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Recall memory ability affecting factors on undergraduate medical student

Bagas Adipramana Oktovyanto [1,*], Rimbun [2], Dewi Ratna Sari [2] and Purwo Sri Rejeki [3]

[1] *Medical Program, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia.*
[2] *Department of Anatomy, Histology, and Pharmacology, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia.*
[3] *Department of Physiology and Medical Biochemistry, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia.*

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Abstract

Recall memory is a critical component in medical education, where students are required to store and retrieve large volumes of information efficiently. This literature review aims to identify and analyze the various factors that influence recall memory ability in undergraduate medical students. A comprehensive search was conducted across several databases, including PubMed, ScienceDirect, and Google Scholar, focusing on peer-reviewed articles published between 2013 and 2023. The review found that recall memory is influenced by a wide range of internal and external factors. Internal factors include age and prior experiences, while external factors encompass study materials and environmental conditions. Additionally, factors such as intelligence, motivation, physical health, individual learning styles, emotional state, interference, and the physical or social learning environment were identified as contributing elements. To enhance recall memory, medical students are advised to reduce interference by avoiding mixing learning materials, manage their study schedule and content allocation effectively, and apply repeated review strategies. These findings provide valuable insights into how memory performance can be optimized to support academic success in medical education.

Keywords: Recall Memory; Recall Memory Affecting Factors; Memory Effectivity in Learning; Literature Review

1. Introduction

Memory is crucial for humans because it is the mental capacity to receive, store, process, and reproduce impressions, insights, or responses. Human memory can be processed consciously (conscious processing) or automatically. Conscious processing usually leads to new actions, while automatic processing usually results in reflexive or sudden actions within a short period of time [1]. The ability to remember demonstrates that humans are capable of receiving, perceiving, processing, storing, responding to, and re-creating experiences [2].

Recall memory ability is influenced by several factors, namely internal and external factors. Internal factors include age and past experiences. External factors include materials and environmental conditions [3]. The ability to recall memory can be maximized in various ways, namely reducing intervention by not mixing one information with another, determining the time for learning the material, dividing the material, Repetition (repeating the material many times), Recitation (reading the material by heart), and SQ3R, namely survey (reviewing the material briefly), question (asking questions about the material), read (reading from various sources), recite (mentioning it again by heart), and review (reviewing it again) [4].

Learning is a change in a person's behavior through a process of interaction between the individual and his environment which involves cognitive, affective and psychomotor aspects. [5]. Factors that affect memory in learning are divided into two, namely internal factors and external factors. Internal factors that can affect memory in learning are intelligence,

* Corresponding author: Bagas Adipramana Oktovyanto

motivation, physical condition, individual learning modality, distractions, and emotions. External factors are the physical environment and the social environment [6].

Memory cannot be separated from the learning process because individuals can only learn from what they remember [7]. In general, memory recall plays a significant role in learning activities. Medical students must study many subjects such as anatomy, histology, physiology, pharmacology, and so on. All of these sciences must be studied from the preclinical stage, the clinical stage, even after becoming doctor. Therefore, in learning the field of medical science, strategy is needed so that memory is not damaged or lose.

To answer the aforementioned problems, this literature review aims to examine in depth the influence of factors that influence memory recall ability. This review will outline in depth the main factors that influence memory recall ability. Furthermore, this review will also discuss learning factors that can influence memory. Furthermore, this review is expected to provide valuable insights and a foundation for future research in this area.

2. Review content

2.1. Recall Memory

2.1.1. Definition

Memory is the ability to encode, store, retain and recall information or past experiences in the human brain. Most of this information is stored for future control of motor activity and for use in thought processing [8]. The Atkinson-Shiffrin model states that memory is understood as a series of distinct stages, where information is transferred from one stage area to another [9]. According to Tulving, recall memory is the means by which individuals can retain and draw experiences from the past for use in the present. Recall memory is the process of producing a fact, a word or something else from memory. In this process, a fact is selected and identified as something that has been learned before [10]. Recall memory is one way used to measure how much memory is in our heads. The methods used to measure memory consist of three approaches, namely: recall (remembering what is remembered), recognition (recognizing what has been learned), and relearning (relearning material for the umpteenth time) [4].

