

SOME WAYS TO INCREASE THE EDUCATIONAL AND CONSCIOUS ACTIVITY OF STUDENTS OF MEDICAL INSTITUTES IN CHEMISTRY CLASSES

Safarova, N. S.

Department of Medical Chemistry, Bukhara State Medical Institute named after Abu Ali ibn Sina of the Ministry of Health of Uzbekistan

ABSTRACT

The article describes some ways to increase the educational and conscious activity of students of medical schools in chemistry, gives interesting examples of the stages of the lesson.

Keywords: Methods of teaching, teaching technology, medical education, medical chemistry, competence, motivation of the topic.

INTRODUCTION, LITERATURE REVIEW AND DISCUSSION

Often the teacher of a medical school faces the following prejudice: Chemistry is a non-special subject, why should we teach it. Are we going to talk with patients about the chemical composition of drugs?

But during the realization of the relevance for this subject, they will already be studying at senior courses where only specialized clinical subjects are taught.

Therefore, the task of a chemistry teacher includes the following:

1. Motivating the topic. In my opinion, it is precisely to this part of the lesson that the teacher must be prepared with special zeal.

The reason of being faced with the problem concerning grabbing students' attention is that the most teachers make the classic 'About A Topic' mistake. The 'About A Topic' mistake is when you teach '**About** A Topic'. Whether it's History, Chemistry, or any other topic you could possibly think of, when you talk 'About' it, you lose people's attention.

The solution is not to teach 'About A Topic' but instead to teach 'For The Student'. That means, the Student should immediately feel the benefit of the content you are teaching. When you show a benefit, you create desire. And when there's desire, you guessed it, you hold attention. Here is a summary of the beginning of the lesson. As you know, the absolutely most important part of effective teaching is how you start it. If you begin improperly, it's almost impossible to get your student's attention back. Never start with a typical 'Welcome' or 'Here's what we're going to learn today' (classic Mistake). Instead, begin your content with Headlines and with Hooks.

A Headline is a short sentence that boils down the core benefit of being part of the class.

A Headline is a Promise. What can your content promise your students? If you delve into your students' minds, you'll discover exactly how they want to learn, and, trust us, they're hungry for wisdom. But they must see what kind of benefit might be taken from your content. For example, learning about the history could show them how to be an effective leader, how to bring about a movement of change, the principles of starting something new (whether it's a company or a country or an app), etc. Or, the better a student is at Mathematics (whether it's 4th-grade math or advanced geometry) the better they'll be able to Code (which is all about math and algorithms) and create innovative businesses and technology.

Here's a brilliant effective teaching strategy for you: **Create anticipation for your curriculum.** Most teachers start the year by saying something general like, "This year is going to be great, you're going to learn all about..." – classic AaT mistake. Instead, build up the benefit, value, pain, lack and top it off with a Preview: "...but you'll only learn the 4 secrets to George Washington's Leadership Success in a few months..."

Did you feel that? Now your students CAN'T learn something? They can't have something they WANT right now? Super powerful, 100% attention hacker gold.

Think of television. They never release a movie at once. Each movie starts with a preview first. You wait to watch the movie, and before the movie starts, you'll see 5 movies that will "coming soon". Then you see the Preview again on TV or YouTube and you can't wait for it to come out because of all the anticipation they've created for you.

Here's something you already know: There are 3 main types of learners – Visual, Audio, and Kinesthetic. To really master effective teaching, notice which type your students are.

Visual is *seeing* the material, Audio is *hearing* the material, and Kinesthetic is *feeling* the material. Meaning, the optimal learning environment is NOT to sit passively waiting for a lecture to end. The IDEAL learning environment is when the student sees, hears, and feels the material themselves.

That's why making animated videos and presentations has become such a popular new method of effective teaching recently. Animated videos hit the Audio and Visual, and when the student creates one himself, it hits the Kinesthetic type too. [5]

2. Careful planning of increasing the practical competence of the students. That is, the application of theoretical knowledge in medical practice.

