Chapter – III

Conceptual Frame Work
## CONCEPTUAL FRAMEWORK

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CHAPTER - III

CONCEPTUAL FRAMEWORK

Chemistry is the integrated study of the preparation, properties, structure and reactions of the chemical elements and their compounds. Chemistry is considered an important subject in school and college curriculum as many professional and applied courses, directly or indirectly use of knowledge of chemistry. Moreover, the present age is the era of science and more number of people are being employed in scientific pursuits which require knowledge of chemistry. Chemistry education is also necessary because of its immense value in the student’s individual life as well as in society.

3.1. MEMORY

Psychologist have provided a variety of definitions of memory. These definitions and elaborate its characteristics. The following are some of the more enlightening definitions. According to Stout, Memory is a process to awaken, bring to life and recollect past experiences. Ryturn endorses the meaning of memory in the following words. “The power that people have to “to store” our experiences and to bring them in to the field of our consciousness some time after the experiences have occurred is termed as memory”. Levin Says Memory can be linked to a giant filing cabinet in the brain with data sorted, classified and cross filed for future reference (S. K Mangal, 2007)

3.1.1. Types of Memory

Affect Memory
Recall of emotion associated with a past event.

Antero grade Memory
Memory of the senile type which is able to recall events of the distant past but not those which have happened recently.
BRAIN & MEMORY
Aural Memory
The ability to recall things heard.

Visual Memory
The power to recall images.

Immunological Memory
The capacity of antibody producing cells to respond much faster and in great degree to subsequent stimuli than they did to the primary stimuli.

Kinaesthetic Memory
Recall of a past event in terms of the muscular action or effort associated with that event (Butter Worth, 1978).

M. Retrograde
Ability to recall events of recent occurrence but lacking ability to recall knowledge with which patient had previously been familiar Syn: amnesia, retrograde (Taber, 1990).

Remote Memory
Memory that is serviceable for events long past, but not able to acquire new recollections.

Replacement Memory
The replacing of one memory with another.

Screen Memory
A consciously tolerate memory serving as a "screen" for another memory that may be disturbing or emotionally painful if recalled (Dorland’s Pocket Medical Dictionary, 1969).

False Memory
An inaccurate or incomplete remembrance of a past event. Memory accuracy, validity, and reliability are affected by the following factors: age, serious illness, injury, or psychological trauma; prolonged medication therapy or use of a substance of abuse; mental retardation; mental illness, anxiety; preoccupation; fatigue; guilt and fear of penalty; and coercion and incentive to
testify falsely. These factors must be considered when evaluating the reliability of patient reported.

**Impaired Memory**

The state in which an individual experiences the inability to remember or recall bits of information or behavioral skills. Impaired memory may be attributed patho physiological or situational causes that are either temporary or permanent.

**Procedural Memory**

The memory capability that permits an individual to perform activities, this type of memory is usually preserved when other memory functions are lost.

**Recovered Memory**

A memory recalled after having been forgotten. Recall may be the result of psychotherapy or suggestion. However not all instances of recovered memory are accurate.

**Selective Memory**

Choice an older individual makes to remember only the pleasant memories of the past or those that are ego protective (Taber, 1992).

**Iconic Memory**

That part of the sensory storage system that holds visual stimuli.

**Immunologic Memory**

The capacity of the immuno system to respond more rapidly and strongly to subsequent antigenic challenge than to the first exposure called also amnesia.

**Physiological Memory**

The physical storage of engrams in the brain by means of RNA. The capacity to retain and retrieve impressions to recall or recognize previous experience (Darland, 1994).
Senile Memory

Memory that is good for remote events, often in contrast to current events, characteristically seen in aged persons.

Subconscious Memory

Information not immediately available for recall (Stedman, 1990).

3.2. MEMORY IMPROVEMENT TECHNIQUE

Whether memory can be improved by training is a controversial issue though its improvement is desired by all. Every one of people is keen to improve his sense organs and muscles etc., but the improvement of memory as such is not possible. The opinion expressed by Morgan-and Gilliland (1942) is relevant in this context:

Memory training is not like muscle training—individual can make a muscle develop by any kind of use. Memory is not helped by any kind of exercises.

Mere repetition of material for the sake of memorization in the form of mental exercise does not yield enduring and effective results. As stated earlier, memory consists of four factors—learning, retention, recognition and recall. Improvement in any one or more of these constituents is likely to improve memory as a whole. Therefore, to obtain a logical answer regarding the improvement of memory, its four different components have to be considered: Is it possible to improve learning, retention, recognition, and recall as independent functions? Let people examine these aspects and try to find an answer.

Retention, it is said, is native and inherited and, therefore, cannot be improved by training. People can, at the most, try to protect retentiveness by some measures but it is most hardly possible to improve it by training. In the case of recognition also, it is most difficult to say whether it can be improved by training as it happens to be a prompt and spontaneous act.
The remaining two constituents—learning and recall, have been observed to improve by training. Let people see how they can be improved.

1. While trying to recall something, individual should be free from excessive anxiety, fear and other emotional factors which tend to block memory.

2. Have confidence in our self and never think that individual would not be able to recall something. Be calm, avoid nervousness, and concentrate on the task of recall.

3. Remember that association of ideas, connection and systematic thinking, are very helpful in the task of recall. If, for example, individual need to recall the place where Individual have put the key of our drawer, and individual should try to think systematically with the help of the principle of association: where was I just before this time, what was I doing. I was taking a bath, so I may have put it in the cupboard of the bathroom. Proceeding like this individual can ultimately recall the exact place.

4. Do not strain ourself for too long to recall anything. If individual find it difficult to recall something, give up for a while and after allowing ourself a little time to relax, try again later.

Learning is the most important factor of memory. Improvement of memory to a large extent rests upon this factor which can be improved by training. Improvement in learning is mainly influenced by (a) the techniques and methods of learning, (b) the learning situations and environment, and (c) the learner's state of mind.

Improvement in all these aspects calls for interest and earnestness on the part of the learner. Let people now examine some of the requirements and techniques which can lead to successful results.

1. Will to learn. There must be firm determination or strong will to learn effectively and successfully. Where there is a will there is a way. Materials read, heard or seen without genuine interest or inclination are
difficult to be remembered for being recalled at a later time.

2. **Interest and attention.** Interest as well as close attention are essential for useful learning and memorization. A person who has no interest in what he learns, will not give due attention to it and consequently will not be able to learn it. Bhatia (1968) states this fact in the following words:

   Interest is the mother of attention and attention is the mother of memory; if individual would secure memory, individual must first catch the mother and the grandmother.

   Every care should, therefore, be taken to create the necessary interest in the material by making its purpose clear and linking it with one's natural instincts and urges. All the factors causing distraction should be reduced to a minimum so that full attention can be paid to the material in hand.

3. **Adopting proper methods of memorization.** There are several efficient methods of memorization but not all are suitable on all occasions and for all individuals. Therefore, a judicious selection should be made in choosing a particular method in a given situation.

4. **Following the principles of association.** It is always good to follow the principle of association in learning. A thing should never be learnt in an isolated, insular manner. An effort should be made to connect it with one's previous learning on the one hand and with as many related things as possible on the other. Sometimes, for association of ideas, special techniques and devices are used that facilitate learning and recall, e.g., the letters VIBGYOR have proved to be a very effective aid to remembering the colours of the rainbow. Many such associations may be formed and the material to be learned easily remembered with their help.

5. **Grouping and rhythm.** Grouping and rhythm also facilitate learning and help in remembering. For example the telephone number 567345234 can be easily memorized and recalled if people try to group it as 567 345 234.

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Similarly, rhythm also proves to be an aid in learning and memorizing. Children learn effectively the multiplication tables by reciting them in a singsong. The arrangement of the material in verse with rhythm and rhyme is found very useful in this direction. The rhyme about the days of the months is well known:

6. **Utilizing as many senses as possible.** Senses are said to be the gateways of knowledge and it has also been found that things are better learned and remembered when they are presented through more than one sense. Therefore, attempts should be made to take the help of audio-visual aid material and receive impressions through as many senses as possible.

7. **Arranging better learning situations.** Environmental factors also affect the learning process and due care should, therefore, be taken to arrange favourable learning situations and environment. A calm and quiet atmosphere and stimulating environment proves to be an effective aid to learning.

8. **The learner's internal factors.** Besides the various external factors there are things within the learner which affect his learning and capacity of recall. His physical and mental health and emotional state at the time of learning as well as reproduction of the material learnt counts a lot towards the effectiveness of his memory. Therefore, due attention should be given to the improvement of the student's health physical as well as mental. His emotions should also be trained and emotional tensions removed as far as possible.

9. **Provision for change and proper rest.** Adequate provision for rest, sleep, and variety in the work should be made as this helps to relieve fatigue and monotony. A mind which is fresh is naturally able to learn more and retain it for a longer period than a mind which is dull and fatigued.
10. **Repetition and practice.** Finally, repetition and continuous practice adds to the effectiveness of memorization. Intelligent repetition with full understanding always helps in making the learning effective and enduring and things repeated and practised frequently are remembered for a long time. Due attention should, therefore, be given to drill work practice and review etc. in the process of memorization and learning.

11. **Making use of SQ 4 R technique.** Thomas and Robinson (1972) developed this strategy for effective learning and memorization. In this technique, the learners are taught to adopt a systematic approach to learning the desired material involving, sequenced steps. i.e survey, question, read, reflect, recite and review. These steps are named and remembered through the letters SQ 4 R.

  - **Survey.** Initially, the material to be remembered is surveyed quickly to get an idea of what is going to be remembered.
  - **Question.** In this step the learner asks himself questions like why, what, when, where and who, concerning the material surveyed in the first step.
  - **Read.** The material is then read for mental comprehension and to learn the answers to the questions raised in the second step.
  - **Reflect.** The information given in the required material is organized and made meaningful by (a) linking it with the previous knowledge, (b) comparing and contrasting the facts, (c) correlating the information with other similar facts, concepts and principles, and (d) attempting to make use of the material in solving simulated problems.
  - **Recite and recall.** The information provided in the material is remembered through recitation and recall both orally and in writing.
• **Review.** In this final step, the material needed to be remembered is actively reviewed. The learner asks himself questions related to the information given in the material and in case he is unable to provide satisfactory answers, he reads the material again, recites and remembers it more carefully and then again evaluates his learning or remembering performance.

