2. Human Memory

Memory is essential for going about the daily business of our lives. We need memory for everything we do: perceiving the world, synthesizing and analyzing information, and applying knowledge to new situations. In fact, learning is the making of memory, which is laid down in our brains in chemical form. Chemical changes are created at the neuron level; without them, there's no substance for our minds to work with (**Weiss, 2000).**

When we looked at the literature, we can see an enormous number of different types of distinctions, concepts, and phenomena about the human memory.

In psychology, memory is an organism's ability to store, retain, and subsequently retrieve information. There are several ways to classify memories, based on duration, nature and retrieval of information. A basic and generally accepted classification of memory is based on the duration of memory retention, and identifies three distinct types of memory: sensory memory, short term memory and long term memory (www.wikipedia.org).

Another modality of memory concerns sensor-motor skill, like playing tennis, juggling, or driving a car. Typically such sensor-motor skills are conceptualized as programs that can be run or activated if required.

Within long-term memory, a number of additional distinctions, such as episodic memory or semantic memory, concern the kind of information stored or the form in which it is encoded, whereas semantic memory includes general world knowledge and language. Autobiographical memory, related to episodic memory, deals with people's recollections of their earlier lives. Yet another distinction is the one between procedural and declarative memory, which is very similar to semantic memory. Procedural memory contains know-how, programs on how to do things, whereas declarative memory contains facts (Chapter 15: Human Memory).

Figure-1 and Figure 15-2 (Chapter 15: Human Memory) have shown two models of memory. Both models do not explain the latest and all workings of our memory but they are useful representation for explaining the working of memory to broadest audience and mainly for education community or training department of businesses.

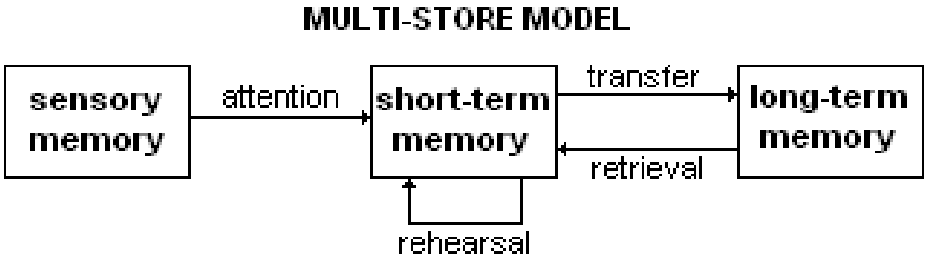

Figure 1: Atkinson-Shiffrin memory model (www.wikipedia.org).

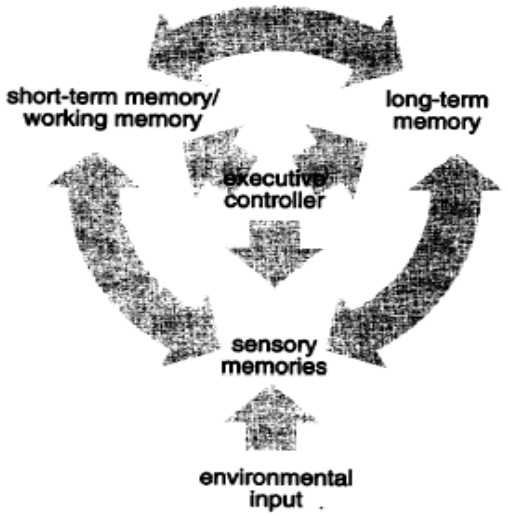

Figure 15.2 Flowchart model of memory. The model includes sensory memories that register environmental input, a short-term/working memory, and a long-term memory. An executive controller manages the information flow among these memory systems. (Redrawn from Ashcraft 1994, p. 68.)

The sensory memories act as buffers for stimuli received through the senses. A sensory memory exists for each sensory channel: like iconic memory for visual stimuli, echoic memory for aural stimuli and hap tic memory for touch. Information is passed from sensory memory into short-term memory by attention, thereby filtering the stimuli to only those, which are of interest at a given time. (Squire, 1987)

Short-term memory (STM) acts as a scratch pad for temporary recall of the information under process. For instance, in order to understand this sentence you need to hold in your mind the beginning of the sentence you read the rest. Short-term memory decays rapidly and also has a limited capacity. Chunking of information can lead to an increase in the short-term memory capacity. (Leake, et al. 1991) This is the reason why a

hyphenated phone number is easier to remember than a single long number. The successful formation of a chunk is known as closure. Interference often causes disturbance in short-term memory retention. This accounts for the desire to complete the tasks held in short term memory as soon as possible. (Thagard, 2005)

The storage in sensory memory and short-term memory generally has a strictly limited capacity and duration, which means that information, is available for a certain period of time, but is not retained indefinitely. By contrast, long-term memory can store much larger quantities of information for potentially unlimited duration (sometimes a whole life span). While short-term memory encodes information acoustically, long-term memory encodes it semantically (www.wikipedia.org).

The duration of information stays in sensory memory is 0.5 – 4 seconds, in short-term memory 17-21 seconds. Long-term memory is intended for storage of information over a long time. Information from the STM is transferred to LTM after a few seconds. Unlike in STM, there is little decay for LTM. The saving of information from short memory to long memory takes 3-10 seconds.

If we took all the above numbers and compare with our classrooms teachings process, what can we see? Normally, a person can talk 120-150 words per minute. Every 5-6 words are assumed as a chunk of meaning or concept. Let’s assume a kid

brain is saving each chunk in 5 seconds. In perfect classroom that kids have full attention to teacher and fully ready and motivated for the subject, a smart kid can save 60/5 = 15 chunk of info. On the other hand a slow talking teacher can say 120/5 = 24 chunk of info. The difference is 24-15 = 9 chunk. For perfect student attention and slow talking teacher, physically a student cannot get 9 chunk of info. In real classroom it is most likely that the number is much higher.

The truth is our current education system just bombards naïve brains with full of info that is more than physical capacity of learners brain.