

OPTIMISATION OF THE EDUCATIONAL PROCESS IN MEDICAL SCHOOLS THROUGH THE USE OF MNEMOTECHNICS METHODS

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Abstract. *The training of future doctors presupposes the reliable assimilation and retention in memory of a large amount of information necessary for their further professional activities. For more efficient and less laborious memorization, storage and reproduction of various information in the educational process in medical universities, methods of mnemonics can be applied - a set of methods and techniques that facilitate memorization and increase the amount of memory by creating artificial associations. At the same time, information that is difficult to remember is most often transformed in some way and turns into a form that is convenient for memorization. The use of the method of associations in the classroom contributes to the development of creative activity and logical thinking of students, improves the mechanisms of memorization, preserving the information received in long-term memory, enriches the vocabulary and the level of knowledge of future doctors. The methods and techniques of mnemonics proposed for the study of medical subjects are used by us in the process of teaching the subject of Pathophysiology to students of all faculties of the Samarkand Medical Institute. The ease of use of mnemonic methods and techniques, the clarity of the developed teaching material and the original style of its presentation make such training accessible to a wide student audience.*

Keywords: *mnemotechnics, associations, memorization mechanisms, educational process, medical universities.*

Introduction. The information field around the modern student, compared to the student of the previous epoch, is huge and chaotic. It grows exponentially and is chaotic with the help of such sources as handheld gadgets, personal computers, and other means. The educational process in educational institutions requires constant improvement of pedagogical skills. Students of medical universities, unlike other students, have to process and assimilate a large amount of information, to memorize which most of them try to memorize mechanically the material of the textbook or the one that is given in a lecture or practical lesson. The level of assimilation of educational material strongly depends on the quality of its presentation by the teacher and the ability to memorize, and most importantly, understand by students. Starting in the 1st year, medical students are faced with words that they did not know before. If such words are just “cramming”, they disappear from memory after a few days. The training of future doctors presupposes the reliable assimilation and retention in memory of a large amount of information necessary for their further professional activities. The difficulty of assimilating the taught material is due to the large number of special terms that came from foreign languages (Latin, Greek, etc.). The peculiarity of studying various topics of medical subjects is that only a very small percentage of the necessary information is remembered using logical connections. For lasting and at the same time easy memorization, one should fill the word with content - something that is associated with specific vivid visual, sound images, with strong sensations. The set of special techniques and

methods that make it easier to memorize the necessary information and increase the amount of memory through the formation of associations (connections) is called mnemonics. Mnemotechnics / mnemonics (Greek mneme - memory, techne - art) is the art of memorization, one of the oldest applied disciplines. The first surviving written works on mnemonics date back to 86-82 years BC. The practice of using methods of memorizing information arose even earlier: the Mayan tribes and the ancient Greeks were already familiar with mnemonics [2].

The effectiveness of mnemonics has been tested in practice in the most severe and stressful conditions (in our case, these are tests and exams). Memorization methods have coexisted with the human race for more than one millennium. Many great orators, scientists, military leaders possessed various methods of mnemonics. Even in our computer age, people often have to memorize difficult information. Difficult is information that has nothing to link to. There is no logic in it, it seems to be meaningless. And so that it is just as pointless not to cram, not to load mechanical memory, many people come up with ways of memorizing. Mnemonics are used to memorize a large amount of information or even non-memorized information. Association is the relationship between individual definitions, facts, objects, phenomena, as a result of which the mention of one concept evokes the memory of another, combined with it, we can say that they are based on the features of memory, imagination and thinking. For this purpose, vivid images and plot stories are used. Associations can arise according to various characteristics: color, taste, shape, sound, action, purpose, quantity. In this case, abstract objects and facts are replaced with concepts and representations that have a visual, auditory or kinesthetic representation. Often there is no rational explanation why one image or another evokes the idea of another.

