
MEMORY AND ITS THEORIES IMPLICATION FOR TEACHING AND LEARNING

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***Abstract:** There is no doubt that all Instructors I/Cs aim at expanding the knowledge of the learners by providing both the problems and the materials with which to solve those problems. They encourage the learners to acquire and retain the knowledge gained in and outside school for future use in dealing with life situations. Experience has shown that students forget a lot of school learning after some time. This paper is concerned with the concept of memory, the information processing model of memory, types of memory, methods of measuring memory, the reasons why people forget what they have learn and the factors that instructors can use to aid memory.*

Keywords: Memory, Teaching, Learning.

Introduction

Memory is one of the most important parts of our cognitive functions. Memory is essential to all knowledge since it is at the centre of human living progress and activities. Without memory, one can not remember, think, learn and one can not solve problems. But with memory, we are able to store away useful information and recall them when needed. If information acquired from learning is not stored in the memory, it will be lost and so we would not be able to recall it.

To be effective therefore, a teacher must acquaint himself with the way memory work. He must find out ways children forget and be able to prevent it. He must consciously teach to promote effective storage of the material learnt by the students. This paper will therefore describe the concept of memory, the information processing, model of memory, kinds of memory, methods of measuring memory, the major reasons why people forget and the implication for teaching and learning.

What is Memory?

Memory is the 'apparatus' which enables animals and humans to hold or keep information for use at a later date or time (Akinade 1996). Memory is conceived of as a store – house for information. Information about names of people, things, dates, days of the week, name of subjects, countries. Indeed, all the information that a person has amassed must sit somewhere and this place is called memory (Baddeley, 1998, Mamman 2005). Memory is the process in which information is encoded, stored, and retrieved (Akinade 1996). Thus, Encoding allows information that is from the outside world to reach our sense in the forms of chemical and physical stimuli. Gordon Says Memory,

consist of both non – verbal imaginary processes and a verbal symbolic process. Chauhan (1987) says good memory is identified by the following five features; rapidity, accuracy; promptness; serviceableness and length of time to retain and recall information accurately. Researchers have shown that there exist three main processes or phase in learning. The first phase is the acquisition or encoding phase during which the learner takes in the material to be learned. Thus, it is the process where by information is put in to the memory. Secondly, we have the storage phase in which the learner stores what is acquired from the first phase and thirdly, there is the retrieval phase which the learner recalls the information out of the storage when needed. Thus, it relates to the recovery of stored information memory.

Various theories have been used to explain how memory works. Information processing model of information is one of the most comprehensive theories of memory. The theory explains the processes of encoding, storage and retrieval.

The information processing model of memory

In this model, there are three levels of memory, namely;

- i. The Sensory Memory (SM),
- ii. The Short Term Memory (STM) and
- iii. The Long Term Memory (LTM).

According to this theory, each memory can store varies as to how much information it can hold and for how long. Thus, the flow of information between the three memory stores is controlled by some processes, namely; recognition, attention, rehearsal, encoding and retrieval.

The Sensory Memory (SM)

The Sensory Memory (Sensory Register) is the first store in the system. When we experience a sensation (smell, sight, touch, taste etc) it enters our sensory memory. The Sensory Memory holds the information for one to three seconds for us to decide whether to attend to it or not. If we don't attend to it and recognize it as meaningful, it gets lost or disappears. But if we attend to it and recognize it, it is then moved to the next level of Memory for further processing. That is to the Short Term Memory.

The Short Term Memory (Immediate or working memory)

The Short Term Memory (STM) refers to the memory that has a very short span—some seconds or very few minutes between when stimulus is received and when the information is used. The Short Term Memory (STM) last longer than the sensory memory. The Short Term Memory holds information for approximately 30 seconds. It holds information for immediate use and for further processing in the long term memory. Information not processed within about 30 seconds disappears. Several examples of short Term Memory (STM) occur in our every day living when we quickly forget names of streets or towns we have just passed by a fresh; car/telephone numbers and address of people. Short Term

Memory is very active in information processing. George A. Miller revealed that average human memory span can be expressed as 7 ± 2 meaning that an adult can normally recall 7 items but may often be able to remember as many as 8 or 9 or only as few as 5 or 6. These items can be numbers, letters, nonsense syllable or words regardless of the material; our short term memory capacity remains the same. For example, the name of persons just met remains in short term memory only for a moment. If asked to recall the names after about five minutes, only by not be able to do so. Unless a deliberate effort is made to pay attention to the names by transferring it to the Long Term Memory, the names will be forgotten.

The major problem for teachers is to understand the mechanism that takes place in the process of transfer of information from STM to LTM and how to facilitate the process of transfer from STM to LTM. If the information residing in STM is successfully coded it is transferred to LTM and it otherwise it is forgotten. Information can very quickly disappear from STM unless the STM transfer it to the LTM.