12. **Making use of mnemonics.** 'Mnemonic' is a Greek word meaning "aid to memory". In this sense, a device that helps people remember information is known as mnemonic and an entire system to improve or develop memory is called **mnemonics**. This system usually makes use of visual imagery to provide useful associations and connections for remembering the required material. Let people consider a few popular mnemonic devices.

(a) **The method of loci.** The word loci' means "locations" or "places" in Latin and the loci method is based on the assumption that location can serve as an effective cue for remembering the material. It consists of the following three steps:

(i) Developing one's own route by identifying a set of places which occur in some natural or familiar order (i.e. 20 or 30 locations in one's own house),

(ii) Converting each item one wants to remember into an image and storing it in a location (a stop on the decided route),

(iii) Dining retrieval or reproduction, taking a mental walk by recalling what was placed or stored in each place falling on the familiar route.

(b) **The peg-word method.** In this method people have to memorize:
(i) A set of peg-words rather than a set of locations as cues. The peg-words numbering 1—10 may be memorized with the help of a rhyme such as:

One is a gun
Six is sticks
Two is a shoe Seven is heaven
Three is a tree Eight is a gate
Four is a door Nine is wine
Five is knives Ten is a hen

(ii) Each item to be remembered is then converted to an image so that it figuratively hangs on one or the other peg; such as the words gun, shoe, tree, etc. in the foregoing rhyme,

(iii) At the time of recall, the peg-words serve as cues. What one has to do is to simply follow the peg-words in numerical order.

(c) The narrative-chaining method. This method consists of making up a story built around whatever things one wants to remember. Here the plot or incidences of the story work as a clue for remembering the items.

(d) Initial letter strategy. In this strategy, the initial letters are the focus for remembering and association. Suppose one has to remember the order of the planets going away from the sun, what he has to do is to take the initial letters of the list of the planets and then make a more easily remembered word or phrase like: "Men very easily make jugs serve useful nocturnal purposes". This phrase can be helpful in making the proper associations and then remembering the order of planets i.e., mercury, venus, earth, mars, jupiter, saturn, uranus, neptune and pluto.
Similarly, for remembering the steps to simplify mathematical expressions one can make use of mnemonic BODMAS which stand for bracket (B), of (O), division (D), multiplication (M), addition (A), and subtraction (S) respectively.

(e) The keyword method. This method makes use of imagery for remembering the difficult, uncommon and unfamiliar words and items. For example, if one wants to learn 'golova' the Russian word for head, one looks for a keyword resembling and associated with the word golova. It may be Gulliver. Now a mental image can be built around this keyword making note of the other word 'head' of the desired pair for associate learning. For this purpose the learner may visualize Gulliver with his head tied down by the lilliputians and this portrait or mental image may now help him to remember the Russian word 'golova' associated with its English equivalent 'head' (S. K. Mangal, 2007)

3.3 NEURAL ASPECT OF MEMORY

Immediate memory lasts for few seconds, e.g. memory upto 7-10 telephone numbers. Memory only lasts as long as the person continues to think about the numbers.

Suggested mechanisms of immediate memory:

- Continual neuronal activity due to traveling of signal through a circuit of reverberating neurons.
- Presynaptic facilitation or inhibition- This occurs in the synapses that lie on the presynaptic terminals and not in the subsequent neuron. This causes prolonged facilitation or inhibition for as long as few seconds to a minute.
- Synaptic potentiation-When train of impulses passes along the presynaptic terminal, the amount of calcium ion increases with each impulse. When it becomes greater, there is prolonged release of neurotransmitter at the synapse.
Short-Term Memory

Short-term memory lasts for many minutes to many weeks. This results from temporary physical or chemical changes or both at the presynaptic terminal.

1. One terminal is from primary input sensory neuron and terminates on the surface of the neuron that is to be stimulated. This is called sensory terminal. The other terminal lies on the sensory terminal and is called facilitator terminal. Changes occur as follows:

   (a) Stimulation of facilitator neuron at the same time so that the sensory neuron is stimulated. It causes serotonin release at the facilitator synapse on sensory presynaptic terminals.

   (b) Serotonin acts on the receptors present in the sensory terminal surface and activates adenyl cyclase which causes formation of cyclic AMP.

   (c) Cyclic AMP activates protein kinase which causes phosphorylation of a protein that is the part of potassium channels. This blocks the channel. This blockage can last for few minutes to few weeks.

   (d) Blockage of potassium channels prolongs the action potential which causes activation of calcium pores. Large quantities of calcium enter the sensory terminal causing greater release of transmitter which greatly facilitates synaptic transmission. Thus when sensory neuron and facilitator neuron are simultaneously stimulated, facilitator neuron causes prolonged change in sensory terminal that produces memory trace.

2. Second suggested mechanism for short-term memory-Stimuli from two separate sources acting on a single sensory neuron can cause long term changes in the membrane properties of the entire postsynaptic neuron under appropriate conditions.
MECHANISM OF LONG TERM MEMORY

- Working memory
- Long-term memory

- Incoming information
  Need room to process

- Active processing
  A. Receive new
  B. Recall stored
  C. Integrate new with stored

- Stored mental models
Long-Term Memory

Long-term memory is due to actual structural changes at the synapse that enhance or suppress signal conduction. There is no real demarcation between more prolonged type of short-term memory and long-term memory.

Suggested mechanism for long-term memory:

1. There is increase in total area of the vesicular release site in the presynaptic terminal during development of long-term memory traces. Increase in vesicular site starts within hours after initiating the training session.

2. There is also increase in the number of transmitter vesicles in the presynaptic terminal.

In addition, there is also increase in number of terminals themselves, i.e. number of synapses increases. Both these effects facilitate signals transmission. This is the basis of learning. It is also possible that there is change in the number of neurons in the used circuits. For immediate memory to be converted into either short-term or long-term memory, it must become consolidated, i.e. memory must in some way initiate the chemical, physical and anatomical changes in the synapses that are responsible for the long-term type of memory. This process requires 5 - 10 min for minimum consolidation and an hour or more for maximal consolidation. This occurs due to phenomenon of rehearsal, i.e. rehearsal of same information again and again (Vijaya, D. Joshi, 1995)

Memory and Emotion

Emotions and memory are closely linked. After having a pleasant or unpleasant experience, one would like to remember it so that the pleasant experiences can be repeated and unpleasant ones can be avoided. Among the limbic structures, memory function has been localized to the hippocampus and the temporal limbic cortex.
Hippocampus is responsible for immediate memory and for selecting the experiences which need to be transferred to long term memory. For example, a telephone number found from the directory is ordinarily remembered only as long as is necessary for dialing it. But if it is a number likely to be needed frequently, an effort is made to ‘transfer’ it to long term memory. The temporal limbic cortex is responsible for memory of complex sequences. The function seems to be asymmetrically localized. The left temporal cortex seems to specialize in remembering verbal material and the right temporal cortex remembers other sensory inputs. (R.L. Bijlani, Jaypee, 1995)

Memory and Learning

Memory and learning are closely linked. Remembering does not ensure learning but some degree of remembering is essential for all types of learning (R. L. Bijlani, Jaypee, 1995).

Brain areas involved in the neuroanatomy of memory such as the hippocampus, the amygdala, the striatum, or the mammillary bodies are thought to be involved in specific types of memory. For example, the hippocampus is believed to be involved in spatial learning and declarative learning, while the amygdala is thought to be involved in emotional memory. Damage to certain areas in patients and animal models and subsequent memory deficits is a primary source of information. However, rather than implicating a specific area, it could be that damage to adjacent areas, or to a pathway traveling through the area is actually responsible for the observed deficit. Further, it is not sufficient to describe memory, and its counterpart, learning, as solely dependent on specific brain regions. Learning and memory are attributed to changes in neuronal synapses, thought to be mediated by long-term potentiation and long-term depression.

Hebb distinguished between short-term and long-term memory. He postulated that any memory that stayed in short-term storage for a long enough
time would be consolidated into a long-term memory. Later research showed this to be false. Research has shown that direct injections of cortisol or epinephrine help the storage of recent experiences. This is also true for stimulation of the amygdala. This proves that excitement enhances memory by the stimulation of hormones that affect the amygdala. Excessive or prolonged stress (with prolonged cortisol) may hurt memory storage. Patients with amygdalar damage are no more likely to remember emotionally charged words than nonemotionally charged ones. The hippocampus is important for explicit memory. The hippocampus is also important for memory consolidation. The hippocampus receives input from different parts of the cortex and sends its output out to different parts of the brain also. The input comes from secondary and tertiary sensory areas that have processed the information a lot already. Hippocampal damage may also cause memory loss and problems with memory storage.

Memorization: Memorization is a method of learning that allows an individual to recall information verbatim. Rote learning is the method most often used. Methods of memorizing things have been the subject of much discussion over the years with some writers, such as Cosmos Rossellius using visual alphabets. The spacing effect shows that an individual is more likely to remember a list of items when rehearsal is spaced over an extended period of time. In contrast to this is cramming which is intensive memorization in a short period of time. Also relevant is the Zeigarnik effect which states that people remember uncompleted or interrupted tasks better than completed ones. In March 2007 German researchers found they could use odors to re-activate new memories in the brains of people while they slept and the volunteers remembered better later. At the Center for Cognitive Science at Ohio State University, researchers have found that memory accuracy of adults is hurt by the fact that they know more than children and tend to apply this knowledge when learning new information. The findings appeared in the August 2004 edition of the journal Psychological Science.
Interference can hamper memorization and retrieval. There is retroactive interference when learning new information causes forgetting of old information, and proactive interference where learning one piece of information makes it harder to learn similar new information. Emotion can have a powerful impact on memory. Numerous studies have shown that the most vivid autobiographical memories tend to be of emotional events, which are likely to be recalled more often and with more clarity and detail than neutral events. The International Longevity Center released in 2001 a report which includes in pages 14–16 recommendations for keeping the mind in good functionality until advanced age. Some of the recommendations are to stay intellectually active through learning, training or reading, to keep physically active so to promote blood circulation to the brain, to socialize, to reduce stress, to keep sleep time regular, to avoid depression or emotional instability and to observe good nutrition.

3.4. MODELS OF MEMORY

3.4.1. Information Processing Approach

In their efforts to understand memory storage, theorists have historically related it to the technologies of their age. One of the earliest models used to explain memory storage was the wax tablet. Both Aristotle and Plato compared memory to a block of wax that differed in size and hardness for various individuals. Remembering, according to this analogy, was like stamping an impression into the wax. As long as the image remained in the wax, the memory would remain intact.