The experience accumulated over time in the application of mnemonic techniques began to be used in teaching various disciplines. Teaching medical subjects using mnemonics in a foreign medical school has become a widespread practice, with its inclusion in textbooks for the discipline being studied. Meanwhile, in medical universities in Russia, Uzbekistan and other Commonwealth of independent states countries, mnemonic education is a fairly new and little-known direction for most teachers, as evidenced by only a few publications.

Materials and methods. The use of the method of associations in the classroom contributes to the development of creative activity, figurative and logical thinking of students, improves memorization mechanisms, and enriches vocabulary. Accordingly, interest in the educational process increases and motivation in learning increases. The associative method can be used to study any topic of all subjects of the program. A significant factor influencing the effectiveness of the application of the associative method in educational activities is the teacher's emotionality - his facial expressions, gestures, and expressiveness of speech. The use of the association method makes the lesson fascinating and interesting every time in a new way, develops attention, creative and logical thinking, contributes to better memorization of the material. Information obtained using mnemonic techniques is stored in long-term memory. The main purpose of using this technique is to generate interest in the topic of the lesson, to strengthen memory mechanisms.

Results. Below are some examples of the use of mnemonic methods that I use in my classes on pathophysiology.

1. Examples of associations used to memorize the sequence of stages of phagocytosis:

1. Approach of the phagocyte to the object of phagocytosis.
2. Adhesion of the phagocyte to the object of phagocytosis.

3. Absorption of the phagocytosis object by the phagocyte.
4. Digestion of the phagocytosis object by the phagocyte.

Considering that phagocytes are the protector cells of our body, let's imagine them in the form of soldiers fighting against enemies (microbes). Before the start of the battle, soldiers (phagocytes) are in a trench (vessel).

Enemies (microbes) appeared, soldiers emerge (leukodiapedesis) from the trench (vessel) and run towards the enemy (1st stage).

They reach the enemy (2nd stage) and hand-to-hand combat begins (3rd stage). Each soldier has a grenade (lysosome), which he explodes (release of lysosomal hydrolytic enzymes) and dies along with the enemy (4th stage), most often not one, but several.

It is known that a phagocyte can simultaneously phagocytose and destroy up to 20 microorganisms (like a soldier surrounded by enemies with only one grenade, he tries not to be captured, but to destroy himself along with as many enemy soldiers as possible). This outcome of the battle (process) is called completed phagocytosis. Sometimes the grenade does not work (low activity of hydrolytic enzymes) and in this case the soldier (phagocyte) does not destroy the enemy (microorganism), but continues to hold him (incomplete phagocytosis). In the clinic, this condition is called "carrier of viruses" or "carrier of bacteria".

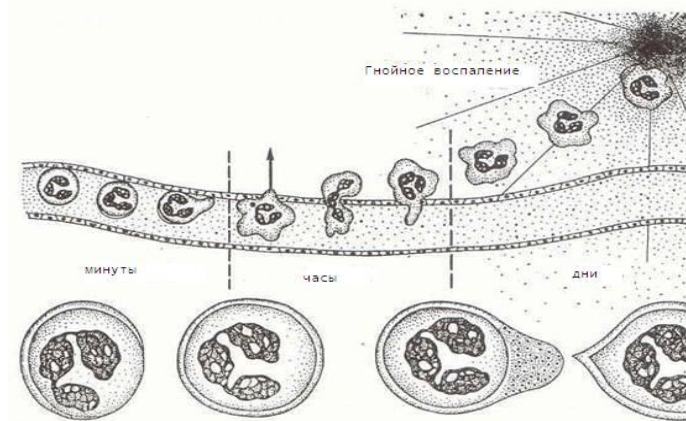
2. To explain one of the mechanisms of erythrocyte sedimentation rate (ESR) increase, erythrocytes are associated with coins, and their aggregates - with columns of coins.



