

Mind/Brain Learning Principles

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Principle One: The brain is a complex adaptive system.

Perhaps the most potent feature of the brain is its capacity to function on many levels and in many ways simultaneously. That is one reason why we have here subsumed two former principles ("The brain is a parallel processor" and "Learning engages the entire physiology"). Thoughts, emotions, imagination, predispositions and physiology operate concurrently and interactively as the entire system interacts with and exchanges information with its environment. Moreover, there are emergent properties of the brain as a whole system that can not be recognized nor understood when the parts alone are explored. Education **MUST** come to terms with the complex, multifaceted nature of the human learner.

Principle Two: The brain is a social brain.

"For the first year or two of life outside the womb, our brains are in the most pliable, impressionable, and receptive state they will ever be in" (Zen Physics, P.18). We begin to be shaped as our immensely receptive brain/minds interact with our early environment and interpersonal relationships. Vygotsky was partially responsible for bringing the social construction of knowledge to our awareness. It is through this dynamical interaction with others that therapy works, for instance. It is now clear that throughout our lives, our brain/minds change in response to their engagement with others - so much so that individuals must always be seen to be integral parts of larger social systems. Indeed, part of our identity depends on establishing community and finding ways to belong. Learning, therefore, is profoundly influenced by the nature of the social relationships within which people find themselves.

Principle Three: The search for meaning is innate.

In general terms the search for meaning refers to making sense of our experiences. This is survival-oriented and basic to the human brain/mind. While the ways in which we make sense of our experience change over time, the central drive to do so is life long. At its core the search for meaning is purpose and value driven. Something of the extent of human purposes was expressed by Maslow. Included are such basic questions as "who am I?" and "why am I here?" Thus, the search for meaning ranges from the need to eat and find safety, through the development of relationships and a sense of identity, to an exploration of our potential and the quest for transcendence.

Principle Four: The search for meaning occurs through "patterning".

In patterning we include schematic maps and categories, both acquired and innate. The brain/mind needs and automatically registers the familiar while simultaneously searching for and responding to novel stimuli. In a way, therefore, the brain/mind is both scientist and artist, attempting to discern and understand patterns as they occur

and giving expression to unique and creative patterns of its own. It resists having meaninglessness imposed on it. By meaninglessness we mean isolated pieces of information unrelated to what makes sense to a particular learner. Really effective education must give learners an opportunity to formulate their own patterns of understanding.

Principle Five: Emotions are critical to patterning.

What we learn is influenced and organized by emotions and mind-sets involving expectancy, personal biases and prejudices, self-esteem and the need for social interaction. Emotions and thoughts literally shape each other and cannot be separated. Emotions color meaning. Metaphors are an example as Lakov so aptly describes. Moreover, the emotional impact of any lesson or life experience may continue to reverberate long after the specific event that triggers it. Hence an appropriate emotional climate is indispensable to sound education.

Principle Six: Every brain simultaneously perceives and creates parts and wholes.

Although there is some truth to the "left-brain right-brain" distinction, that is not the whole story. In a healthy person, both hemispheres interact in every activity, from art and computing to sales and accounting. The "two brain" doctrine is most useful for reminding us that the brain reduces information into parts and perceives holistically at the same time. Good training and education recognize this, for instance, by introducing natural "global" projects and ideas from the very beginning

Principle Seven: Learning involves both focused attention and peripheral perception.

The brain absorbs information of which it is directly aware, but it also directly absorbs information that lies beyond the immediate focus of attention. In fact it responds to 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 impact on students. Educators, therefore, can and should pay extensive attention to all facets of the educational environment.

Principle Eight: Learning always involves conscious and unconscious processes.

One aspect of consciousness is awareness. Much of our learning is unconscious in that experience and sensory input is processed below the level of awareness. That means that much understanding may NOT occur during a class, but may occur hours, weeks or months later. It also means that educators must organize what they do so as to facilitate that subsequent unconscious processing of experience by students. In practice this includes proper design of the context, the incorporation of reflection and metacognitive activities and 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 Nine: We have at least two ways of organizing memory.

Although there are many models of memory, one that provides an excellent platform for educators is the distinction made by O'Keefe and Nadel 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 which 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, is inexhaustible and is motivated by novelty. Thus we are biologically supplied with the capacity to register complete experiences. It is through a combination of both approaches to memory that meaningful learning occurs. Thus meaningful and meaningless information are organized and stored differently.

Principle Ten: Learning is developmental.

Development occurs in several ways. In part, the brain is "plastic". That means that much of its hard wiring is shaped by the experiences that people have. In part, there are predetermined sequences of development in childhood, including windows of opportunity for laying down the basic hardware necessary for later learning. That is 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 new connections throughout life.

Principle Eleven: 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 which 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. However, low threat is NOT synonymous with simply "feeling good". The essential element of perceived threat is a feeling of helplessness or 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 Twelve: Every brain is uniquely organized.

We all have the same set of systems, and yet 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 both 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.

(See R. Caine and G. Caine, (1994) Making Connections: Teaching and the Human Brain, Addison-Wesley)

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