

the larger sensory context in which teaching and communication occur. "Peripheral signals" are extremely potent. Even the unconscious signals that reveal our own inner attitudes and beliefs have a powerful effect on students. Educators, therefore, can and should pay extensive attention to all facets of the educational environment.

Principle 8: Learning always involves conscious and unconscious processes. One aspect of consciousness is awareness. Much of our learning is unconscious — experience and sensory input are processed below the level of awareness. Thus, much understanding may *not* occur during a class, but rather hours, weeks, or months later. Educators must organize what they do to facilitate that subsequent unconscious processing of experience by students. In practice, teachers should properly design the context; incorporate reflection and metacognitive activities; and provide ways to help learners creatively elaborate on the ideas, skills, and experiences. Teaching largely becomes a matter of helping learners make visible what is invisible.

Principle 9: We have at least two ways of organizing memory. Although many models of memory exist, one that provides an excellent platform for educators is the distinction made by O'Keefe and Nadel (1978) between taxon and locale memories. They suggest that we have a set of systems for recalling relatively unrelated information (taxon systems, from "taxonomies"). These systems are motivated by reward and punishment.

O'Keefe and Nadel also suggest that we have a spatial/autobiographical memory that does not need rehearsal and allows for "instant" recall of experiences. This is the system that registers the details of your meal last night. It is always engaged, inexhaustible, and motivated by novelty. Thus, we are biologically supplied with the capacity to register complete experiences. Meaningful learning occurs through a combination of both approaches to memory. Thus, meaningful and meaningless information are organized and stored differently.

Principle 10: Learning is developmental. Development occurs in several ways. In part, the brain is "plastic," which means that much of its hard wiring is shaped by people's experiences. In part, there are predetermined sequences of development in childhood, including windows of opportunity for laying down the basic hardware necessary for later learning. Such opportunities are why new languages, as well as the arts, ought to be introduced to children very early in life. And finally, in many respects, there is no limit to growth and to the capacities of humans to learn more.

Neurons continue to be capable of making, and strengthening, new connections throughout life.

Principle 11: Complex learning is enhanced by challenge and inhibited by threat. The brain/mind learns optimally — it makes maximum connections — when appropriately challenged in an environment that encourages taking risks. However, the brain/mind "downshifts" under perceived threat. It then becomes less flexible and reverts to primitive attitudes and procedures. That is why we must create and maintain an atmosphere of relaxed alertness, involving low threat and high challenge. Low threat, however, is *not* synonymous with simply "feeling good." The essential element of perceived threat is a feeling of helplessness and fatigue. Occasional stress and anxiety are inevitable and are to be expected in genuine learning. The reason is that genuine learning involves changes that lead to a reorganization of the self. Such learning can be intrinsically stressful, irrespective of the skill of, and support offered by, a teacher.

Principle 12: Every brain is uniquely organized. We all have the same set of systems, and yet we are all different. Some of this difference is a consequence of our genetic endowment. Some of it is a consequence of differing experiences and differing environments. The differences express themselves in terms of learning styles, differing talents and intelligences, and so on. An important corollary is to appreciate that learners are different and need choice, while ensuring that they are exposed to a multiplicity of inputs. Multiple intelligences and vast ranges in diversity are, therefore, characteristic of what it means to be human.

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