

Notes

- Learning engages the entire person (cognitive, affective, and psychomotor domains).
- The human brain seeks patterns in its search for meaning.
- Emotions are an integral part of learning, retention, and recall.
- The brain's working memory has a limited capacity.
- Lecture results in the lowest degree of retention.
- **Rehearsal is essential for retention**
- The brain is a parallel processor performing many functions simultaneously

The brain goes through physical and chemical changes each time it learns.

- The dendrites are covered with little bumps, called spines, that contain chemical receptor sites. As the chemical messages enter the spines, they may spark a series of electrochemical reactions that cause this second neuron to generate a signal or "fire."
- The reaction causes more receptor sites to form on the spines. The next time neurotransmitters cross that particular synapse, the spines will take in more of these chemicals and the stimulation will be stronger, ultimately forming a new memory trace, or *engram*. **These individual traces associate and form networks so that whenever one is triggered, the whole network is strengthened, thereby consolidating the memory and making it more easily retrievable.**
- Memories are not stored intact. Instead, they are stored in pieces and distributed in sites throughout the cerebrum.

Persistence in Working and Long-Term Memories

The more connections that are made, the more understanding and meaning the learner can attach to the new learning, and the more likely it is that it will be stored in different networks. The process now gives the learner multiple opportunities to retrieve the new learning.

When the **signal repetitions along the axon are few**, then spines formed at the affected synapses **are too small to associate**. This, then, results in an essentially electrochemical reaction and may explain why information in working memory usually does not persist longer than a few hours. **If there are many repetitions of the impulse traveling along the neural pathway (through rehearsal and practice), then many larger spines are formed so that there are anatomical changes at the synapses and the memory trace persists.**

Retention of Learning & Rehearsal

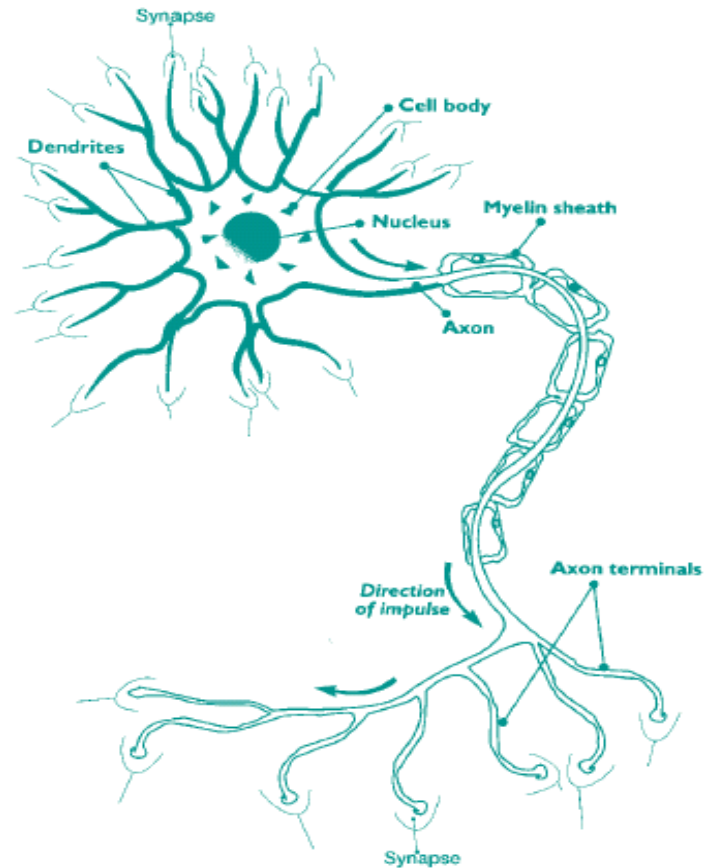
Retention refers to the process whereby long-term memory preserves a learning in such a way that it can locate, identify, and retrieve it accurately in the future.