2.1.2. Memory Stages

There are stages of storing information in memory. This can be explained using one of the models as in the following diagram [11].

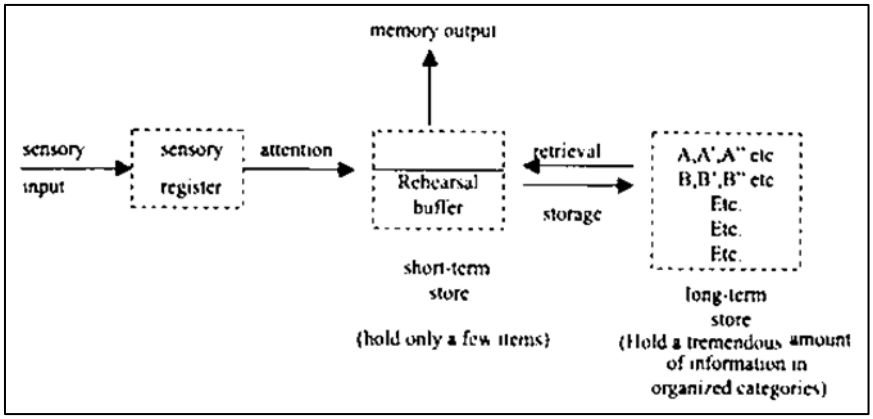

Figure 1 Information Processing Model in Memory Based on the Atkinson-Shiffrin Model [11]

Stimulus (sensory input) is perceived through the senses (sensory register). To have perception requires attention. What is perceived enters the memory, and in a short time what is perceived can be brought back as memory output which is called short-term store. Perceived information also does not immediately appear in the realm of consciousness as memory output, but is stored in memory through encoding. At a time when needed through retrieval what is in memory is brought back as memory output. Retrieval is looking for information in memory. Perceived or learned information is stored in memory for a long time, and when needed can be brought back into consciousness. This is called long-term storage [11].

There are three information processing processes in memory, namely encoding, storage, and retrieval. Encoding is process of changing information into a form that can be processed and used by the brain. This stage involves the senses to perceive external stimuli. Storage is process of storing experiences that have been perceived, so that at some point they can be recalled by the brain. Experiences that have been perceived will leave traces in memory as memory traces stored in memory. Memory traces can be lost or damaged due to the process of forgetting. So that memory traces cannot fully survive in memory. Retrieval is process of recalling experiences that have been stored in an individual's memory so that they can be used in everyday life. This stage can be done by recalling or recognizing. Recalling requires individuals to work twice, namely reviving information that may be appropriate and then recognizing it as stored information [12].

According to Woodworth and Marquis, there are three stages of remembering, namely, inputting information (learning), storing (retention), and recalling (remembering). There are two ways to enter information in learning, namely intentionally or unintentionally. During retention, the information that has been learned will be stored in the form of traces that will be re-created, called memory traces. If not used often, memory traces can be difficult to re-create or even disappear. Remembering is related to bringing back things stored in memory. Bringing back what is stored in memory can be done by recalling and recognizing. In recalling people can bring back what is remembered without the help of an object as a stimulus to be remembered. In recognizing people can bring back what is remembered or has been learned with the help of an object that must be remembered [2].

2.1.3. Conditions for Recall Memory to Occur

According to Atkinson and Shiffrin, there are several conditions for recall memory to occur, namely the presence of received stimuli, sensory organs, and time. A stimulus will be more accepted if the stimulus is very different compared to other stimuli, contrasting stimulus compared to its environment, strong stimulus intensity, stimulus given repeatedly, stimulus, different stimulus sizes, and individual attention to the stimulus received. Healthy and well-functioning sensory organs will clarify the information received. The longer the stimulus is not accessed, the information will be entered into long-term memory. If the stimulus is immediately accessed or re-elicited, the information enters short-term memory which will be easier to re-elicit [9].