Current theories of memory reflect the technological advances of the 20th Century. Many modern theories draw in analogy between information storage, by computers and information storage in human memory. This information – processing theories emphasize how information flows through a series of separate memory stores. The most prominent information - processing model of memory holder that there are three memory stores, a sensory memory
store, a short-term memory store, and a long term memory store. Many psychologists have contributed to this theory, but Richard Atkison (1968) and Richard Shiffrin (1971) were especially influential.

During the past three decades, memory research has been driven by the “cognitive revolution” in psychology, which views the mind as an information processor. The Atkison and Shiffrin model of memory assumes that memory involves the processing of information in three successive stages: Sensory Memory, Short-Term Memory and Long Term Memory. Sensory Memory stores, in sensory registers, exact replicas of stimuli impinging on the senses. Sensory memories last for a brief period from less than 1 second to several seconds. When an individual attend to information in sensory memory, it is transferred to short-term memory, which stores it for about 20 seconds. Unless, the individual maintains it through mental rehearsal as when the individual repeat a phone number to our self long enough to dial it. Information transferred from short term memory into long-term memory can be stored for up to a lifetime. Our ability to recall old memories indicates that information also passes from long-term memory into short-term memory.

The handling of information at each memory stage has been compared to information processing by a computer, which involves encoding, storage, and retrieval; Encoding is the conversion of information into a form that can be stored in memory. When the subject strikes those keys on a computer.
keyboard, actions are translated into a code that the computer understands. Similarly, information in memory is stored in codes that brain can process. Storage is the retention of information in memory. Personal computers typically store information on diskettes on hard disks. In human and animal memory, information is stored information in diskettes on hard disks. In human and animal memory, information is stored in the brain. Retrieval is the recovery of information from memory. When the student strikes certain keys, people provide the computer with cues that make it retrieve the information of student's desire. Similarly, people often rely on cues to retrieve memories that have been stored in the brain. All the individuals are also subject to forgetting the failure to retrieve information from memory. This is analogous to the erasing of information of a diskette. Thus information – processing model of the memory assumes that information such as phone number passes from sensory memory to short term memory to long term memory. Information may also pass from long – term memory to short term memory. Each of the stages involves information encoding, storage and retrieval (Distance Education, 1995)

System of Memory

Sensory memory stores in sensory registers exact replicas of stimuli impinging on the senses. Sensory memories last for a brief period—from less than 1 second to several seconds. When the student attends to information in sensory memory, it is transferred to short-term memory, which stores it for about 20 seconds. Unless it is maintained through mental rehearsal—as when the student repeats a phone number to himself long enough to dial it. Information transferred from short-term memory into long-term memory can be stored for up to a lifetime. Our ability to recall old memories indicates that information also passes from long-term memory into short-term memory.

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**Sensory Memory**

Regardless of the individual subtypes, sensory memory in general is able to store information for only a very short time. If material does not pass to short-term memory, that information is lost for good. For instance, iconic memory seems to last less than a second, although if the initial stimulus is very bright, the image may last a little longer. Echoic memory fades within brief duration of sensory memory, its precision is high: It is able to store an almost exact replica of each stimulus to which it is exposed. If the storage capabilities of sensory memory are so limited and information stored within sensory memory so **fleeting**, it would seem almost impossible to find evidence for its existence; new information would constantly be replacing older information,
even before a person could report its presence. In sum, sensory memory operates a kind of snapshot that stores information which may be of a visual auditory, or other sensory nature for a brief moment in time but it is as if each snapshot, immediately after being taken is destroyed and replaced with a new one. Unless the information in the snapshot is transferred to some other type of memory, it is lost. Because the sensory memory holds only raw, unprocessed sensory information it is sometimes seen as a sensory buffer, or way station, situated between the external environment and internal memory.

Short Term Memory

Short-term memory is the memory stored in which material first has meaning, although the maximum length of retention is relatively short. It appears that short term memory can encode only about seven separate items (plus or minus two) — limited capacity and can hold them for only a limited time. Estimates of how long information can be retained in STM vary from about a few seconds to almost a minute. Since seven in the typical number of separate items in a Telephone number, STM is often referred to as Telephone number memory. Thus, if people were verbally given a phone number, people could most probably hold it in STM long enough to pick up the phone and dial the number. However, if the other party didn’t answer the ring or there was a busy signal, people probably could not recall the number long enough to dial a second time.

Even though STM is restricted to about seven items; the items may be grouped together or chunked. In this way several items may be packaged together and processed as a single element. For example it is asked to repeat a series of nine digits, a number that is pushing the limit of the “magical” value of seven plus or minus two by chunking the digits into groups of three; however individual then have to hold only three separate items in mind, not a difficult task. The same is true for letters. Whereas a random set of seventeen letters pushes for beyond its limit, by chunking the letters, retention can be
Conceptual Framework

made easy. Take the letters OPECIBMSONARRADAR, which is a total of seventeen letters. If individual chunk them into OPEC, IBM, SONAR, and RADAR, the task of remembering them falls far short of STM capacity.

Although it is possible to remember seven or so relatively complicated sets of information entering short-term memory, the information cannot be held there very long. Most psychologists believe that information in short-term memory is lost after fifteen to twenty-five seconds-unless it is transferred to long-term memory by rehearsal.

Whether the transfer is made from short-to-long-term memory seems to depend largely on the kind of rehearsal that is carried out. If the material is simply repeated over and over again as people might do with a telephone number while people rush from the phone book to the telephone it is kept current in short-term memory, but is will not necessarily be placed in long-term memory. Instead, as soon as people stop dialing, the number is likely to be replaced by other information and will be completely forgotten.

On the other hand, if the information in short-term is rehearsed using a process called elaborative rehearsal; it is much more likely to be transferred into long-term memory. Elaborative rehearsal occurs when the material is considered and organized in some fashion. The organization might include expanding the information to make it into a logical frame work, linking it to another memory, turning it into an image, or transforming it in some other way. For example, a list of vegetables to be purchased at a store could be woven together in memory as items being use to prepare an elaborate salad; they could be linked to the items bought on an earlier shopping trip; or they could be thought of in terms of the image of a farm with rows of each item.

Working Memory: The Components of Short-Term Memory

Although short-term memory has traditionally been considered as a single system, more recent evidence suggests that it may actually consist of
several components. According to psychologist Alan Baddeley, short-term memory is better thought of as a **three-part working memory**. In this view, one component is the **central executive**, which coordinates the material to focus on during reasoning and decision-making. The central executive makes use of two sub-components: the **visuospatial sketch pad** and the **phonological loop**. The visuospatial sketch pad concentrates on visual and spatial information, while the phonological loop is responsible for holding and manipulating material relating to speech, words and numbers.

Some researchers suspect that a breakdown in the central executive may result in the memory losses that are characteristic of **Alzheimer’s disease**, the progressively degenerative disorder that produces loss of memory and confusion.

**Long Term Memory**

Researchers in the area both cognitive and brain science are now suggesting that people may have at least two **long term memory systems**, one for **declarative memory** and the other for **procedural memory**. The declarative memory has **episodic memory** and **semantic memory**. It can be represented diagrammatically as follows.

```
Long-term memory
      |                          |
Declarative memory       Procedural memory
      |                          |
Episodic memory           Semantic memory
```

**Declarative Memory**

Declarative memory represents the storehouse of **factual in formations** such as dates, names, facts, places, faces, and past experiences. It is called
"declarative" because it can be brought to mind and stated or declared in the sense of a fact, propositions, or image. There are two types of declarative memories

1. Episodic and
2. Semantic Memory.

Episodic Memory

It is also known as "autobiographical" memory. As its name implies consists of one’s memory for personal past episodes in one’s life. It is made up mostly of images from personal experiences organized on the basis of when and where they occurred-chronologically organized.

It is as though our lifetime experiences were on a long reel of movie film, and people rewind the reel to go back and look at the images on a few frames. Our ability to recall what people did last night or last week or even years ago is based on our retrieval of episodic memory.

Try to remember our childhood home, its colour and shape, our bedroom and where our parents slept or people can recall our school days, the classroom people were in, the area people played in at recess and our first fight with our neighborhood bully. These memories are stored as images and are related to one another by space and time, and so if people shut our eyes and relax, people can probably imagine many of those childhood scenes.

Semantic Memory

It contains our storehouse of words and the meaning of words, facts, general information, concepts, and the rules for learning most of the things that people were supposed to learn in school. Because of semantic memory people remember that 2x2=4 and "menoree" is misspelled. The organization of this memory is grounded, not on an ordered-time basis, but on net works of interconnected relationship and ideas called schemata, as a plural, or schema in the singular. For example individual might have a schema which covers
virtually everything individual know about football: that there are referees, that there are eleven players on each side, that players may get injured, that a touchdown counts for six points and so on. That is, any body information to a central core concept represents a schema.

**Procedural Memory**

It contains memory of motor skills, typically learned through repetitive practice and conditioning. A person relies on procedural memory when tying shoes, playing a musical instrument, riding a bicycle, hitting a ball and typing. Any one who doubts that procedural memory is a valid phenomenon should try asking typists where certain letter on the keyboard. Watch as their fingers flex out the answer. That this memory system is separate from declarative memory is evidence by a series of reports on individuals who have underdone brain surgery and apparently, on occasion, lost one type of memory but not the other. Also, patients with Alzheimer’s disease often show no impairment of their procedural memory, but cannot recall the names of their children.

**Recalling Long-Term Memories**

Have individual ever tried to remember someone’s name, convinced that individual knew it but unable to recall it no matter how hard individual tried’ This not infrequent occurrence-known as the tip of the tongue phenomenon exemplifies the difficulties that can occur in retrieving information stored in long-term memory. Thus is the inability to recall information that one realizes one knows—a result of the difficulty of retrieving information form long-term memory.

**Retrieval Cues**

The capacity of long-term memory is vast, given the broad range of people’s experiences and educational backgrounds. For instance, if individual are like the average college student, our vocabulary includes some 50,000 words, individual know hundreds of mathematical “facts” and individual are
able to conjure up images-such as the way our childhood home looked-with no trouble at all. In fact, simply cataloging all our memories would probably take years of work.

How do people sort through this vast array of material and retrieve specific information at the appropriate time? One of the major ways is through the use of retrieval cues. A retrieval cue is a stimulus that allows people to recall information that is located in long-term memory more easily. It may be a word, an emotion, a sound; whatever the specific cue, a memory will suddenly come to mind when the retrieval cue is present. For example, the smell of roasting turkey may evoke memories of Thanksgiving or family gatherings.

