. Defining (Word Analysis, Vocabulary)
19. Vocal Music
20. Industrial Drawing

Certification Requirements 1875

- Find the cost of a draft on New York for $1,400 payable 60 days after sight, exchange being worth 102.5% and interest being reckoned at a rate of 7% per annum. (Written Arithmetic, one of ten items.)
- Divide 88 into two such parts that shall be to each other as 2/3 is to 4/5. (Mental Arithmetic, one of ten items.)
- Name and illustrate five forms of conjugation. Name and give four ways in which the nominative case may be used. (Grammar, two of ten items.)
- What is adhesion? What is capillary attraction? Illustrate each. (2 of 10 items from Natural Philosophy.)
- Name five powers vested in Congress.

Certification Requirements 1875

And with respect to pedagogy (which was admittedly a little underrepresented in the exam) there were questions like these:

- What course would you pursue to keep up with the progress in teaching?
- How do you succeed in teaching children to spell correctly the words commonly misspelled?
- How do you interest lazy and careless pupils? Answer in full (!).

Certification Requirements 1985

- Organisation in preparing and presenting instructional plans.
- Evaluation.
- Recognition of individual differences.
- Cultural awareness.
- Understanding youth.
- Management.
- Educational policies and procedure.

Missing Paradigm

Blind spot with respect to content…[in] our state-level programs of teacher evaluation and teacher certification. . . What we miss are questions about the content of the lessons taught, the questions asked, and the explanations offered.

Forms of Knowledge

- Propositional knowledge
  - Principles, Maxims, Norms
- Case knowledge
  - Prototypes, Precedents, Parables
- Strategic knowledge
  - Reflection, Professional judgement