Long Term Memory

The storage in sensory memory and short-term-memory generally has a strictly limited capacity and duration, which means that information, is not retained indefinitely. By contrast, long-term memory can store much larger quantities of information for potentially unlimited duration (sometimes a whole life span). Its capacity is immeasurably large. For example, given a random seven digit number we may remember it for only a few seconds before forgetting, suggesting it was stored in our short – term memory. On the other hand, we can remember telephone numbers for many years through repetition, this information is said to be stored in long-term memory. The LTM is like a bank, a reference section of the library or the freezer compartment of a fridge, where food items are preserved or kept for later use. LTM contains all past, well-organized experiences (Akinade 1996). Thus, this means that LTM is durable and its capacity is limitless.

In a classic experiment by Gates (1917) cited in Chauhan (1996) established that rehearsal is most efficient technique because it gives the person practice in retrieving information. Tulving (1967) in Chauhan (1996) has confirmed the result of the experiment conducted by Gates that rehearsal improves retrieval.

The two ways process of STM and LTM according to Masha (2002) gives an insight into the reasons for forgetting some of these are:

1. The information learnt did not reach STM from the sensory store.
2. The material learnt was not encoded in STM and never transferred to LTM for storage.
3. Inability to retrieve information because of inappropriate or incomplete cues to recall it in LTM.
4. Subsequent inputs in STM may cause the information to decay or disappear (retroactive inhibition). Forgetting often occurs because of interference between the newly learnt and the previously learnt materials.

5. Brain fog (action Decrement), during the transition period between STM and LTM there is a high probability to forget part of totally what has been learnt.

Kinds of Memory

The mind is able to store several different sorts of information. Psychologists generally group these into three kinds of memory, based the way the memory deals with the information.

Episodic Memory

A part of LTM that stores images of our personal experiences (Shukla 2005). Episodic memory deals with episodes or events that happen in your life or take place in your presence. For example, you always remember your birthday party and the presents you received. Such memory is stored as episodic memory.

Semantic Memory

A part of LTM that stores facts and general knowledge, thus, memory in which general or factual information is stored as it in a dictionary or encyclopedia. It represents a very large portion of LTM. Semantics has to do with the meanings of words or things. You can remember how to spell 'psychology' and to know something of what the word simply means.

Procedural memory

A part of the LTM that stores information about how to do things. Thus, it refers to memory related to practical skills, habits and other complex perceptual motor tasks or how to do something. It is sometimes known as Skill Memory. Thus, involves knowledge of how to do something. This memory tends to last a long time e.g. riding a bicycle is an example of Procedural Memory.

Methods of Measuring Memory

Some methods have been described by Psychologists to measure memory.

- a) **Recall:** Recall means retrieval or production of information from memory. For adequate recall, there must be freedom from fear and anxiety. The individual must be relaxed. Recall involves sorting out, recognition and decoding (Masha, 2002). The method of recall is used to measure the memory of students in examination. The method requires a person reproduce correctly what he has previously learned. Recall is very simple to measure, you show some list of words to the students and after exposure of specified time ask them to recall as many items as possible. The recall score is percentage correct. Sometimes a student can recall almost the whole lecture when given some directions. This is referred to as recall from reduced cues or reintegration. Others can be given an accurate reproduction of a story as if someone has coached them on what to say. This type of recall is called eidetic imagery which means that the person has a photographic memory images.

- b) **Recognition:** Recognition according to (Masha, 2002) is discrimination between seen or unseen. It is what we do when we take a multiple choice test when we recognize the correct choice out of a number of choices. Recognition: This implies ability to discriminate among various items. In a recognition test, students are given a question and possible answers in a multiple choice test (objective) a student is expected to pick out the correct choice one among other items (distracters). The student has to select the correct alternative after recognizing it. Recognition score can be calculated thus:

$$\text{Recognition: } \frac{\text{Correct responses} - \text{Incorrect responses}}{\text{Total possible correct responses}}$$

- c) **Relearning:** The third technique of measuring retention is relearning. Instead of asking the subject to recall or recognize materials that have appeared in his past experience, we may ask him to relearn the material at some later stage. The differences between the numbers of trials of learn new concepts and the number of trails to relearn is the index of retention or saving score. According to (Oladele 1994, Masha 2002) the formula for measuring relearning effect is:

$$SC = \frac{\text{Original trial} - \text{Relearning trail}}{\text{Original trail}}$$

The validity of relearning depends on the ability to construct a new task that is strictly equivalent to the original learning task. According to Chauhan (1996) the advantage of relearning is that it measure retention independent of availability of specific responses. Retention of learnt materials (Memory can be improved).

Why do we forget when we learn?

There are number of reasons as to why we forget when we learn. Several theories have tried to analyze the cause of forgetting. Some of the theories are:

- a) Theory of Decay
- b) Theory of interference
- c) Psychoanalytic theory
- d) Forgetting as retrieval failure

Theory of Decay

The theory is often called theory of fading or theory of decay. This theory is strongly linked to Thorndike's theory of exercise which stresses on issues of frequency and recency of the use of information. The theory says that the more recently learnt materials and those more frequently used ones are more resistant to being forgotten than those learnt much earlier and which are not used often. The decay theorist state that the memory marks are like path in a bush, which fade away if not trodden for a long term. Time and usage are the two major critical factors in this theory—information left unused for a long time stands the chance of being forgotten. Rehearsal or practice strengthen the marks made by memory learning, while disuse marks them to completely decay from memory

and consequently forget the information. Thus, this implies that helpful information should be used repeatedly or frequently. Learners should develop the habit of continuous practices of whatever they are studying.

