Memory in the Learning Process

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08/23/10
Learning styles assist those in pursuit of knowledge, but knowledge that cannot be committed to memory does not retain exceeding value. Memory is essential to learning, as memorization allows students to store and retrieve information obtained through the learning process. Through understanding the functions of human memory and how stressors can induce negative affects in the learning process, students will enhance their memorization ability.

Understanding the basic functions of how the human brain processes and stores information is key to enhancing memory ability. According to Michael Martinez (2010), Professor of Education, University of Irvine, CA, there are two major forms of memory. As stated by Professor Martinez “Some human memory, called long-term memory, is relatively durable. The mind also has memory that’s temporary, called short-term memory” (Martinez, 2010, p. 63). Short-term memory has the major characteristic of a small storage capacity. Short-term memory is used for brief tasks, daily tasks and recalling facts from long-term memory. Long-term memory has a large storage capacity, but has limitations. Particularly, information stored in long-term memory is often not accurate or complete. Learning occurs when information from short-term memory is processed and flows into long-term memory. The ability to recall allows information to flow from long-term memory back to short-term memory.

Professor Martinez notes that mankind has created marvels such as literature, music, architecture and medicine, even though the human brain contains a “distortive and selective memory” (Martinez, 2010, p.64). Meaning, the brain is selective in what experiences are
stored and the memory that is stored is not always true to reality. Distortive and selective memory is important to give consideration when processing information. Allowing for connections to be made and complete understanding is key to accurate information.

Understanding the brain’s cognitive architecture explains how the human brain functions and learns, thus giving valuable insight on how to improve memory. Author and educator Betty Garner defines cognitive structures as “the basic mental processes people use to make sense of information” (Garner, 2007, p.2). Garner describes the three main cognitive structures as comparative thinking, symbolic representation, and logical reasoning structures. Each structure processes types of information such as music, arts, literature, and language. In processing information using the cognitive structures, students will collect, organize and group information together finding meaningful patterns that result in an output of information. According to Garner, students that “know how to gather, process, and output information…have well-developed cognitive structures” (Garner, 2007, p. 2).

Since memorization is a type of cognitive structure that the brain uses to process, store and recall information, “The more connections we make through recognition and classification, the more likely we are to remember information” (Garner, 2007, p. 36). Also, memory does not record and store all information like a motion picture. The human brain may be processing multitudes of information, but the brain is not moving the bits of information into a “memory bank”. According to Garner, “Although memory stores bits of data without integration with existing knowledge, memorization as a cognitive structure activates different parts of the mind to reconstruct information” (Garner, 2007, p. 36) Therefore, the brain must make connections in order for information to be processed into long-term memory with the ability of recall.
With insight and understanding of brain function as it relates to memory in the learning process, students can increase memorization by utilizing cognitive learning. Understanding information tends to be simple, a person can read information and gain understanding, but memorization requires cognitive thought for information to be processed. According to Garner, “Continuous memory and long-term memory involve physical and mental skills that become automatic with practice and easily accessible when the person has a repertoire of processed information” (Garner, 2007, p. 37) Therefore, if information has complete understanding, rather than disconnected data, the information is more likely to be processed. Students that are aware of their individual learning styles will enhance their ability to become fully aware of the best way to understand and process information. Teachers who involve all learning styles, and students who take information and individualize, conceptualize and attach emotion to the information will have a very high likelihood of processing the information. As Garner points out “…memory is enhanced with positive or negative emotional associations; the stronger the emotional bond, the more vivid the memory” (Garner, 2007, p. 38).

Memory in the learning process can be difficult if learning does not take place in a state of mind and environment that is conducive to learning. Stress can play an enormous role on the brain’s ability to process information. According to research conducted at Ruhr-University Bochum in Germany, “Learning under stress reduced both free recall and recognition performance, irrespective of the emotionality and the stress context relatedness of the words” (Schwabe & Wolf, 2010, p. 183). Test findings clearly reveal stress during the learning process impairs efficient processing of information, thus impairing memory formation of learned material.
Men and women have complex physiological differences that affect many facets of how information is processed and recalled. Studies performed by the Department of Cognitive Psychology, Ruhr-University Bochum, show “…the effect of stress was comparable in men and women, women outperformed men in the free recall test” (Schwabe & Wolf, 2010, p. 183). Studies continue to investigate why stress affects learning and memory ability more so in men than women. According to a recent study of sex-specific neural processing as it relates to learning and memory, “…it is clear that ovarian hormones have a significant influence on how stress affects learning processes in females” (Beck & Luine, 2010, p. 204).

Sleep is vital to the human brain for processing, storing and coping with information learned and experienced. Studies conducted to analyze the affects of sleep deprivation on learning and memory processing show significant deficiencies in memory occur when students are sleep deprived. According to a collaborative study of the effects of sleep deprivation on memory, “Sleep deprivation results in a decreased ability to discriminate new items from those previously studied and reduced the amplitude of an early component to the decrement of performance” (Mograss, Guillem, Brazzini-Poisson, & Godbout, 2009, p. 343). Although the study shows information may still be learned and retrieved, details and the amount of information retrieved were significantly decreased. Sleep deprivation studies find “…sleep deprivation does not affect access or retrieval of the trace, …perhaps due to less local processing to details and a reduction in the amount of information retrieved” (Mograss et al., 2009, p. 351).

Understanding memory in the learning process is important to the academic success of any student. Through knowledge of memory function, memorization techniques and the negative affects of stress and sleep deprivation on memory; students can prepare both
physically and mentally to obtain successful memorization and study habits.
References