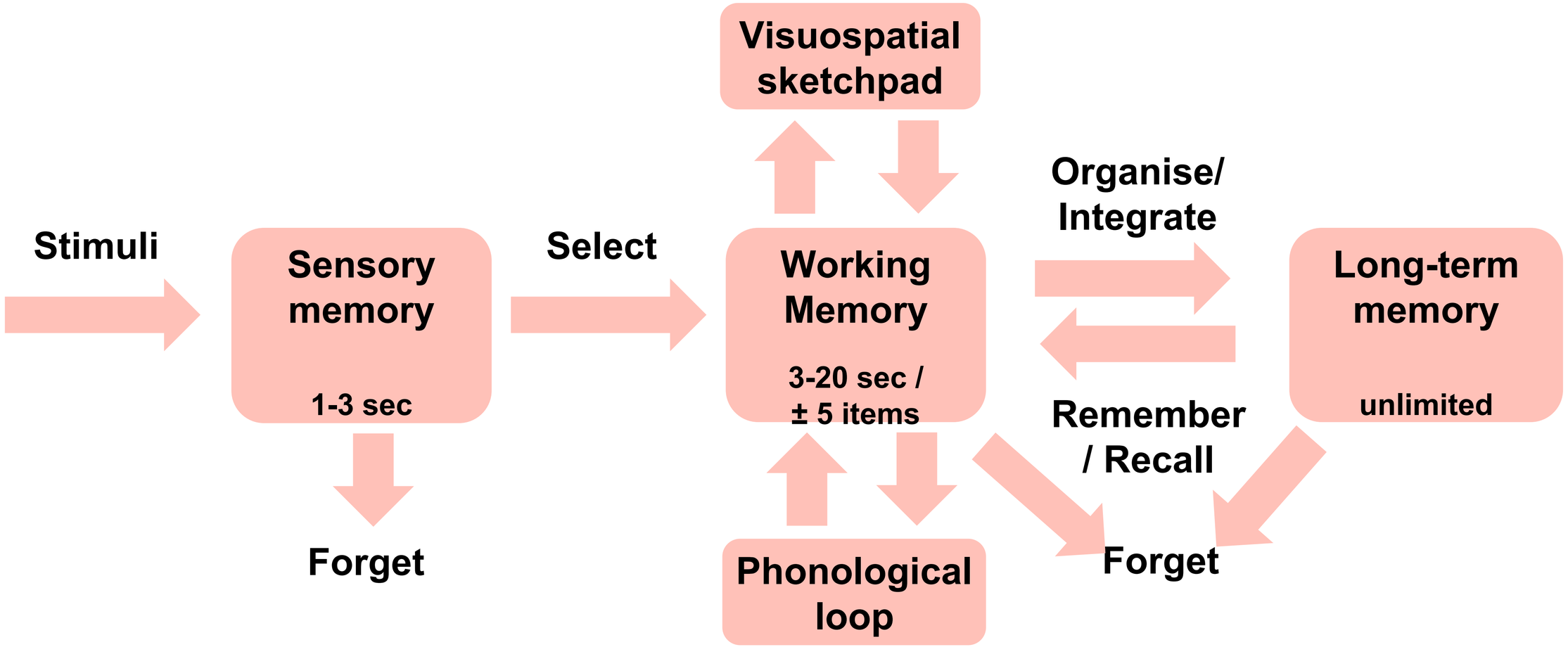
Teacher Knowledge Matrix

		Forms of Knowledge		
		Propositional	**Case**	**Strategic**
Perspectives on Knowledge	**Subject Matter Content**	Principles Maxims Norms	Prototypes Precedents Parables	Reflection Professional judgement
	Pedagogical Content	Principles Maxims Norms	Prototypes Precedents Parables	Reflection Professional judgement
	Curricular	Principles Maxims Norms	Prototypes Precedents Parables	Reflection Professional judgement

Takeaways

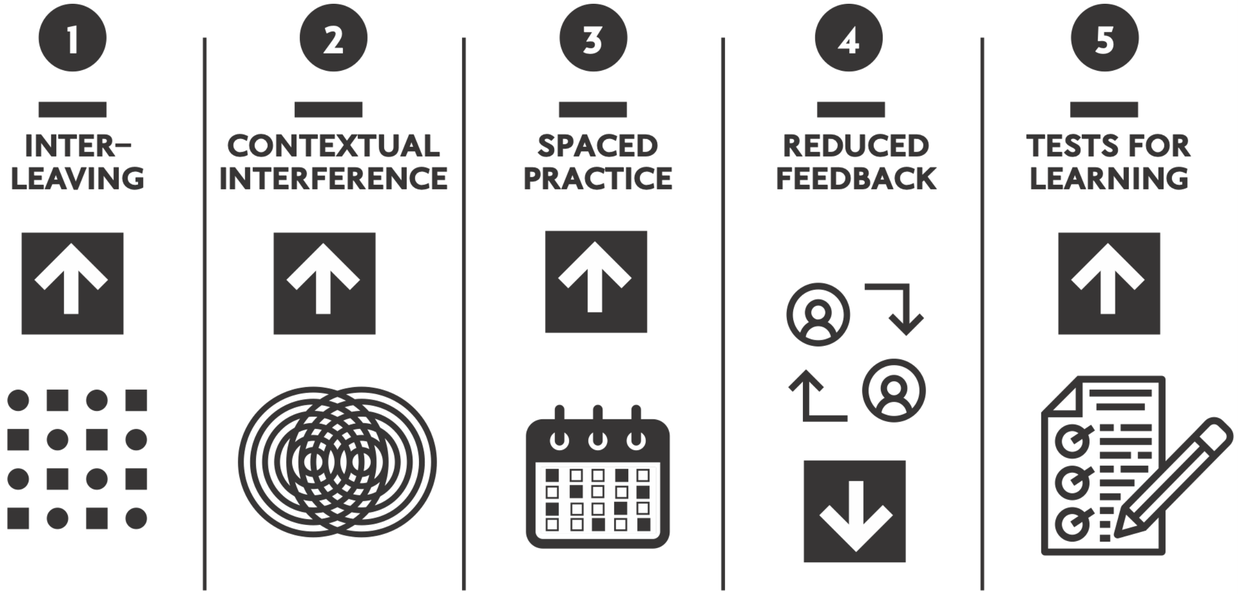
- Knowledge of pedagogical strategies without knowledge of the content is insufficient for good teaching
- Teacher training should contain a mix three categories of content knowledge and three forms of knowledge
- Research-based TT programs must accommodate conceptions of both process and content
- Assessing teachers must reference content taught

Primer: Cognitive Architecture



The Learning Equation

$$\sum_{1}^{n} Storage + \sum_{1}^{n} Retrieval = \sum Learning/Retention$$



Learning: No Pain, No Gain

Desirable Difficulties

Robert Bjork

No Pain, No Gain

Desirable Difficulty

A learning task/study **strategy** requiring considerable but **desirable amount of effort**, thereby improving **long-term performance**.

Paradox

"Conditions of learning that make **performance improve** rapidly often fail to support long-term retention and transfer, whereas conditions that create challenges and slow the rate of **apparent learning** often optimize long-term retention and transfer."