If you take 2 identical glasses of water and at the same time throw one coin into one of them, and a column of coins into the other, you can see that the column of coins will settle to the bottom of the glass faster, i.e. erythrocyte aggregates are "heavier" than a single erythrocyte. Thus, the aggregation of erythrocytes contributes to increase of ESR.

3. The phenomenon of thixotropy - the transition of the colloidal substance of the basement membrane of the vessel wall from a solid state (gel) to a soft state (sol) under the action of leukocyte enzymes during their emigration during inflammation can be represented as follows.

The colloidal substance of the basal membrane is associated with jellied meat: jellied meat in the freezer is a gel state, and at room temperature it is a sol.



The higher the temperature of the environment in which the jelly is located, the more liquid it becomes. In this case, leukocyte enzymes are associated with increased ambient temperatures.

4. After myocardial infarction, a deep Q wave remains on the ECG, which reflects the replacement of dead cardiomyocytes with connective tissue, i.e. scar formation. Elements of connective tissue are not capable of performing the functions of cardiomyocytes, therefore, a deep Q wave on the ECG of such people will always be revealed until the end of their life, and in some cases, it indicates that a person once suffered a myocardial infarction on his legs, which he does not even know about. To remember this, there is the expression "monument to the dead myocardium."

Discussion. Methods and techniques of mnemonics can be used to assimilate information within all studied medical disciplines, both theoretical and clinical. In medical universities, the complexity of mastering the material is primarily due to the large number of special terms that came from foreign languages (Latin, Greek, etc.). In the study of medical subjects, only a very small percentage of the necessary information is memorized using logical connections. Most of it does not lend itself to logical connection. To memorize just such information in the educational process in medical universities, in our opinion, it is necessary to use mnemonic methods and techniques. Today, mnemonics in the universities of the Commonwealth of independent states (CIS) countries is only gaining experience. Like any new undertaking, it has supporters and opponents, and it is perceived by teachers in different ways. Those who advocate the need to actively introduce mnemonics into the educational process are convinced of its great effectiveness. The use of mnemonic techniques simplifies the memorization of information, contributes to a good perception of the material, since "the introduction of mnemonic elements allows you to increase the volume of the studied material due to the formation of artificial associations" [1].

In addition, the methods and techniques of memorizing information that are used in mnemonics are also physiologically grounded, since they are based on the main principles of the brain [10]. The brain, like a computer that stores information using a binary number system (1 and 0), is also an information system, only biological, different from the technical storage of information using images. Research carried out in cognitive psychology has shown that "parts of the material, creating new associative connections with past images ... easily pop up in memory" [7].

Opponents of learning using mnemonics explain its rejection by the fact that, doing mnemonics, you can easily overload your brain with information. However, since information only activates the brain at the moment of recall, the onset of fatigue is not associated with memory overload, but with general body fatigue. There is also an erroneous opinion of skeptics who claim that all techniques aimed at improving memory force us only to focus on the material through concentration of attention, application of effort and repeated repetition of the memorized material [6]. In defense of the use of mnemonic strategies in teaching, an improvement in academic performance can be noted. Learning even one mnemonic technique can significantly improve academic performance. Hopefully, in the near future, mnemonic learning will take its rightful place among modern advanced educational technologies.

Conclusion. The use of the associative method in our pedagogical practice allows us to conclude that when explaining the topic of the lesson using examples based on associations, information is memorized easily and much faster, and it is retained for a long time. At first glance, all these techniques seem like child's play. However, with a good organization of the material and successful association, mental images created as a result of such associations can be a reliable means of memorizing elements of various information that have little in common with each other. Even if the efforts to draw up mnemonic schemes seem excessive in comparison with the achieved results, it should be remembered that such a game is still "worth the candle": requiring constant mobilization of the imagination, it will develop creativity and logical thinking. We think that teachers of universities, especially medical ones, need to be taught teaching methods using various techniques and methods of mnemonics, which will undoubtedly contribute to an increase in the level of knowledge and the development of logical thinking among future doctors.

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