Retrieval cues guide people through the information stored in long-term memory in much the same way as the cards in a card catalogue guide people through a library. They are particularly important when people are making an effort to recall information, as opposed to our being asked to recognize material stores in memory. In recall, a specified piece of information must be retrieved-such as that needed to answer a fill-in-the-blank question or write an essay on a test. In contrast, recognition occurs when people are presented with a stimulus and asked whether they have been exposed to it previously, or are asked to identify it from a list of alternatives.

Flashbulb Memories

Flashbulb memories are memories centered on a specific, important, or surprising event that are so vivid it is as if they represented a snapshot of the event (Distance Education, 1995).

3.4.2. Levels of Processing

Craik and Lockhart (1972) proposed that it is the method and depth of processing that affects how an experience is stored in memory, rather than rehearsal.
• **Organization** - Mandler (1967) gave participants a pack of word cards and asked them to sort them into any number of piles using any system of categorization they liked. When they were later asked to recall as many of the words as they could, those who used more categories remembered more words. This study suggested that the act of organizing information makes it more memorable.

• **Distinctiveness** - Eysenck and Eysenck (1980) asked participants to say words in a distinctive way, e.g. spell the words out loud. Such participants recalled the words better than those who simply read them off a list.

• **Effort** - Tyler et al. (1979) had participants solve a series of anagrams, some easy (FAHTER) and some difficult (HREFAT). The participants recalled the difficult anagrams better, presumably because they put more effort into them.

• **Elaboration** - Palmere et al. (1983) gave participants descriptive paragraphs of a fictitious African nation. There were some short paragraphs and some with extra sentences elaborating the main idea. Recall was higher for the ideas in the elaborated paragraphs.

### 3.4.3. Cognitive Effort Model of Memory

The cognitive effort model is a dynamic model stating that the critical variable for reliable memory is related to the degree of cognitive effort used when processing the information with increased cognitive effort; more distinct and durable memories are established. According to this model, the degree of motivation expended in establishing a memory determines the level of success of memory consolidation and later retrieval, in essence, the harder individual try to encode a memory the more successful individual will be. Let people caution individual here that this effort must first be correctly placed in order to be effective. The final model of memory that people will introduces is the depth of processing model, (Douglas. J. Mason .D Michael L. Kohn. D 2002).

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3.5. MEMORY ENHANCING STRATEGIES

3.5.1. Memory and Strategies

“All improvement in memory consists of one’s habitual method of recording facts” - Dr. William James, Father of American Psychology

In psychology, memory is an organism's ability to store, retain, and recall information. Traditional studies of memory began in the fields of philosophy, including techniques of artificially enhancing the memory. The late nineteenth and early twentieth century put memory within the paradigms of cognitive psychology. In recent decades, it has become one of the principal pillars of a branch of science called cognitive neuroscience, an interdisciplinary link between cognitive psychology and neuroscience. From the information processing perspective there are three main stages in the formation and retrieval of memory:

- Encoding or registration (receiving, processing and combining of received information)
- Storage (creation of a permanent record of the encoded information)
- Retrieval, recall or recollection (calling back the stored information in response to some cue for use in a process or activity)

Mnemonics

Mnemonics is a Greek word meaning “aid to memory”. In this sense, a device that helps people remember information is known as mnemonic and an entire system to improve or develop memory is called mnemonics. This system usually makes use of visual imaginary to provide useful associations and connections for remembering the required material. The mnemonic devices of improving memory include the following.
The Method of Loci

The word ‘Loci’ means “location” or “place” in Latin and loci method is based on the assumption that location can serve as an effective cue for remembering the material. It consists of the following three steps.

i. Developing one’s own route by identifying a set of places which occur in some natural or familiar order.

ii. Converting each item one wants to remember into an image and storing it in a location.

iii. During retrieval or reproduction, taking a mental walk by recalling what was placed. (S. K. Mangal, 2007)

In the method of loci people have to associate new information with a series of specific physical locations that are already firmly established in our memory.

About 2,500 years ago the Greek poet Simonides stepped outside of the banquet hall where he was to recite a poem in honor of a nobleman — while Simonides was outside, the hall collapsed, killing all the guests and crushed them beyond recognition. Yet, by recalling where each guests and crushed them Simonides was able to identify each of them, he called this the method of loci (Loci means “Place” in Latin), which he recommended to orators because paper and pens were too expensive to waste on writing routine speeches. The method of loci is useful for memorizing lists of them.

In the method of loci people have to associate new information with a series of specific physical locations that are already firmly established in our memory, for example, Luria (1968) studied a man referred to as ‘S’, who exhibited an extraordinary memory. To begin with, he simply visualized himself walking along a familiar street. While on this mental walk S would visualize the specific items, all he had to do was go on his imaginary walk. As he “arrived” at each location, the image associated with that location, and therefore the item he wanted to remember, would be elicited (Distance Education, 1995)
Conceptual Framework

**Acronym**

An invented combination of letters with each letter acting as a cue to an idea need to be remembered. Example: - BRASS is an acronym for how to shoot a rifle — Breath, Relax, Aim, and Sight Squeeze.

**Acrostic**

An invented sentence where the first letter of each word is a cue to an idea need to remember. *Every Good Boy Deserves Fun* is an acrostic to remember the order of the G- Clef notes on sheet music — E, G, B, D, F. (www.uofaweb.ualbertaca/a dated: 18.07.2007)

**PEG Word — Rhyming Method**

Like the method of loci, the main idea of these systems is to establish, in long term memory, a well-organized set of images (pegs) to which the to be remembered item can be linked. In number system, individual form an image with each number. For instance, a rhyming system can be used for the numbers 1 through 10. Think of words that rhyme with the numbers — 1 is a burn, 2 is a shoe, 3 is a tree, 4 is a door and so on. Now when individual have a list to remember, individual can associate the items on the list with images of the numbers. If the first item on a grocery list is coffee, imagine a steaming cup of coffee next to a plate of buns: if the second item is hamburger, imagine a giant shoe squashing ham burger into a party: and so on through the list, associating the number images with what is to be remembered (Distance Education, 1995).

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>bun</td>
</tr>
<tr>
<td>Two</td>
<td>shoe</td>
</tr>
<tr>
<td>Three</td>
<td>tree</td>
</tr>
<tr>
<td>Four</td>
<td>door</td>
</tr>
<tr>
<td>Five</td>
<td>hive</td>
</tr>
<tr>
<td>Six</td>
<td>sticks</td>
</tr>
<tr>
<td>Seven</td>
<td>heaven</td>
</tr>
</tbody>
</table>
Conceptual Framework

Eight         gate
Nine          vine
Ten           pen

This technique is used to memorize ten rhyming words. It is relatively easy to remember this list because the chosen words end in sound similar to the sound of words 1, 2, 3 etc. Use the same list of rhyming words to memorize different lists. Choose these rhyming words so that it can be easily made a picture of what the word represents (Raj Bapna, 2000).

Spelling Strategy

One good way to reduce spelling mistakes for the purpose of exams and writing is to write essays or write answers for previous question papers, and to have some teacher check answers. In this way the mistake can be found. Here are mnemonics for remembering some spellings. Stationary, stationery – is to be written as stationery. Or stationery uses envelopes. Notice the letter ‘e’

Arithmetic: Use this sentence: A Rat in the House May Eat the Ice Cream. The first letter of each word in this sentence makes the spelling arithmetic

Believe : Believe has a ‘lie’ in it.
Committee MM, TT and EE met in a Committee
Conscience – Does Science have a conscience
Desert – one ‘S’ because it is So dry
Dessert – Two ‘S’ because it is So Sweet.
Separate – To spell separate, just remember that it contains ‘a rat’.
Cheque – Cheque comes in a ‘Q’
Enterance – There is no ‘enter’ in entrance, That is the word ‘enter’ is not within the word ‘entrance. (Raj Bapna, 2000)
Visualizing Structure

The socially important business of associating names with faces is a different matter. There are no notes to help this. As first step in establishing a good memory for names and faces, people should.

1. Be sure people hear the name clearly when introduces,
2. Repeat the name when acknowledging the introduction, and
3. If the name is usual, politely ask new acquaintance to spell it. While people are making sure people have heard and rehearsed the name, people should be paying close attention to the individual’s face. The shape and size of the head and individual characteristics of the hair, for head, eyebrows, eyelashes, eyes, check bones; nose, ears, lips, chin and skin should all be focal point of attention. Voice quality may also be important. Almost everybody people meet will have one or several feature that can be elaborated, exaggerated or perhaps even caricatured as in a cartoon to form a distinctive memory image that can be related to person’s name (Distance Education, 1995)

Link Method

Mnemonic device that makes use of imaginary is the link method, which takes images of the items to be Memorized and connects them in sequence. One version of the link method is the narrative method, in which unrelated items are connected to one another in a story. For example

- Bird
- Costume
- Mail box
- Head
- River
- Nurse
- Theater
- Wax

A man dressed in a bird costume and wearing a mailbox on his head was seen leaping into the river. A nurse ran out of a nearby theater and applied wax to his eyelids, but her efforts were in vain. He died and was tossed into the furnace
The Number Shape Technique

In this technique, select an object or thing that has the shape similar to the shape of numbers 1, 2, 3 etc. Remember this list and then use it to memorize any list of up to ten items. Here is one such list.

1. Pen
2. Swan

Key words 1. Table 2. Feather

Now let people see how the student can associate the list to be remembered with the key words.

1. Pen – Table

Imagine a big pen lying on the table. The pen is so big that the table is about to break.

2. Swan – feather

Imagine a swan having a big colorful feather. The swan is white but there is a big colorful feather.

Grouping

It can be organized material by grouping similar concepts or related ideas together. Arranging the material into related groups helps memory by organizing the information. The process of organizing a list into groups can often help to understand the relationship between the concepts better.

Example: Halides of groups of elements

Oxides of groups of elements.
Journey Method

The journey method is a powerful, flexible and effective mnemonic based around the idea of remembering landmarks on a well-known journey; use the journey method by associating information with landmarks on a journey that should be well known. It is a method of remembering lists of information, by imagining images and events at stops on a journey (www.uofaweb.ualbertaca/a dated: 18.07.2007).

