

How people learn

Science of Learning

Best Practices for Teaching and Learning

To help our students learn, we need to know and understand how our students construct knowledge, what type of mental models they construct, and how they modify and adapt existing knowledge. We also need to understand what our students know and do not know prior to taking our courses and how prior knowledge impacts how they learned in our classrooms. In addition, understanding students' mental models and how they differ from those of experts is key. Last, we will look at how course design can affect whether students approach our courses through surface learning or through deep learning.

We will now take some time to explore each of these questions, mainly what the research tells us and what practical strategies we can use to translate these into classroom practices. Let's begin by exploring how people learn.

In the past 50 years, cognitive and learning science research has truly revolutionized and changed our understanding of how learning occurs. Prior views about learning, included the notion that learning is transmitted from the teacher to the student. In this view, the student could be compared to an empty vessel that could be filled with knowledge through teaching. In this view, teaching equals learning.

In recent years, this teacher-centered view has fallen out of favor. This has come as a result of our increased understanding of how people learn. Current views about learning argue that students construct their own knowledge. In this view, knowledge is not acquired from the teacher but rather constructed through the learner's own experiences and reflections.

Knowledge is formed when new information gets incorporated into pre-existing mental frameworks, which are based on prior experiences and notions. New information is either readily assimilated into pre-existing mental frameworks or causes their revision. In this view, teaching does not equal learning. We need to invest in strategies that facilitate our students' processes of knowledge construction, which may or may not involve actual teaching.

The finding that learning takes place through the construction of knowledge by the learner has significant implications for classroom instruction and course design. This means that we as teachers should think of ways to support our students with knowledge construction. We can do this through activities that facilitate meaning making and promote adaptation and revision of pre-existing mental frameworks.

To support meaning making and help students adapt to existing frameworks, you can ask students to draw concept maps. Concept maps are diagrams that illustrate how concepts relate to one another. When building concept maps, students identify the concepts learned and organize them into hierarchical schemes.

In this example, a concept map is used to explain the seasons. Concept map variables used to explain why we have seasons are placed inside boxes and are organized in a hierarchical manner, with the most inclusive and general variables at the top of the map and the most specific, less inclusive variables below.

Another important characteristic of concept maps is that the relationships between the different variables are indicated with arrows. And the nature of these relationships is shown with labels. Notice that some variables can be connected to more than one other variable. This cross-linking demonstrates rich interconnections that characterize deep understanding. Concept maps are extremely effective tools for learning, because they provide opportunities for students to build and revise mental frameworks and model the process of building mental models that experts developed through years of experience and practice.