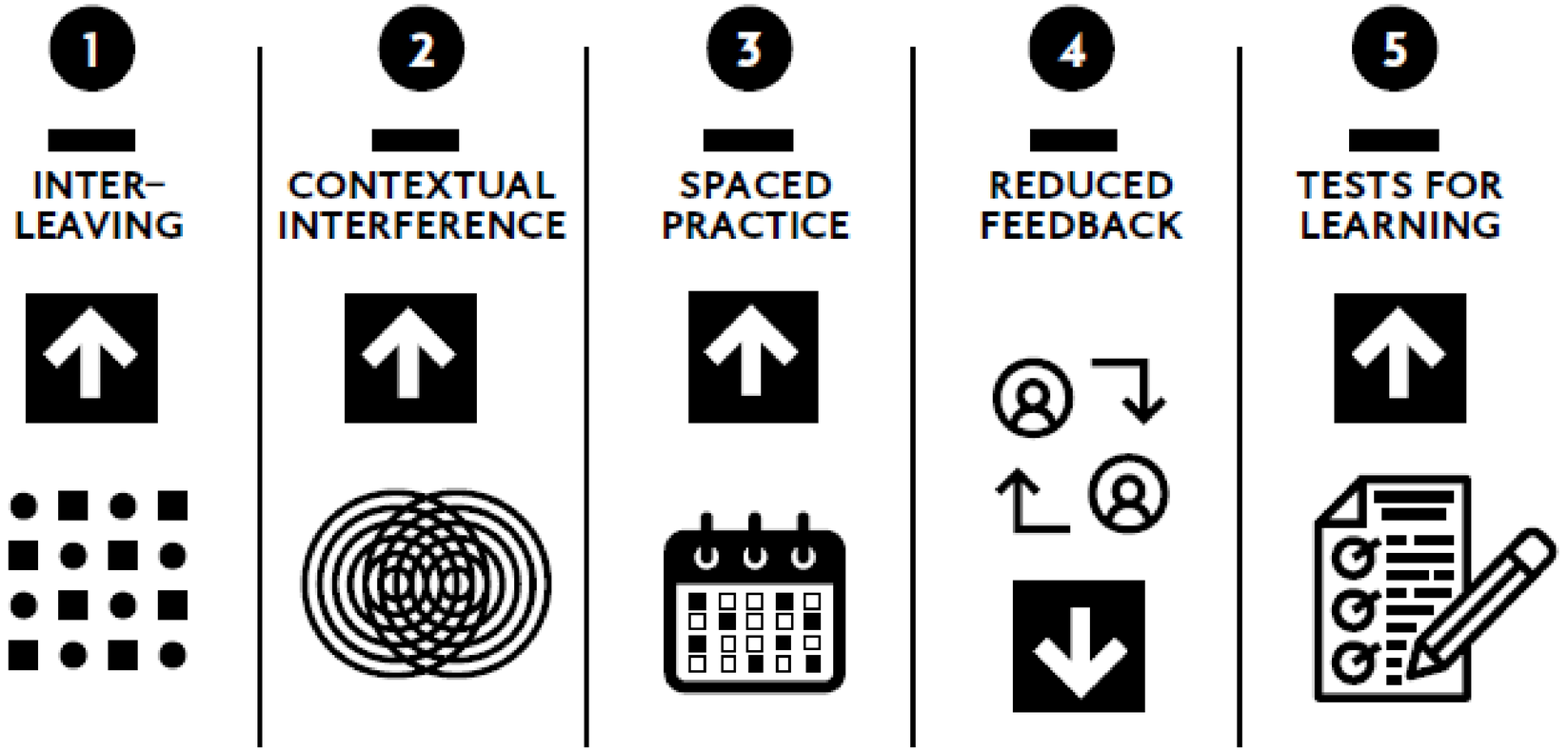
Learning

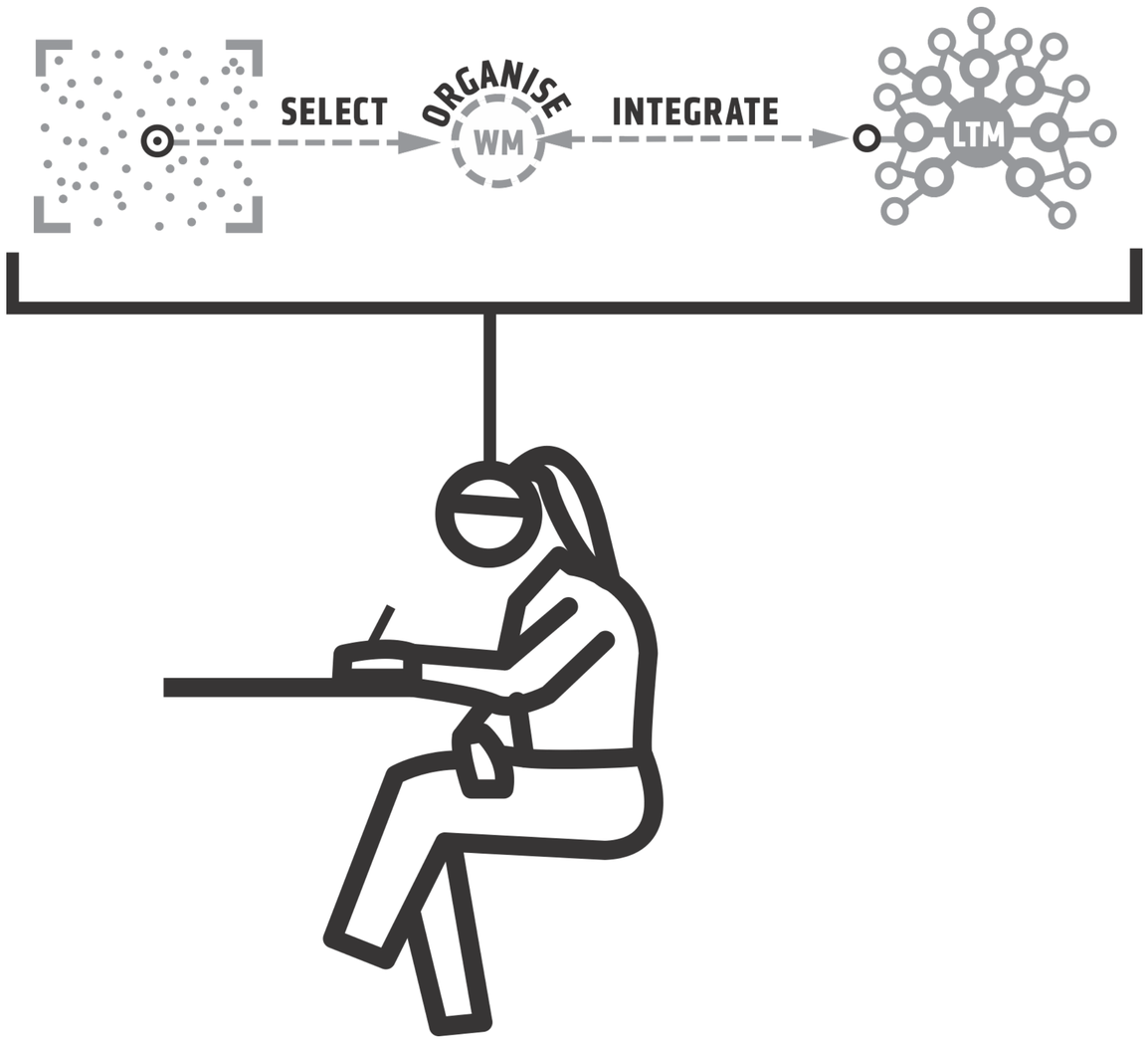
- Stable change in long-term memory
- Must be inferred
- Result of cognitive information processing

Performance

- Temporary fluctuations in knowledge or behaviour
- Can be observed/measured during or shortly after instruction or training