Alphabet Technique

The Alphabet Technique links the items to be remembered with images of the letters A – Z. This allows remembering a medium length list in the correct order. By pegging the items to be remembered to letter of the alphabet if items have been forgot and know the cues to use to trigger their recall. When images are being created for the letters of the alphabet, images are created phonetically, so that the sound of the first syllable of the word is the name of the letter (www.uofaweb.ualbertaca/a dated: 18.07.2007).

Writing Repetition

Ten words are written for five times each. Words are written as a whole list rather than writing each separate word five times in a row. After writing the list down five times, the list is placed out of sight. After taking three minute break before proceeding to the next portion of the exercise.

Verbal Translation of Visual Information

The structure is described first in a brief paragraph. So that without seeing the diagram would be able to reproduce it.

Visual Translation of Verbal Information

First the structure is drawn of each part one by one then describe in a paragraph without seeing the structure (Douglas. J. Mason, 2007)
CHEMISTRY EQUATIONS

One methane molecule

$$\text{CH}_4 \quad 1\ 	ext{C} \quad 4\ 	ext{H}$$

Two oxygen molecules

$$2\text{O}_2 \quad 4\ 	ext{O}$$

One carbon dioxide molecule

$$\text{CO}_2 \quad 1\ 	ext{C} \quad 2\ 	ext{O}$$

Two water molecules

$$2\text{H}_2\text{O} \quad 2\ 	ext{H}$$

Iso-Octane

$$\text{CH}_3 \quad \text{H}_3\text{C} - \overset{\text{C}}{\text{C}} - \text{CH}_2 - \text{CH} (\text{CH}_3) - \text{CH}_3$$
The Number Shape Technique

It is a very effective method of remembering lists in a specific order. If it works by linking things to be remembered with the images representing the numbers 0 – 9. By using it in conjunction with the Number Rhyme system, poet’s images can be built. It can make very effective mnemonics. The technique works by helping to build up pictures in mind, in which the numbers are represented by images shaped like the number. These are associated with the things to remember using striking images (www.uofaweb.ualbertaca/a dated: 18.07.2007).

Word – Letter Association

First letter of the word in the remember list associate with another word in which the first letter start with same letter of the word which is present in the remember list.

1. Reasoning - Red
2. Memory - Mice
3. language - love
4. Spatial Function - Stirred
5. Sensory function - Sour,
6. Motor function - Margarites

Verbal Repetition

Repeating ten words aloud five times going over them carefully and committing them to memory. Memorize the list as a whole and do not repeat the first word five times and then move on to the second word. Repeat these words aloud five times, wait three minutes (time ourself) and write down the words individual remember in the following spaces (Douglas J. Mason, 2007).
Conceptual Framework

Chunking

Chunking is the systematic way of encoding information, to remember credit - card number - 10141609001, for example, the first four numbers may remind of an important date in history (the date of out break of world war 1), the next four numbers can also be “chunked” as a date, while the last three numbers form a chunk that is easy to remember by itself (Distance Education, 1995).

Key Word Method

This method makes use of imagery for remembering the difficult, uncommon and unfamiliar words and items for example, if one head one looks for a keyword resembling and associated with the word ‘golova’. It may be Gulliver now a mental image can be built around this keyword making note of the other word ‘head’ of the desired pair for associate learning. For this purpose the learner may visualize Gulliver with his head tied down by the Lilliputians and this portrait or mental image may now help him to remember the Russian word ‘golova’ associated with its English equivalent ‘head’. (S.K. Mangal, 2007)

Word Association

List of words are associated with each pair of words together, remember to associate the words in pairs.

<table>
<thead>
<tr>
<th>Apple</th>
<th>-</th>
<th>Orange</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>-</td>
<td>Red</td>
</tr>
</tbody>
</table>

3.5.2. Effective Study Habits

Planning Study Time

To practice good study habits, people would begin by setting up a schedule in which people would do the bulk of our studying, when people are
alert and most motivated whether in the early morning, in the late afternoon, or at some other time. Study in a quiet, comfortable place, free from distraction.

**Over-Learning**

Study the material until know all of it and then go over it several more times. It has been found that over learning improves the retention of material. Over learning appears to work by making less likely to forget material individual have studied and more confident that individual know it. This might improve performance by making less anxious.

**Small Units**

Use distributed practice instead of mass practice is especially important in studying academic material. If it can be devoted a total of 5 hours to studying one chapter, it would be better off studying for 1 hour on five different occasion then studying for 5 hours on one occasion. Individual might recognize this as a suggestion to avoid “cramming” for exams.

**Correct Order of Text Material**

Most of life’s more important recall tasks involve not lists of words but rather texts that have been read. One proven technique for improving recall of written materials consists of organizing the material in memory as it is being read for the first time. To do this first identify any advance information about the structure and content of the material scanning by using the table of content, chapter outline, headings and even the end of chapter summary – before reading a given chapter. Understanding the structure of the material will enable to recall it better (Distance Education, 1995)

**Upgrading**

In this method, the poem is divided into many parts. After fully memorizing the first part, the second part is memorized and then both the parts are jointed. Then the third part is memorized and added to the first two parts. In
this way other parts are memorized and thus the entire poem is memorized. In this method the defects of other methods are not present. In this no unnecessary relation is established between words, because with the introduction of the entire method. The short lived relation disappears. The difficulty of memorizing too much at a time is not present in this method. Therefore the subjects escape from unpsychological dissatisfaction. But in this method, too, there is the defect of unnecessary repetition of some words.

The Recitation Method

The mental repetition of something is called recitation. Recitation makes the subject firmer than if it were read over and over again or repeated. Mental repetition is an active way of study. This saves time, at the same time assuring the longer retention of the subject (R. SHARMA, 2002). To recite means to recall actively what one has learnt. It shows the progress one has made so far. It is a stock – taking exercise. It furnishes an immediate goal to work for and hence move stimulating than mere repetition. (Dandapani 2001).

Using SQ3R Method

SQ3R stands for Survey, Question, Read, Recite and Review. This method has proved helpful to the students. It requires elaborative rehearsal, in which people process information at a relatively shallow level. If people have ever found one studying for hours, yet doing poorly on exams, it might be the consequence of failing to use elaborative rehearsal.

While using the SQ3R method to study any lesson, first, survey the main heading and sub heading to create an organized frame work in which to fit the information. Second, as when surveying the sections ask questions to be answered.

Third, read the material carefully, train to answer the questions. In memorizing new terms people might find it especially helpful to say them loud, wrote them down or heard them spoken by some one else. Fourth, after
Conceptual Framework

reading a section recite information from it to see whether it can be understood it. Do not proceed to the next section until understand it fifth, periodically review the information (Distance Education, 1995).

Mind Maps

Some key words or taste or smell or sound can bring back memories. A new style of taking notes that uses this knowledge of how the brain stores and organizes information. This technique is called “mind mapping”. Mind Map uses the current scientific knowledge about how the mind stores and organizes information mind map uses only key words and key concept.

Use the following guidelines while drawing or writing a mind map.

* Use a key word or key phrase at the center.
* Then draw lines from the center.
* On each line, write key words in CAPITAL letters. Using capital letters helps revision and memory.
* Use only one word per line this makes it easy to make connections.
* Let ideas flow. Do not try to ‘think’ hard. Just write down what ever comes to mind. The aim is to write everything that mind thinks about the central idea. Mind thinks faster than writing. So don’t pause or stop momentarily. Just keep writing or drawing. Some elements or graphical parts are color, arrows, codes, shapes, three dimensional shapes and other images for diagrams. It can be used in mind maps. Images are easily remembered by the right brain. So practice and use images in mind maps.

Advantages of Mind Map

The mind map clearly shows the central idea or theme. The relative importance of any idea is clearly shown. The ideas nearer to the enter the key ideas are clearly shown. The nature of the structures makes it easily to add new
information without scratching or writing in small letters. Each mind map looks
different from other mind maps and this help memory.

While using mind map there is no need to worry about the problems
usually associated with linear notes like order, sequence, and emphasis of
ideas, beginning, ending, and organization. These problems are simply
eliminated in the mind map technique (Raj Bapna, 2000)

Strategy for Recollection

Chunking: Perhaps Chunking is the oldest method used in memorization. In
this method, the items to be memorized are divided into small and easily
memorizable chunks or groups. This method works best when the order of the
items is not important. This method is found to be particularly well suited for
memorizing multi-digit numbers (eg., ID nos., telephone nos., etc.) and for
committing complicated spellings to memory.

Example:

1. The number 472627607 may be memorized easily if it is grouped as
   472, 627,607 or as 47, 26, 27,607.
2. These chunks may then be learned by rote. Learning and retention are
   much facilitated if further explore the numbers by finding some
   relationship among these different chunks. Finding the digital root will
   also be helpful. The more explorations or relations individual do, the
   better.
3. Words like mathematics may be divided into mat +he +mat +ics,
   Together may be divided into to + get + her; Important may be divided
   into im +port + ant. This technique will make people learn much master.
4. The list apple, cucumber, paper, ink, cabbage, banana, grapes, beans,
   stapler, orange can be better learned by rearranging and applying
   chunking as :-Apple, banana, grapes, orange, cucumber, cabbage, beans,
   paper, ink, stapler- 4 fruits, 3 vegetables and 3 stationary items.
If possible, organize the material as meaningfully as people can and think out relationships among each group. This not only improves learning ability and retention but also aids in faster and effortless recollection. Psychologists doing research on Human Memory have found that the capacity of Short Term Memory (STM) for humans is $7 \pm 2$ that is from the range 5 to 9 items. So people should take care to keep the chunks people create within this limit.

**Rhyming:** This is also one of the popular and oldest methods in memorization. This technique makes use of the fact that people have a natural tendency to remember rhymes and rhythms. The following is a very popular example of application of this technique which almost all school students are familiar with.

"Thirty days have September  
April, June and November  
All the rest have thirty-one  
February has twenty-eight alone  
Except in leap year, then the time  
When Februarys days are twenty-nine."

If possible create rhymes like this and it will not only aid in improving our memory but in improving our creativity as well.

**Mediation/Bridging:** In this method, a bridge is built in between the items given to be memorized. This technique is best suited for learning material involving word pairs or material that can be reduced to word pairs. An example often cited by memory experts is the learning of the capital of Poland. The capital of Poland is Warsaw. World War II started with Germany's attack on Poland. Thus it may be arranged as Poland SAW War first.

Here, the word pair to be connected together is Poland and Warsaw. The additional information of the World War II is used as a bridge or mediator in bringing these two words together.
Again, like other techniques, the mediation technique calls for the learner's active participation in the learning process. This is because one is to bring in the mediator or the bridge from relevant items one has learned.

