# How Learning Works Part I*

## Prior Knowledge

Can hinder learning when:

- Inactive
- Insufficient
- Inappropriate
- Inaccurate

Methods to gauge prior knowledge

- Talk to colleagues to get sense of student's prior knowledge – where did they struggle?
- Give a diagnostic quiz – include responses that reveal misconceptions
- Have students assess their own prior knowledge
- Hold a discussion/brainstorming session (what do you know about…what comes to mind…)
- Look for patterns of error in student work

Methods to activate accurate prior knowledge

- Use exercises to generate students' prior knowledge (what do you already know about…)
- Explicitly link new material to knowledge from previous courses and from your own course
- Use analogies and examples that connect to students' everyday knowledge

Methods to address insufficient prior knowledge

- Identify prior knowledge you expect students to have
- Remediate insufficient prerequisite knowledge

Methods to help students recognize inappropriate prior knowledge

- Be explicit about when and how to apply prior knowledge, provide rules and guidelines
- Identify discipline-specific conventions and when they can be applied to other disciplines

Methods to correct inaccurate prior knowledge

- Ask student to make and test predictions, or to try to articulate and justify their reasoning
- Provide multiple opportunities for students to use accurate knowledge
- Recognize that deeply held misconceptions are harder to reverse

* Adapted from Susan A. Ambrose, Michael W. Bridges, Marsha C. Lovett, Michele DiPietro, and Marie K. Norman, *How Learning Works: Seven Research-Based Principles for Smart Teaching* (San Francisco: Jossey-Bass, 2010).

# How Learning Works Part I*

## Knowledge Organization

Experts = rich and meaningful knowledge structures
Novices = sparse and superficial knowledge structures

Strategies to reveal and enhance knowledge organization

- Create a concept map to analyze your own knowledge organization
- Analyze tasks to identify what type of knowledge organization is needed
- Provide students with the organizational structure of the course (advanced organizers)
- Explicitly share the organization of each lecture, lab, or discussion
- Explore concepts in depth, contrast and compare cases or examples, make connections among concepts explicit
- Encourage students to work with multiple organizing structures
- Ask students to draw a concept map or complete a sorting task to expose their knowledge organization – revisit over time
- Monitor students' work for problems in their knowledge organization

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