Five Desirable Difficulties





Make Something of What You've Learnt

Generative Strategies

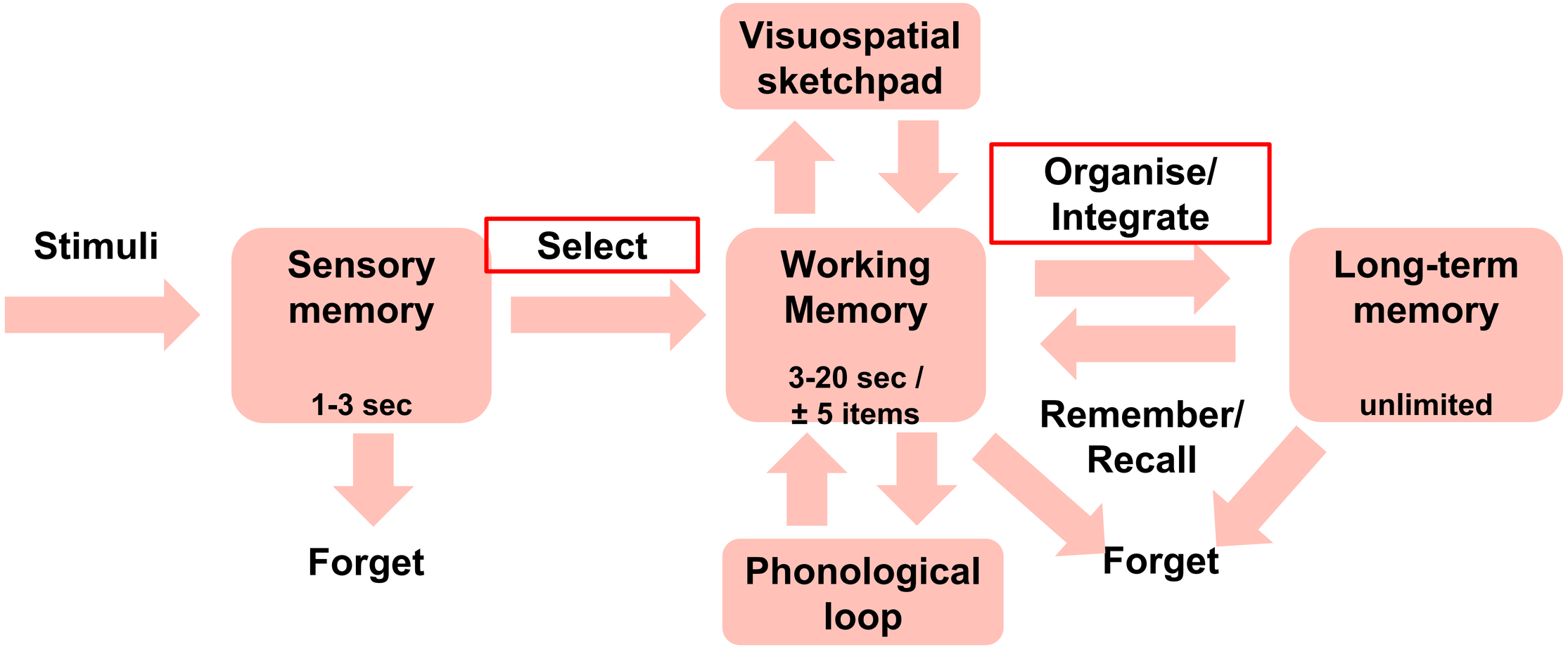
Logan Fiorella and Richard Mayer

Generative Learning Strategies

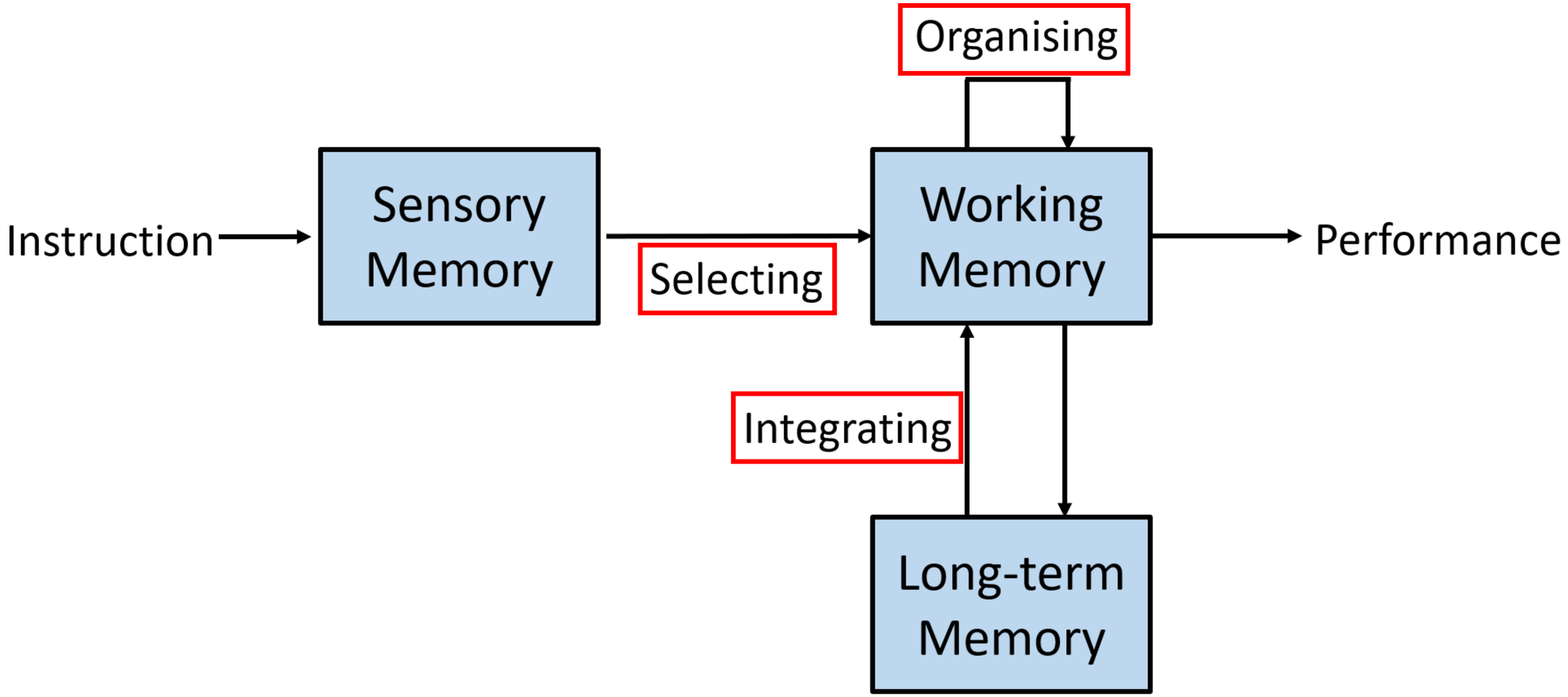
Making sense of new information by **selecting** important information, **reorganising** it, and **integrating** it with what one already knows.