**Bed-time Recital.** In this technique, people do our recital or rote learning just before going to bed. The mind in the process of sleeping would then arrange the information in a systematic and effective way when people are sleeping. Psychologists have also found that if people sleep after thinking about our problems there is a better chance that individual arrive at a solution the next day.

Steps for Memory Improvement

1. Being in a relaxed mood
2. Writing down the things that individual are supposed to remember in a piece of paper.
3. Reading it aloud (if possible) once or twice and recite it two to three times.
4. Going to sleep without worrying or thinking about anything.

**Trying by Not Trying:** All of people apply this method knowingly or unknowingly. Sometimes when people try to recall people may not be able to recall it at that time even if people are sure that people know it very well. People experience a blocking that prevents people from recalling it. Normally people tend to try again and again but in vain. To handle this situation people just keep away from trying to recollect it and do something else; to our pleasant surprise that information automatically pops up into our mind after some time. This is because even if people stopped trying, the mind is searching for that information and brings it to awareness when it is found. Sometimes the information was blocked when people wanted, and mind brings it forward when the blocking is removed. This is where stress plays its role in hindering recall.
ALPHA BREATHING

Relax

Breathe deeply

Exhalation ➔ Inhalation

Lung

Ribs

Diaphragm
If people are very anxious by nature or very stressful in nature, people may encounter this type of blockage very often. In such case, it is highly recommended that people practice some kind of relaxation technique and thus keep our anxiety and stress away. This is very important because this behavior can bring many undesirable psychological and physiological conditions. People may even consult a Clinical Psychologist in extreme cases (Clifford T. Morgan, 1961).

3.6. RELAXATION TECHNIQUES AND MEMORY

3.6.1. Alpha-Breathing for Relaxation: Simplified Pranayama and Imagination

Alpha-breathing is combination of imagination and a simplified version of Pranayama (Yoga of breath). It is a technique of deep regular breathing.

**Deep breathing is important for three reasons.** First, the brain needs a lot of oxygen to function at high level of intelligence. The brain weight is about 1.5 kilogram, which is about 3% of our body weight. But, the brain uses 20 to 25 percent of the total oxygen intake. Deep breathing helps satisfy the oxygen demand of our brain. Second deep breathing for relaxing. Third, breathing with a regular natural breathing cycle is one of the easiest and most effective ways to increase alpha content of our brain waves. This helps learning (Raj Bapna, 2000)

**Breathing from Diaphragm**

Before people learn alpha-breathing, let people learn to breathe from diaphragm. Common sense says that for deep breathing our chest should move in and out. Not our stomach. But it is not true. Diaphragm separates lungs from the stomach. In fact, the diaphragm is the muscle of breathing. As our stomach moves slightly outwards, the diaphragm moves down, and as result the lungs expand. If people watch a child sleeping, people can notice that the stomach moves in and out as the child breathes. That’s what people should
MEDITATION
also do. Practice breathing in such a way that our stomach moves in as people breathe out and our stomach moves out as people breathe in (Raj Bapna, 2000).

**Alpha – Breathing**

Here are the steps for alpha-breathing.

- Breathe from our diaphragm. Breath in through our nose for count of four (saying to _one, two three, four_)
- Hold our breath for a count of four. While holding, imagine that oxygen is relaxing our brain and our body.
- Breathe out through our mouth for a count of four. While exhaling, imagine that all stresses and tensions in our body/mind are going out with the breath.
- Do not pause. Immediately repeat the above steps (Raj Bapna, 2000)

**3.6.2. Meditation: An Ancient Technique for Mind Power**

As the advanced countries became interested in meditation they also did scientific research to find out the effects of meditation on body, mind, and performance. TM (Transcendental Meditation) created by Maharishi Mahesh yogi is the most extensively researched of all the meditations. Mahesh Yogi got an M.Sc., in Physics before becoming a yogi. He became world-favour in the 1960’s when the famous American music group “Beatles” came to learn meditation from him. Even Ph.D., work has been done on the effects of TM. There are over 350 published studies on TM in prestigious scientific journals. The scientific research on TM showed that the TM practice produces a state of rest and relaxation deeper than sleep. That it reduces anxiety and stress, lowers high blood pressure, strengthens immune system. Students who practiced TM got better grades or more marks. The long term benefit seems to be slowing down of the aging process. Five-year TM meditators were tested to have 12-year younger “biological age” as compared to people who do not meditate (Raj Bapna, 2000).
Sleep Versus Meditation

During sleep, people rest and relax. As a result, the need for oxygen reduces. People consume less oxygen. The following graph shows that 20-minute practice reduces the oxygen consumption to less than the oxygen consumption after about 5 hours of sleep. Lower oxygen consumption means a more relaxed state (also called deeper relaxation). It means individual are more relaxed in meditation than in deep sleep (Raj Bapna, 2000)

Relaxation Response or transcendental meditation

To learn transcendental meditation, people have to go to a trained teacher who gives people a mantra and teaches the TM. Based on TM, another technique called Relaxation Response was developed. People can learn this technique from the following instructions.

Here are the steps for Relaxation Response:

- Choose a focus word or a short phrase for which people have deep belief or respect. For most people, this would be name of some god such as Buddha, Rama, Krishna, Allah Mahavir, etc.,
- Sit quietly in a comfortable position.
- Close our eyes.
- One by one, for each part of our body (for example hands, legs, chest, head, etc.,) move it a little bit so relaxes.
- Breathe slowly and naturally. As individual keep breathing repeat the focus word.
- The experience is different for everyone. Whatever individual feel, whatever happens to people is right for us. Take a passive attitude. Do not worry about doing it well.
- Continue it for 10 minutes or 20 minutes.
- Practice this technique once or twice daily.
3.6.3. Using Music and Relaxation for Mind Programming

The sub-conscious mind is not under our conscious control. The sub-conscious mind functions on the basis of information stored in it. This is the basis of mind programming.

Mind programming means that if people can put information in a person’s subconscious mind, then people can alter that person behavior. The main difficulty is the conscious mind, which does not let people put information in the sub-conscious mind.

To understand the power of mind programming, let people see one example from history of my city Udaipur. People may also know a similar example from our part of India. When enemies attacked and killed the king, his son was saved by a servant named Panna Dhay. Finally, the boy grew up and became the king. Why do people think he could do it? Was it in the blood (Genetics) of the boy? No. He did it because the servant and everybody else told the boy “Individual are a prince. Individual must become the king. The enemy has taken over our kingdom”. And when he grows up, individual must take revenge and defeat the enemy constantly hearing these messages, the child’s mind was programmed. As a result, the child did not want to become an officer or an executive but he wanted to become the king. And he was willing to die to achieve his goal.

This historical story shows that people or society can program our mind. Unlike the prince, most of people become programmed the wrong messages such as; don’t do that ... don’t take risk don’t be stupid... individual are stupid... individual are not as good as.... People can imagine the bad effect such messages can have on any person. To understand mind programming, let people consider how the conscious mind and the sub-conscious mind work. The conscious mind is like a watchman and the sub-conscious mind is like a store room. The watchman has no intelligence on his own. He behaves on the information in the store (Raj Bapna, 2000).
Conscious mind is like a watchman, and the sub-conscious mind is like a store-room. Mind programming means putting information into the store without the knowledge of the watchman. Mind programming involves putting information in the store without the knowledge of the watchman. Suppose individual tell our self that “individual are good at study”. And the store has stored other people’s comments such as “individual are stupid, individual can not succeed”. The watchman sees our sentences and compares it with the knowledge in its store and says “this information is wrong”. The watchman throws this new information away. He does not put the new positive information in the store. This is the fundamental difficulty in changing behavior of a person.

For the first time in the history of humanity, there are now easily available powerful techniques that allow individual to program our mind. All these techniques reach the sub-conscious mind and put information into it without the knowledge of the conscious mind (Raj Bapna, 2000).

**Relaxation and Mind Programming**

In the relaxed state, people can tell ourselves positive messages such as “I am good at studies”. Use imagination to see ourselves achieving success.

**Music, Songs and Mind Programming**

How to find out if some music is good? It is simple. The body and mind, are very intelligent. This intelligence can not be measured by IQ tests because IQ tests measure only knowledge processing, for example, multiplying two numbers. If the music is good, people will feel good and people will like the music. So, listen to any music that makes individual feel good. Here is an important observation: as individual learn to become more relaxed, our choice of music will change.

Because music can change the brain waves and relax us, people can combine music with voice or songs for the purpose of mind programming.
Consider what happens when individual listen to a film song or any other popular song. The music and the soothing voice of the singer put individual into a relaxed state. There is an increase in alpha brain waves. In the state of relaxation, the conscious mind becomes less critical of the incoming information. So the incoming information (words of the song) reaches our subconscious mind and is stored there. Now this new information also contributes to determine the subconscious mind’s behavior.

As a result, the words of music get embedded into our subconscious easily. If those words are encouraging, motivating, positive, good then that music will make people feel good. If those words are negative, sad, discouraging, then people begin to feel that way.

Dr. Anil Bapna’s Mind Power Music is popular for mind programming. Individual can compare this music with being in a park, jungle, or a picnic spot. Our mind does not know when the next bird is going to sing or make pleasant sound. That is why being in park has a profound relaxing effect on a person’s body and mind. Random music also increases the alpha brain waves, which indicate a relaxed state of mind and body. Mind power music also contains Hidden-messages for programming our sub-conscious mind (Raj Bapna, 2000).

**Mind Power Music**

New scientific music is being developed all over the world to change our behavior, to help individual to relax, to improve the functioning of our brain/mind, to help individual to get success.

**Hidden-Messages: The Power behind Dr. Anil Bapna’s Mind Power Music**

Dr. Anil Bapna’s Mind Power Music contains Hidden-Messages. It means that there are messages which are hidden from our conscious mind. But, our sub-conscious mind can hear these messages and accept them. Since our conscious mind cannot hear Hidden-Messages, it does not interfere with them. They simply go to the sub-conscious mind and program or control it.
• My memory is very good.
• I remember very easily.
• I remember permanently.
• I concentrate easily on anything
• I enjoy concentrating on my work.
• I concentrate easily and remember easily
• I remember easily whatever I read, hear, see.
• I like to enjoy studying and remember for competitions.
• I remember and recall easily during exams and tests.

Here is what some of our customers say about the Mind Power Music.