A topical task facing vocational education today is the practical implementation of the competency-based approach. Federal state educational standards of vocational education of the third generation increase attention to the problem of training a specialist of a qualitatively new level. The quality of education is associated with the formation of student competencies, which will ensure personal and professional self-actualization of the graduate.

The task of education is to ensure that, regardless of the specialization and nature of the work, any novice specialist should possess fundamental general education, general technical and special knowledge. And not only possess a certain level of knowledge, skills and abilities, but should be able to implement them in professional activities. In this connection, it is necessary to update the content, forms, methods and means of education from the point of view of competence approach.

Competence means the ability to apply knowledge, skills, personal qualities and practical experience for successful activity in a certain field.

Professional competences are understood as the ability to act on the basis of existing skills, knowledge and practical experience in a certain professional activity. Because the development of chemists are used for the needs of medicine since ancient times. Thus, the study of compounds of mercury and arsenic by Paracelsus formed the basis of iatrochemistry - the science of the use of certain chemical compounds for the treatment of diseases. The discovery of substances capable of destroying various microbes in the environment formed the basis of the disinfection method.

Concept of competence includes not only cognitive and operational-technological components, but also motivational, ethical, social and behavioral components. The composition of key

competences is also given: mathematical, communicative, informational, autonomous, social, productive and moral.

Since we live in the world of substances and materials, continuously occurring chemical reactions, we emphasize chemical competence, which includes chemically competent handling of substances, materials and processes, safe both for their own lives and for the normal, natural functioning of the environment.

Without chemical competence, it is impossible to develop a health-saving competence.

In chemistry, subject matter competence includes the following knowledge and skills:

1. The concept of chemistry as an integral part of the natural sciences of the world. Chemistry is the central science of nature, closely interacting with other natural sciences.
2. The notion that the world around us is made up of substances that have a certain structure and are capable of mutual transformation. There is a connection between structure, properties and application of substances.
3. Chemical thinking, the ability to analyze the phenomena of the world around in chemical terms, the ability to speak and think in a chemical language.
4. Understanding the role of chemistry in everyday life and its applied importance in the life of society, as well as in solving global problems of mankind: food, energy, environment, defense, etc.
5. Skills in the safe handling of substances, materials and chemical processes in everyday life and practice, as well as the ability to manage chemical processes.

So, for disinfection of tissues during operations D. Lister used phenol solutions; P. Koch - solutions of chlorine mercury, and in 1909 Stretton discovered the disinfecting properties of solutions of iodine in alcohol.

Arsenic-based compounding, successfully carried out by P. Ehrlich, laid the foundation for chemotherapy - a method of treating any infectious, parasitic disease or malignant tumor (cancer) with the help of poisons or toxins.

Another important discovery of chemists for medicine was the synthesis of various sera, which allow them to develop immunity to a specific disease.

3. The knowledge test stage. The permanent phase of the training session, which includes a survey: oral and written, maybe in the form of tests, etc. Whichever type of test includes this stage, it should not be boring and should not oblige students to think shiveringly about the results of the lesson, that is, would I be able to take an exam successfully.

Here situational problems, different cognitive crosswords come to the aid.

4. And don't forget about homework. As the subject of chemistry is closely related to the environment, let the students get to know it better by applying chemical knowledge. To do this, select the appropriate tasks. For example, how do you feel about the following: Examine the effects of citric juice, acetic acid on baking soda and draw conclusions. E.t.c.

For example, I suggest the order of one lesson in the subject "Medical chemistry" on the theme "Carbon acids and their derivatives".

1. Motivational introduction.

"Do you want to know what does the word "spoiled wine" means?

Or how did this liquid come into the medicine?

In the first millennium B.C., winemakers noticed that if the wine was left in an open container, it would sour out after a while. "Spoiled wine" was usually poured out without finding any use for it. Later it was used for cooking, marinating meat, tasting salads, etc. But nowadays, the use of this substance and its derivatives have become used even in the field of medicine and very often. In my opinion, you have already guessed what I am talking about. Yes, today we will talk about organic acids, which are also called carboxylic acids.