Producing something meaningful **beyond** the information provided.

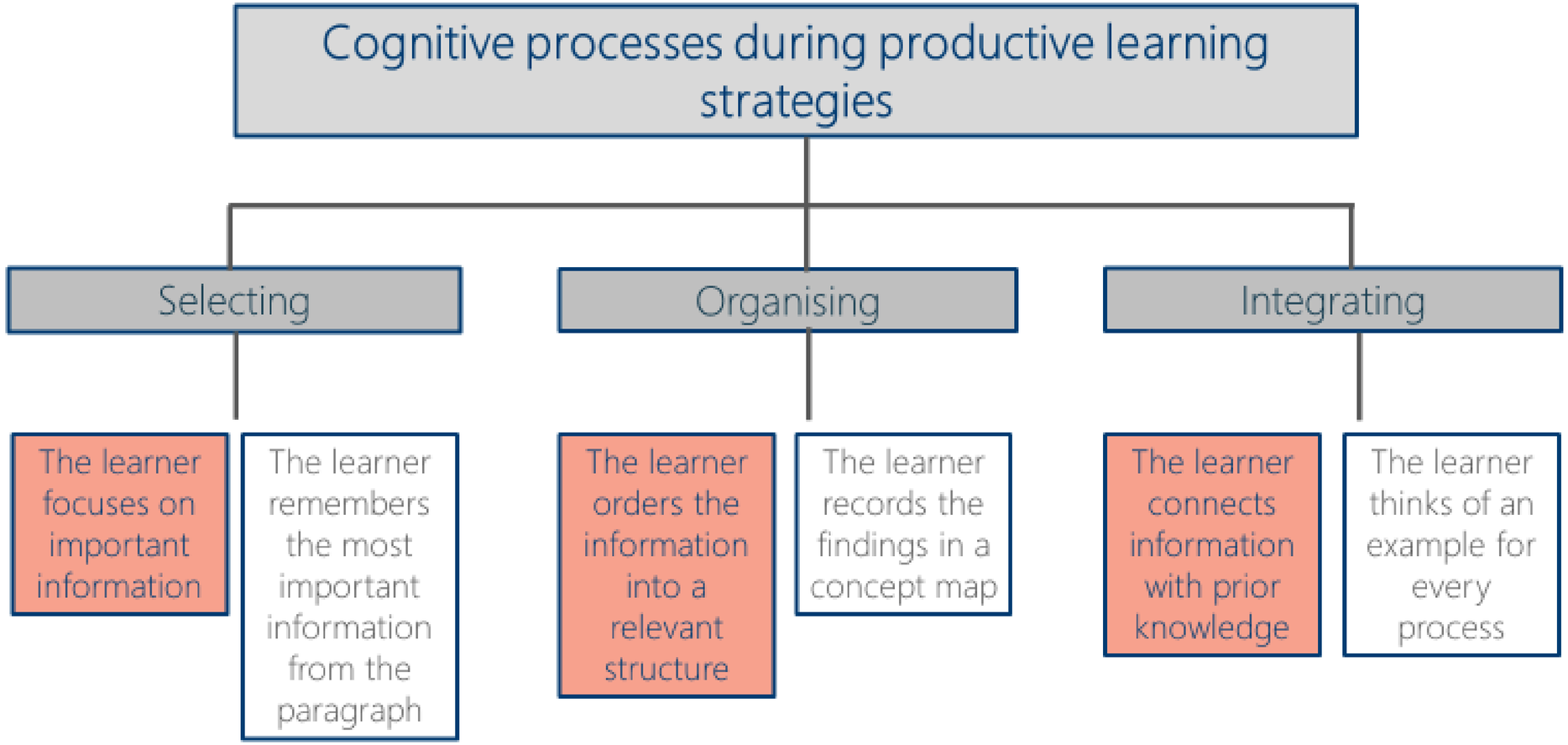
Revisiting Cognitive Architecture



SOI Model


Organising
Instruction
Sensory Memory
Selecting
Working Memory
Performance
Integrating
Long-term Memory

Do Something With It!