“I got 84.4% in S.S.L.C. my previous 9th std results were only 70%. I am very thankful for our help. Previously, was only 40% in Maths, but now it is 97%.” Maria Williams, Coimbatore, TN

“I had only 51% in B.Sc., III Year. But after listening to our music, I stood first in M.Sc., Environment Science entrance. I scored 62% in M.sc., I year and 72% in M.Sc., II year”. - Mahesh R.Mathapati, Karnataka

“I have already purchased a Memory and concentration cassette. Please send me 6 more cassettes for the use of my staff. Thank you.” Rector (Principal), Holy Rock School, Burdwan, W.B.


**Mind Power Music Cassette Titles**

Dr.Anil Bapna’s Mind Power Music is available from this institute.

The cassettes titles are: Better Memory and Concentration, Relax and Take Exams confidently without Stress or Nervousness, Read Faster to Save Time, Strong Will Power and Determination, Gain Self-Confidence, Develop a Winning Personality, Setting and Achieving Goals, Relaxation, etc.
MIND MACHINE
3.6.4. Mind Machines

Mind machines are among the most exciting fields of research in the world today. For the first time, now scientists are understanding how to make great improvements in the functioning of any person's mind. Many new machines are being designed to greatly improve the functioning of the human mind. These new machines are called "mind machines".

Users of Mind Machine Revolution

It is estimated that more than ten lakh people in the world are now using mind development related technology. Michael Hutchison, the famous American author, was so impressed with the Mind Machines that he started his best-selling book "Mega Brain" with the following paragraph:

"Individual sit down in a comfortable chair, put on the electrical headgear (special eye glasses, etc.), flip a switch on the small control by our hand, close our eyes, and sink into a state of deep relaxation. Thirty minutes later as individual turn off the machine and remove the headgear, individual feel extremely alert and lucid. Our brain is now functioning far more effectively than it was before. Our memory—our ability both to memorize new information and to recall information individual have already learned—has increased dramatically. Our ability to think creatively, to solve problems, has expanded. The speed with which our brain cells pass messages among themselves has increased. In fact, many of our brain cells have actually grown—a microscopic examination would show that the brain cells have developed more dendrites, the branching filaments that carry messages from one cell to another, and more synapses, the junctures between brain cells across which impulses are transmitted. Individual are more intelligent than individual were a half hour before."

Mind machines have eye-glasses with flashing lights and stereophonic headphones. The lights flash in certain pattern and there are certain sound
Conceptual Framework

signals. As a result, it has the ability to change brain waves to alpha, beta, theta, or delta (Raj Bapna, 2000).

Mind Machines may Provide Enriched Environment for Brain Growth and Expansion

It is believed that Mind Machines, like meditation, provide enhanced environment for the human mind. The Mind Machines can increase our intelligence, enhance our brain power, improve our creativity, make individual relaxed, etc., and the machines can do it in 10 minutes instead of 10 or 20 years of traditional meditation.

Benefits Include the Following:

- Increase intelligence
- Reduce stress and tensions
- Instant meditation
- Use both sides of our brain
- Instant hypnosis
- Stimulate release of endorphins
- Increase mental clarity
- Increase creativity, problem solving

Pre-Session Learning Technique:

First read and learn our lessons. Then use the Mind Machine.

When individual are using the Mind Machine, our mind is in an altered state of consciousness and it does not need to see, analyze, remember other information. As a result, the material already read tends to be remembered much better.
Post-Session Learning Technique

Most mind technology users notice a feeling of mental clarity and sensory acuity that lasts for many hours after a session. This feeling is associated with increased levels of certain neurochemicals in the brain and with more consciousness and with presence of more coherent or alpha/theta brain waves. So, study after individual have used the Mind Machine (Raj Bapna, 2000).

How students are using it for super intelligence and faster learning

In addition to enhancing mental ability, intelligence, and IQ, students are using the mind technology devices for super intelligence and faster learning with the pre-session and post-session learning techniques.

How Executives Are Using It for Creativity, Relaxation and Effectiveness

Executives are using the amazing mind machines for creativity, and to relax, and to be free from stress and tension. This helps them to be more effective leaders in their businesses and professions.

Super Learning

Recent studies indicate that the human brain is capable of much greater learning and remembering than had previously been imagined. Normal people under special conditions can store and recall huge amount of information.

Scientists have demonstrated that special relaxing music has the power to increase the learning ability of people by 100% or 200% or up to 500% more. Such music is becoming more and more popular among students and executives in USA and other western countries.

In India, people at the Mind Power Research Institute have successfully introduced Dr. Anil Bapna's Mind Power Music for Super Learning. These Products are popular among students and executives and others (Raj Bapna, 2000).
3.7. NUTRITION AND MEMORY

Nutrition is the science of food and its interaction with an organism to promote a maintain health. Thus, nutrition is a combination of processes by which all parts of the body receive and utilize the materials necessary for the performance of their functions and for the growth and renewal of all the components. Food is the substance taken into the body that will help meet the body’s needs for energy, maintenance of health, growth and reproduction. Optimum nutrition means that a person is receiving and utilizing essential nutrients in proper proportions as required by the body while also providing as ‘reserve’. Nutritional status is the condition of the body as it relates to consumption and utilization of food. The nutritional status of a person may be either good or poor.

Good nutritional status refers to the intake of a well-balanced diet, which supplies all the essential nutrients to meet the body’s requirements. Such a person may be said to be receiving optimum nutrition. Poor nutritional status refers to an inadequate or even excessive intake or poor utilization of the nutrients to meet the body’s requirements. Overeating can also result in poor nutritional status of a person mal nutrition refers to the physical effects in the human body of a dietary intake in adequate in quantity and / or quality. Under nutrition refers to low food intake. The critical unit of food energy intake may be defined 1.2 ‘BMR. The BMR (Basal Metabolic Rate) is the minimum energy expenditure necessary for body maintenance at rest with no physical activity.

Nutrients are chemical components of food that supply nourishment to the body. They are required by the body in the right amounts and they must be eaten regularly. Each nutrient – Proteins, Carbohydrates, Fats, Minerals, Vitamins and Water- Perform a specific function in our body.
FACTORS INFLUENCING HUMAN NUTRITION

A balanced diet is one which includes all the nutrients in correct proportion or adequate amounts to promote and preserve health.

**Nutrition and Memory Improvement**

The entire educationist could know already that a diet based on fruits, vegetables, whole grains, and "healthy" fats will provide lots of health benefits, but such a diet can also improve memory. Research indicates that certain nutrients nurture and stimulate brain function.

- **B vitamins, especially B6, B12, and folic acid**, protects neurons by breaking down homocysteine, an amino acid that is toxic to nerve cells. They’re also involved in making red blood cells, which carry oxygen. (Best sources: spinach and other dark leafy greens, broccoli, asparagus, strawberries, melons, black beans and other legumes, citrus fruits, soybeans.)
- **Antioxidants like vitamins C and E, and beta carotene**, fight free radicals, which are atoms formed when oxygen interacts with certain molecules. Free radicals are highly reactive and can damage cells, but antioxidants can interact with them safely and neutralize them.
Antioxidants also improve the flow of oxygen through the body and brain. (Best sources: blueberries and other berries, sweet potatoes, red tomatoes, spinach, broccoli, green tea, nuts and seeds, citrus fruits, liver.)

- **Omega-3 fatty acids** are concentrated in the brain and are associated with cognitive function. They count as “healthy” fats, as opposed to saturated fats and trans fats, protecting against inflammation and high cholesterol. (Best sources: cold-water fish such as salmon, herring, tuna, halibut, and mackerel; walnuts and walnut oil; flaxseed and flaxseed oil)

Because older adults are more prone to B12 and folic acid deficiencies, a supplement may be a good idea for seniors. An omega-3 supplement (at any age) if individual don’t like eating fish. But nutrients work best when they’re consumed in foods, so try our best to eat a broad spectrum of colorful plant foods and choose fats that will help clear, not clog, our arteries.

**Vitamins for Memory Loss**
- Vitamin A combats toxins that damage brain cells.
- Vitamin B1 is needed to produce the brain chemical acetylcholine, crucial for concentration levels and memory.
- Vitamin B3 is essential for brain health.
- Vitamin B6 improves nerve communication.
- Vitamin B12 is needed to create the myelin sheath that protects nerves and speeds up the rate of electrical transmission.
- Pantothenic acid is essential for the production of the brain chemical acetylcholine.
- Folic acid seems to help guard against the risk of Alzheimer's disease.
- Choline is needed to produce acetylcholine.
- Vitamin C neutralizes harmful free radicals that may damage brain cells.
- Vitamin E boosts brain function (Subhangini A. Joshi, 2005).
Conceptual Framework

Minerals for Memory Loss

- Iron improves concentration.
- Selenium enhances the effects of vitamin E.
- Zinc improves memory.

Zinc

Zinc protect the damaging effect of brain nerve cells. Zinc is necessary for normal brain development (B. Sri Lakshmi 2007)

Zinc is an anti-oxidant which can possibly delay memory loss. Zinc reverse the damaging effect of free radical (Dumont monte, 2001).

Important Sources of Iron

Bajra, Barley, cholam(Sorghum), Maize, Yellow, Oat meal, Ragi, Rice, Paraboiled milled. Rice, Raw milled, Bengal gram dhal, Black gram dhal, Cow gram, Field bean, Dry green gram dhal, Red gram dhal, Soyabeen. Amaranthus, Tender, Coriander, Drumstick, Mint, Radish leaves, Spinach, Egg, Fish, Liver, Goat, Mutton, Cashew nut, Ground nut, Segame, Seeds, Jaggery.

Zinc Content of Foods

Barly, Bread, Whole wheat, Bread white, Corn, Whole, Corn flour (degermed) ook meal, Rice, Raw milled, Rice, Parboiled milled wheat, Whole wheat, Bran pulses, Peas, Nuts and Oilseeds, Peanut, Cherries, Canned Oranges, Pears, Canned, Beef, Clams, Egg Whole, Egg yolk, Herrings, Liver, Beef liver, Pork oysters, Milk, Cow Beets, Cabbage, Carrots, Lettuce, Potato, Spinach. (Dr. M. Swaminathan, 2007)
ZINC RICH FOOD
Herbs and Other Supplements Helpful in Memory Loss

- Omega-3 fish oils are crucial for brain development.
- Amino acids help the brain to function efficiently.
- Bioflavonoids increase the effects of vitamin C.
- Garlic improves blood flow to the brain.
- Ginkgo biloba increases blood flow to the brain, improving cognitive function.