2.1.4. Types of Memory Tasks

There are tasks used to measure memory, namely explicit-memory tasks, declarative-knowledge task, recall task, serial-recall task, free-recall task, cued-recall task, recognition task, implicit-memory task, and procedural-knowledge task. Explicit-memory task is a memory task used to consciously recall memories. Declarative-knowledge task is a memory task that is specifically designed to remember facts that happen to oneself. Recall task is a memory task used to produce facts, words, or other items from memory. Serial-recall task is a memory task used to remember several items in sequence after memorizing them. Free-recall task is a memory task used to remember several items as a whole and not in order. Cued-recall task is a memory task to remember paired words, then remember by being given a word pair clue. Recognition task is a memory task used to select or identify a problem. Implicit-memory task is a memory task that is useful for describing information unconsciously. Procedural-knowledge task is a memory task that is needed to remember skills that have been learned and automatic behavior when the skills are needed [10].

2.2. Factors Affecting Recall Memory

2.2.1. Age

Memory and other cognitive abilities decline with age. Naturally, memory decline is generally due to some brain cells, especially dentate gyrus cells, gradually starting to die, also due to reduced elasticity of blood vessels. Brain cells that start to die will not regenerate, so this is what causes someone to forget easily [12].

2.2.2. Past Experiences

A person who listens to a song that reminds them of their past will automatically remember the events that happened in their past as a whole, making it easier for them to recall the song they heard [3].

2.2.3. Materials

The information learned will be more noticed if it contrasts with the environment, is different from others, or has a deep connection with the individual concerned. Memory recall will be easier if the individual pays more attention to a material [3].

2.2.4. Environmental Conditions

Environmental conditions include temperature, lighting, color, sound. Sound affects human memory [13]. An environment that supports information that can be easily received by individuals will result in maximum memory recall such as: media, aids, or technology [3].

To maximize recall memory ability and prevent forgetfulness, the thing that must be considered is how the information is stored during the storage process. Some ways that can be used to make memory more effective are reducing intervention by not mixing one information with another, determining the time to study a material, dividing the material into several parts, repetition (repeating information repeatedly), recitation (reading information by heart), SQ3R which stands for survey (reviewing the material briefly), question (asking questions about the material), read (reading from various sources), recite (mentioning it again by heart), and review (reviewing it again) [4].

2.3. Factors Affecting Memory in Learning

2.3.1. Intelligence

The higher the individual's intelligence, the faster the individual will encode from the sensory organs into short-term memory. The speed of the individual in encoding will make it easier for the individual to remember what is received so that the resulting recall memory is more optimal [10].

2.3.2. Motivation

Learning motivation is something that greatly influences the learning process. The lower the individual's learning motivation, the more difficult the material will be received so that the memory ability for the material becomes low, if on the other hand the individual has high learning motivation, the easier the material will be received so that the memory ability becomes high [6].

2.3.3. Physical Condition

Physical condition greatly influences memory ability. Poor physical condition can cause a decrease in memory ability [6].

2.3.4. Individual Learning Modality

Memory is influenced by the extent to which the individual has studied and understood the material obtained from the beginning [6].

2.3.5. Interference

Interference occurs when the information obtained is mixed up or pushed aside by other information [6].

2.3.6. Emotion

Individuals will remember well if the events touch their feelings or are enjoyable for the individual. Problems that have been properly understood and considered carefully will stick more in the memory [6]

2.3.7. Physical Environment Condition

Physical environment condition includes the condition of the learning space, the smell of the learning space, the size of the learning space, the cleanliness of the learning space, the ventilation of the learning space, and others [6].

2.3.8. Social Environment Condition

Social environment atmosphere is environment atmosphere related to the interaction patterns between personnel in the learning environment, such as interactions between teachers and students or students with other students. [6].

3. Conclusion

Recall memory is influenced by various factors. These factors are divided into two: internal and external factors. Internal factors that influence recall memory ability include age and past experiences. Meanwhile, external factors include materials and environmental conditions. Several other factors can influence recall memory in learning, including intelligence, motivation, physical condition, individual learning modality, interference, emotions, and the physical or

social learning environment. Medical students can maximize memory recall ability so that all learned material is retained for a long time by reducing interventions by not mixing learning materials, determining the time and division of learning materials, repeating and reading learning materials repeatedly.

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