Eight Productive Strategies

- Summarise – main points (short) in own words
- Map – written/spoken text in a spatial representation
- Draw – visual representation of the contents
- Imagine – mental image of the contents
- Self-test - retrieval-based learning
- Self-explain – explain the content to yourself
- Teach – explain to a (fictitious) other
- Enact – task-relevant movements

SOI

Each of the eight strategies requires learners to:

- **select** relevant information,
- **organise** the information in working memory, and
- **integrate** the information in already existing schemata in long-term memory

in order to learn effectively

“To Thine Own Self, Be True”

Authenticity

Authentic Teachers

- Expertise
- Passion
- Unicity
- Distance

Expertise

“It’s only expertise if it’s also explained in different ways”

“Not really the way they taught but more the way they cared about us, … They wanted us to get good marks, wanted us to get our diploma because they know how important that is and if you have a problem then they always make that extra effort to help you, that’s for sure …”

Passion

“I find this one much more authentic because she really wants to do something. For instance, if you take football, the coach is simply so passionate about it that he’s going to do everything he can to see that you win. That’s great to know that they’re never going to give up…I think it’s great to be among people like that.”

“What was really important was to see that the teacher “lives for his subject.”

Unicity

“The teacher would not only discuss the subject matter but also things from his own experience, what he knows, things that have a lot to do with it but that in fact aren’t directly linked to the subject matter.”

Distance

“A positive relationship between teacher and student requires (limited) “active” involvement from the teacher. Teachers have to have “antennae” to pick up things that are part of their students’ lives; repressed tension that might be present, etc.”

Takeaways

- Authenticity is a unique combination of expertise, passion, unicity, and distance
- It’s not enough to know something well, you have to be able to explain it well
- It’s OK to stray from the lesson plan if an interesting path emerges
- Authentic teachers can spot a problem where the student themselves might not have spotted a problem.

The Many Faces and Uses of Asessment

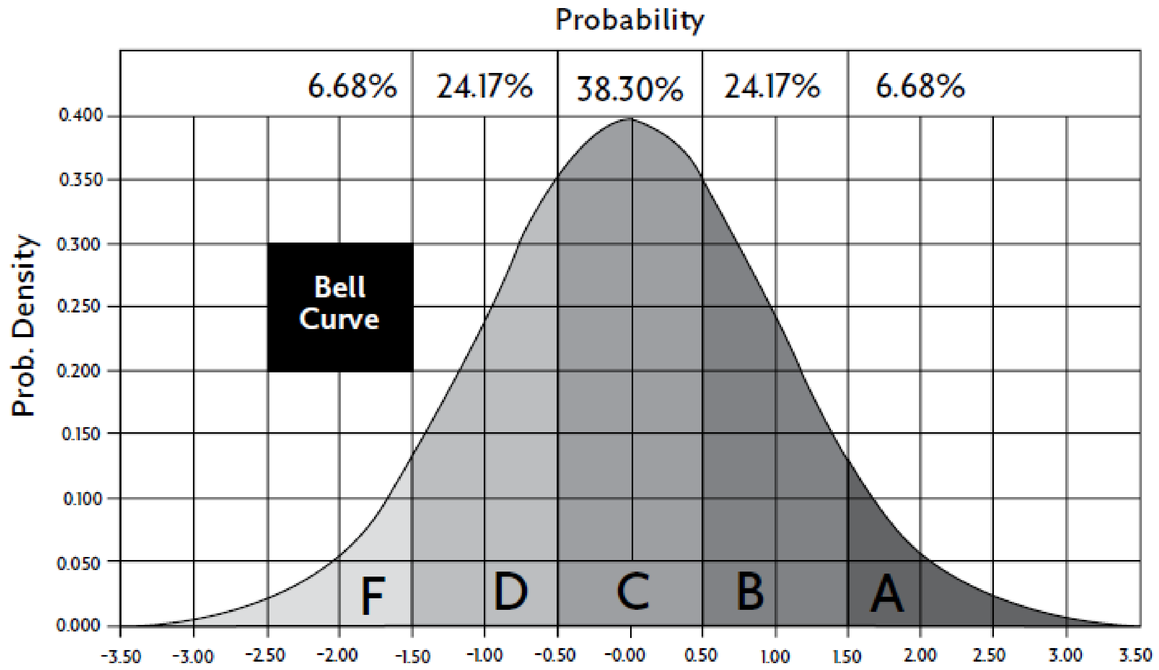
Benjamin Bloom
et al.