Anchovies and sardines, yeast extract, brazil nuts, whole grains, fresh fruits and vegetables, egg yolk, liver, low-fat dairy products. Alcohol destroys brain cells, and coffee, often thought to improve concentration, in reality impairs it (Subhangini A. Joshi, 2005).

3.8. CHEMISTRY ACHIEVEMENT

3.8.1. Role of Chemistry in Developing Scientific Attitude

One of the major aims of teaching chemistry is the development of 'scientific attitude in the pupil. Following are some of the various aspects included in the scientific attitude:

(i) Making pupils open minded.
(ii) Helping pupils open minded.
(iii) Developing intellectual honesty among pupils.
(iv) Developing curiosity among pupils.
(v) Developing unbiased and impartial thinking.
(vi) Developing reflective thinking.

NSSE (National Society of the Study of Education) has defined scientific attitudes "open mindedness, a desire for accurate knowledge, confidence in procedures for seeking knowledge and the expectation that the solution of the problem will come through the use of verified knowledge".
The views regarding scientific attitude expressed at a workshop conducted by the National Council of Educational Research and Training (NCERT) at Chandigarh in 1971 can be summarised as follows. A pupil who has developed scientific attitude:

(i) Is clear and precise in his activities and makes clear and precise statements.
(ii) Always bases his judgment on verified facts and not on opinion.
(iii) Prefers to suspend his judgment if sufficient data is not available,
(iv) Is objective in his approach and behaviour.
(v) Is free from superstitions,
(vi) Is honest and truthful in recording and collecting scientific data.
(vii) After finishing his work takes care to arrange the apparatus, equipments etc. at their proper places.
(viii) Shows a favourable reactions towards efforts of using science for human welfare.

3.8.2. Techniques for Developing Scientific Attitude

In the previous pages an effort was made to define the term 'scientific attitude'. By developing scientific attitude in a person certain mind-sets are created in a particular direction. Such mind-sets may be developed either by direct teaching in schools or by out of school experiences gained by the pupil. Though out of school experiences contribute to a large extent yet according to Curtis direct teaching do modify the attitude of young pupil.

Tyler also made some suggestions for planning learning experiences in order to inculcate scientific attitude in the pupil. These are summarized below:

(i) The increase in the degree of consistency of the environment helps in developing and inculcating scientific attitude in the pupil.
(ii) The scientific attitude can be inculcated in a pupil by providing him more opportunities for making satisfying adjustments to attitude situations.
(iii) The scientific attitude can also be developed in the pupil by providing him opportunity for the analysis of problem or situation so that a pupil may understand and then rest intellectually in desirable attitude (Yadav, 2006)

3.8.3. Basic Concepts of Chemistry

Chemistry is a logical science tells about what chemistry is, what chemists do and why people want to study this science. Experimental work is an essential part of the study of chemistry. An experiment is a test, trail or tentative procedure for the purpose of discovering something unknown or of testing a principle. Chemistry is the place where the students perform various experiments prescribed in their syllabus. It is necessary for the students to get familiarized with a equipment and permanence fixture in the laboratory. Work in a laboratory is effective only when it is perform with an understanding of its theory and basic techniques

3.8.4. Methods of Teaching Chemistry

The following methods of chemistry teaching at the college have relevance for people in our country.

1. Demonstration method
2. Lecture cum demonstration method
3. Project method
4. Lecture method
5. Assignment method
6. Unit method
7. Heuristic method
8. Discussion method
9. Scientific method
10. Problem solving method
11. Laboratory method.
It is noted that no single method could be best method and a good lecture will have to evolve own individual method. Consisting of good points of all the methods he or she will never become a slave to any method and will remain a true master of all of them (Yadav, 2006).

By teaching chemistry people aim at bringing about a desirable behavioural changes among pupils. Teaching is thus a most difficult task and every body is not fit to be a teacher. Some persons may have a 'flair' for teaching and such persons have the ability to awaken interest and arrest the attention of the students. Some others who are not so fortunate can improve their teaching through practice if they are fully acquainted with various methods of teaching. In order to make children learn effectively, the teacher has to adopt the right method of teaching. For choosing right method for a given situation the teacher must be familiar with different methods of teaching. In this chapter an effort will be made to discuss common methods used for teaching of science.

**Lecture Method**

Lecture method is the most commonly used method of teaching chemistry. This method is most commonly followed in colleges and in schools in big classes. This method is not quite suitable to realise the real aim of teaching chemistry. In lecture method only the teacher talks and students are passive listeners. Since the students do not actively participate in this method of teaching so this method is a teacher controlled and information centred and in this method teacher works as a sole resource in classroom instructions. Due to lack of participation students get bored and some of them some times may go to sleep. In these method students is provided with readymade knowledge by the teacher and due to this spoon feeding the students loses interest and his powers of reasoning and observation get no stimulus. Exercises for fostering the development of such “process skills” as observing, hypothesizing and inferring. These are accompanied by data books and books of question for pupils and
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teacher's guides. Textbooks also communicate to pupils various assumptions about the nature and purpose of scientific activity.

Scientific Method

It has already been pointed out that two basic aims of teaching chemistry are (i) development of scientific attitude and (ii) training in scientific methods. In previous sections, people have discussed some ways for developing scientific attitude, and in this section, our aim is to concentrate mainly on training in scientific methods. A 'scientific method' is 'a method which is used for solving a problem scientifically'. It is also referred to as 'the method of science' or 'the method of a scientist'. Sometimes, it is called 'problem solving method'. So far, it has not been possible to arrive at any commonly agreed definition of scientific method.

The scientific method of teaching chemistry is based upon the process of finding out results by attacking a problem in definite steps, therefore there cannot be any one 'particular method' but such methods have certain common characteristics. According to Fitzpatrick, "Science is a cumulative and endless series of empirical observations which result in the formation of concepts and theories, with both concepts and theories being subject to modification in the light of their empirical observation. Science is both the study of knowledge and the process of acquiring and refining knowledge". From this, it becomes quite clear that students of chemistry be exposed to the scientific method of finding out. Scientific method helps to develop in a student the power of reasoning, critical thinking, and application of scientific knowledge. It also helps in developing positive attitudes amongst the pupils. A list of such traits as given by Woodburn and Oburn is as under

(i) A scientist must have an unsatiabie curiosity, inquisitiveness and a spirit of adventure.
(ii) He should be capable of independent thinking and be ready to abandon the disproved.

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(iii) He should be Knowledgeable, enlightened and informed.
(iv) He should possess a power of sound judgment and prudent foresight.

He should possess a high degree of perseverance (Yadav, 2006).

3.8.5. Role of Chemistry Education

There are at least four different philosophical perspectives that describe how the work in chemistry education is carried out.

The first is what one might call a practitioner's perspective, wherein the individuals who are responsible for teaching chemistry (teachers, instructors, professors) are the ones who ultimately define chemistry education by their actions.

A second perspective is defined by a self-identified group of chemical educators, faculty members and instructors who, as opposed to declaring their primary interest in a typical area of laboratory research (organic, inorganic, biochemistry, etc), take on an interest in contributing suggestions, essays, observations, and other descriptive reports of practice into the public domain, through journal publications, books, and presentations. Dr. Robert L. Lichter, then-Executive Director of the Camille and Henry Dreyfus Foundation, speaking in a plenary session at the 16th Biennial Conference on Chemical Education (recent BCCE meetings: [1],[2]), posed the question “why do terms like ‘chemical educator’ even exist in higher education, when there is a perfectly respectable term for this activity, namely, ‘chemistry professor.’” One criticism of this view is that few professors bring any formal preparation in or background about education to their jobs, and so lack any professional perspective on the teaching and learning enterprise, particularly discoveries made about effective teaching and how students learn.

A third perspective is Chemical Education Research (CER). Following the example of Physics Education Research (PER), CER tends to take the
theories and methods developed in pre-college science education research, which generally takes place in Schools of Education, and applies them to understanding comparable problems in post-secondary settings (in addition to pre-college settings). Like science education researchers, CER practitioners tend to study the teaching practices of others as opposed to focusing on their own classroom practices. Chemical education research is typically carried out in situ using human subjects from secondary and post-secondary schools. Chemical education research utilizes both quantitative and qualitative data collection methods. Quantitative methods typically involve collecting data that can then be analyzed using various statistical methods. Qualitative methods include interviews, observations, journaling, and other methods common to social science research.

Finally, there is an emergent perspective called The Scholarship of Teaching and Learning (SOTL). Although there is debate on how to best define SoTL, one of the primary practices is for mainstream faculty members (organic, inorganic, biochemistry, etc) to develop a more informed view of their practices, how to carry out research and reflection on their own teaching, and about what constitutes deep understanding in student learning. Work in chemistry education, then, derives from some combination of these perspectives.

Chemistry is an activity-based education for college science majors and advanced high school chemistry courses that emphasizes understanding and reasoning principles in the context of biologically important molecules. The text is written in a conversational tone, making it accessible and engaging to diverse student populations. Supporting components include project-based laboratory materials, modeling activities, and a companion web site to enhance visualization of critical concepts and empower students to apply their understanding to new situations. The laboratory program is built around project labs that require students working in teams to devise solutions to the problems
posed in the write-up. Limited instruction is given, so each solution may be unique. Together, the textbook and laboratory put great emphasis on active student learning and greater demands on faculty to facilitate that learning (Kolasani Sunilkumar, 2004).

3.8.6. Engineering Students and Chemistry Achievement

Evidence from the research literature suggests that a variety of cognitive factors is responsible for chemistry achievement. This investigation examined the role of four cognitive factors, namely,

- Formal reasoning ability,
- Prior knowledge,
- Field dependence/independence,
- Memory capacity on achievement in chemistry as measured by tests of laboratory application, chemical calculations and content knowledge.
- Students' logical thinking skills
- Interest, enjoyment, university course and career requirements have most influence on students' choices and in the choices of Chemistry.
- Previous chemistry knowledge, math exposure, or attitudes toward the course (Steiner, 1998)

3.9. CONCLUSION

This chapter dealt the conceptual framework of the present study, the researcher have highlighted the importance of education, aim and objectives of chemistry education, types of memory, causes for the poor memory and how nutrition play a predominant role in maintain the memory and how to enhance the memory are explained in a detailed manner.
REFERENCES


Conceptual Framework


Yadav, (2006). Teaching of chemistry Anmol publication pvt ltd, Delhi, India, pp no 1, 2, 11, 22, 24, 49, 50.