It is an inexact process influenced by many factors, including the length and type of rehearsal that occurred, the critical attributes that may have been identified, the student's learning style, and, of course, the influence of prior learnings.

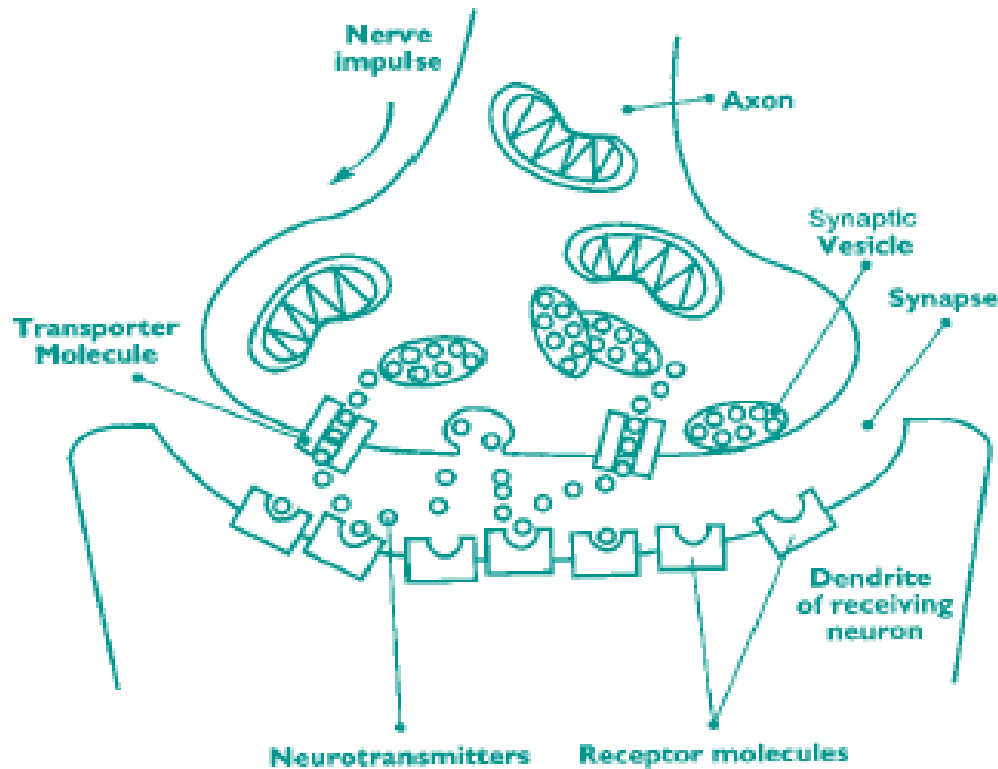
Learning & Rehearsal

The assignment of sense and meaning to new learning can occur only if the learner has adequate time to process and reprocess it.

This continuing reprocessing is called rehearsal and is a critical component in the transference of information from working memory to long-term storage.



Neuron: Nerve cell. The basic unit of the central nervous system, neurons are responsible for the transmission of nerve impulses. Unlike any other cell in the body, neurons consist of a central cell body as well as several threadlike "arms" called axons and dendrites, which transmit nerve impulses. Scientists estimate there are more than 100 billion neurons in the brain.



Axon: A long, single nerve fiber that transmits messages, via chemical and electrical impulses, from the body of the neuron to dendrites of other neurons, or directly to body tissues such as muscles.

Dendrite: Short nerve fibers that project from a nerve cell, generally receiving messages from the axons of other neurons and relaying them to the cell's nucleus.

Research on the Brain

Rats are exposed to three kinds of environments:

- 1. An barren, impoverished environment.**
- 2. A standard rat colony.**
- 3. An enriched environment full of toys and social contact.**

Brain Development

The cortex of rats in the enriched environment was thicker than that of rats in the standard colony and in the impoverished environment it was thinner versus the standard colony. With enrichment the brain grew and with impoverishment it decreased in size.