Three Types of Evaluation

- Initial
- Formative
- Summative

Goal is Mastery

- Plea to dump grading on the normal curve



Aptitude

- Amount of time to achieve mastery
- Quality of instruction
- Characteristics and needs of the student

Formative evaluation as part of the learning process to achieve mastery

Takeaways

- Schools develop individuals to enable them to live effectively in a complex society
- Teachers must be aware of the relation between (1) evaluation, (2) instructional decisions taken, and (3) the analysis of learners, instruction, and learning outcomes
- If achievement approximates the normal distribution, then we have failed

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Reconciling the Paradox

"Students achieve more in classes where they spend **most of their time being taught or supervised by their teachers** rather than working on their own."

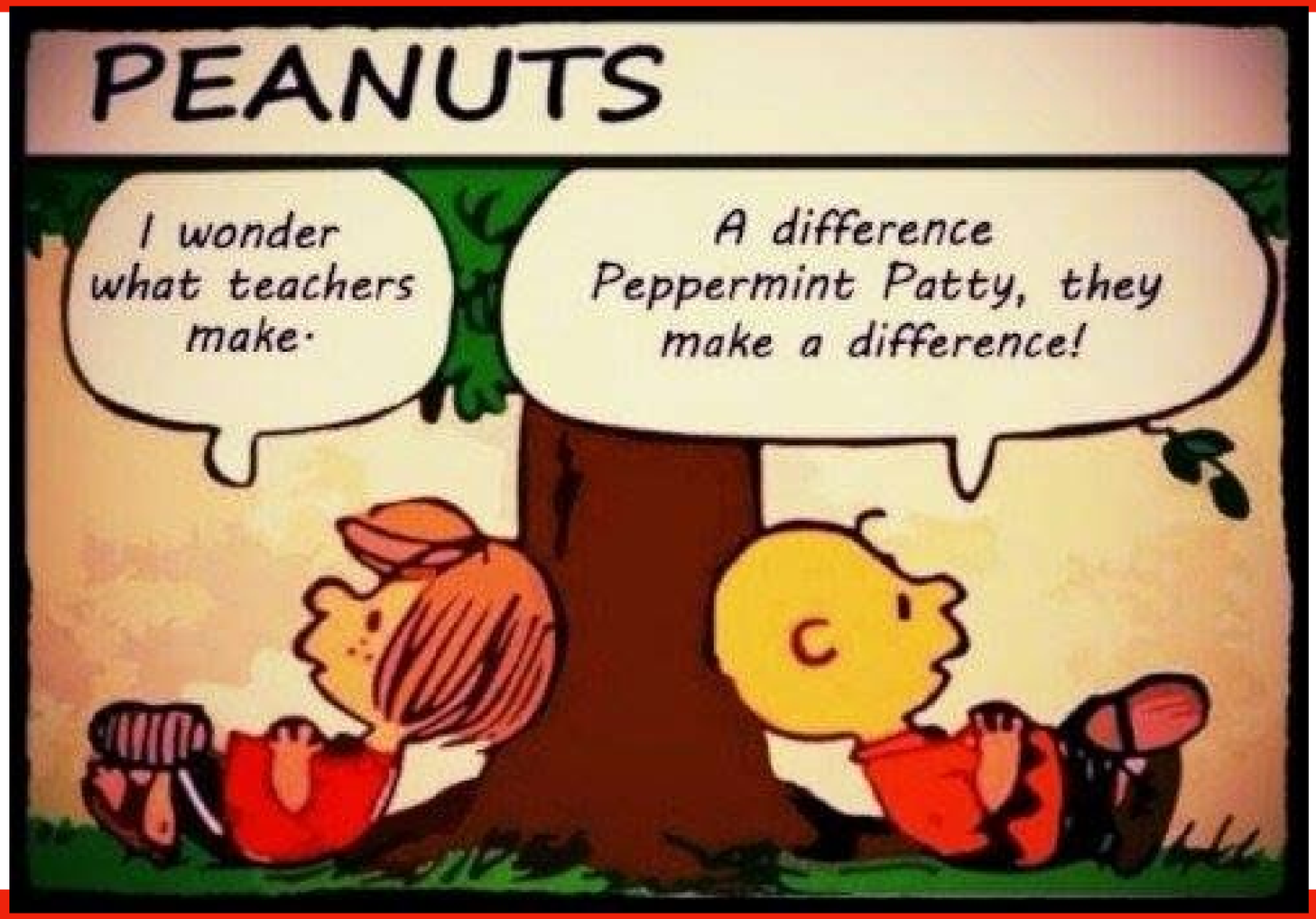
Brophy and Good

"The teacher carries the content to the students personally…but conveys information mostly in brief presentations **followed by recitation or application opportunities**."

Also Brophy and Good

…and last but not least

- Teaching and learning are often counterintuitive
- A good teacher is able to apply clear principles in an arena of chaos


PEANUTS
I wonder what teachers make.
A difference Peppermint Patty, they make a difference!

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Questions