

vated and brought to bear on the reading task. Similarly, in problem solving, learners who already possess an automated schema or mental model have more processing capacity in working memory to apply that schema toward solving more sophisticated problems. An important question, then, is how to facilitate the construction and automation of schemata that are useful for solving problems of interest (Sweller, van Merriënboer, & Paas, 1998).

Sweller, van Merriënboer, and Paas contend that the general strategies most learners use to solve problems when they cannot activate an appropriate schema put heavy demands on working memory. Furthermore, these strategies (such as breaking the goal into component parts) are only peripherally related to learning. The desired learning goal is for learners to construct and automate the appropriate schema or mental model that pertains to the particular class of problems to be solved. Therefore, instructional strategies should be sought that reduce extraneous cognitive load but increase germane cognitive load (Sweller, van Merriënboer, & Paas, 1998). Germane cognitive load has to do with making sure that learners engage in the cognitive processes required to construct an appropriate schema. How instruction might facilitate meaningful learning and schema construction is discussed next.

### *Meaningful Learning, Schema Theory, and Instruction*

What do meaningful reception learning and schema theory have in common when it comes to implications for instruction? Clearly, prior knowledge plays an enormous role in both theories. What learners bring to the learning situation dictates to a large extent what they will take away from it in terms of new knowledge—concepts added to their cognitive structure or details elaborating schemata. But the content and organization of instructional materials are also important in both perspectives. Materials must be potentially meaningful to learners, organized so that connections are easily made between new information and that which is already known. To conclude this chapter, then, let us consider implications of meaningful reception learning and schema theory for activating prior knowledge, using prior knowledge in new situations, and making instructional materials meaningful.

#### **Activating Prior Knowledge**

Most learners already know something about any new topic they are asked to study, or they can make meaningful connections between what they know and what they are being asked to learn. However, possessing relevant prior knowledge is no guarantee that learners will activate and use it appropriately. It has been found in many conventional memory experiments, for example, that participants tend to view information they are asked to learn