Theory of Interference

The criticism against decay theory led to the discovery of theory of interference. This theory proposes that an intervening period between the initial and later learning may interfere adversely against our ability to remember the initially learnt material hence it leads to forgetting. According to Mukherjee (2002) there are two types of forgetting: (a) Proactive inhibition and (b) Retroactive inhibition.

a) Proactive inhibition

In this case, when something we knew in the past makes it impossible to recall or remember some newly learnt information, and then we say that proactive inhibition has taken place. It is called proactive because the suppression action is taking place on new learning. Thus, it is the new learning that is being actively suppressed or inhibited. And because of this, the new learning can not be recalled. In proactive inhibition, the previous learning interferes with recall of present learning (Masha, 2002).

b) Retroactive inhibition

In this case attempts to remember previous learning is failed by new knowledge which acts as obstacle. Morris (1976) In Chauhan (1979) noted that this is heightened when the learners engages in other activities after the learning before sufficient rehearsal that is the memory-trace to engraves. He records experiment that found out that retroactive inhibition at its minimal if the learner goes to sleep immediately after the learning. Sleeping is the least active. For example, every year a teacher meets new set of faces and names in the classroom which he/she has to learn. As he learns these new names he/she tend to forget those of students from previous years, so whenever he meets ex-students there is a tendency to use the names of the present students for them. The newly learnt names are thereby said to be disturbing and inhibiting the recall of names learnt in previous years.

Psychoanalytic theory

Sigmund Freud provided another explanation for forgetting in his popular theory of personality called Psychoanalysis. In Psychoanalysis, forgetting is caused by repression. Repression is induced or motivated forgetting is involves deliberate suppression of information. Although this suppression can be conscious, it is mainly unconscious. This means that people do not know that they are recalling suppressing the information, when information is suppressed, it is impossible to reach, thereby ensuring the failure of retrieval, which leads to forgetting.

Why would people suppress some or any information? If recalling the information or event causes pain, anxiety or worry in the individual, then remembering it is not

pleasurable. On account of this, there are some reasons for removing such information from memory. When such information becomes lost, erased from memory, we say that repression has taken place. It is called motivated forgetting because there is an established reason for forgetting. Whether the reason is conscious or not is immaterial. Sometimes information does not get lost from memory but gets distorted. When an event gets reported or recalled in a manner different from the way in which it actually occurred, we say that the memory has become distorted. This is so because of reorganization. Reorganization may be due to partial forgetting or to the incorporation of older or newer experiences into the event or information being recalled. Anxiety, tiredness, influence of drugs or alcohol and accidents were other explanations for partial or temporary loss of information from memory (Baddelley 1998, Lovell 1973). So, many factors cause forgetting, whether partial or total. Be that as it may, forgetting is disadvantageous to classroom learning. How can then a teacher or learner ensure that forgetting is reduced to minimum?

Factors that teachers can use to aid memory/remembering

According to Akinade (1996:91) several suggestions have been made to aid retention and recall. Some of them include:

1. Teachers should organized and space learning tasks to fit academic abilities of learners.
2. As advanced by Bruner and Ausubel, conscious efforts should be made to points out for learners' similarities and differences between old and new learning. If this is done, it will help overcome effects of interference in learning.
3. Encourage the use of retrieval cues and strategies such as Mnemonics of Chunking after mastering.
4. Teachers should make their lessons impactful, relevant and meaningful.
5. There should be generous and diligent use of audio –visual aids during lessons.
6. Let your lesson be child-centered, relate the lessons to the immediate experience of the learners. Cite practical or familiar examples.
7. Emphasis understanding instead of rote learning.
8. Encourage learner to use part-whole text or passage learning instead of whole text learning.
9. Encouraged distributed practice rather than massed practice.
10. Encourage the improvement of good study habits, use of revision or recitation of ideas.
11. Teach learners to study–rest and study; not study–study and study.
12. Carefully provide for gap or pauses; use language of highest redundancy during lessons.
13. Create situations for proactive and retroactive facilitation so as to reduce the effect of interference.
14. Teachers should use a variety of methods in their teaching.

Conclusion

Indeed, there is no moment of any situation in which we do not involve the use of our memory. Our life could be unbearable if we have absolutely no memory. In fact what we could do and what we could not do, if we think about that we will probably find that virtually everything we do require the involvement of our memory. Surely, any storage system has limits and to go beyond these limits requires the removal of some of the materials already stored.

Recommendations

Below is the list of recommendations that could help in actualizing a positive and sound memory. Therefore, it is our duty as teachers to adopt in our teaching methods those things which will help children to remember what we teach them:

- By planning regular revision in all lessons in the school and spacing the work carefully.
- By making pupils to test themselves by reading the subject matter over times and then repeat it to themselves.
- By avoiding cramming lessons, and by making lesson interesting to the children.
- By making children to know the meaning of the materials before they memorize them.

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