2. Practical competences of the lesson.

*After all, from all the knowledge acquired
the only thing we can remember
is that we've put into practice
Goethe...*

For a start, we apply one of the types of competences. This type has the following character. *Understanding the role of chemistry in everyday life and its applied importance in the life of society, as well as in solving global problems of mankind: food, energy, environment, defense, etc.*

For this purpose, we will talk about the application of carbonic acids in the national economy, medicine, etc. At the same time, we will not forget to know the knowledge of students about it.

Free form of formic acid is found in the body and caustic excretions of ants, burning nettles and in small amounts in the urine and sweat of animals. Antic acid is a caustic substance: droplets of it cause on the skin of the bladder.

Acetic acid is known as acetic acid from ancient times. Anhydrous acetic acid may exist in a solid state in the form of a transparent mass or crystals resembling ice, with a melting point of 16.6⁰C. Therefore, anhydrous acetic acid is often called ice acetic acid.

Oil acids in the free state are contained in rancid oil and sweat. Complex ester of glycerol and butyric acid is a part of cow oil. As other fats do not contain oil acid esters, in doubtful cases the product is analyzed for oil acid to prove the authenticity of cow's oil.

Valerian acid is contained in the valerian root and is a component of the validol drug in the form of ester.

The names of the next three even acids - capron, caprylic and caprylic – which share a common root. "Capra is Latin for "goat"; these acids are indeed found in goat's milk fat.

Pelargonic acid is found in pelargonian and other plants of the geranium family, and laurel acid (it was called laurel acid in the old books) in laurel oil. Myristinic acid is found in the aromatic seeds of the nutmeg tree - the nutmeg.

Palmitinic acid is extracted from palm oil extracted from coconut nuts. "Stear" in ancient Greek means "fat". Hence the name of stearic acid. Together with palmitic acid, it is one of the most important fatty acids and constitutes the main part of most vegetable and animal fats.

Peanut acid is found in peanut butter.



Fig.1

Next, we will continue the practical part with the experiments. We will conduct several demonstration experiments related to the study of the properties of carbonic acids. And after that, we will immediately join those experiments, which can be done by the students themselves, even at home.

There are a lot of them and they are very diverse. Such experiments include determining the reaction of the environment by means of natural indicators. Examples of such products are red cabbage juice, pomegranate

juice or red beet juice, which contain a substance called anthocyanins. These substances are sensitive to changes in the reaction of the solution medium. That is, they change the color.

I think that when students see a change in colour with simple, everyday substances such as soda solution, vinegar solution, bathing products, etc., they will feel attached to chemistry.

In the stage of knowledge testing, as mentioned earlier, we apply not boring, original tasks. A very good example for this is the case studies.

Here are some examples of such tasks:

1. electric kettles being in use in many homes for a very long time. They boil water faster than a gas or electric stove because their heating elements are in direct contact with water.

In populated localities with hard water containing moderate or high levels of soluble calcium and magnesium salts, limescale often appears in electric kettles on the heating element and on the inner surface of the case - a mixture of some insoluble salts of the same metals. Precipitation acts as an insulator, slowing down the boiling of water, thereby increasing energy consumption. Salt deposits can peel off and get into your tea, coffee or other drink in the form of tiny pieces. You can remove limescale from your electric kettle. There is one very simple and safe way: you need to boil water in the kettle, adding some citric or acetic acid to it beforehand. If the limescale still remains, you should do it again. When the desired result is achieved, the kettle should be washed well under running water, then washed with dishwasher and washed well again under running water. That's all - the kettle is clean and ready to go again.[7]

1. What process happens when the water is boiled?

2. Which salts are part of the scale?

3. Why does boiling water with acids remove scale? What happens to it when citric or acetic acid is added?

Answer: 1: When boiling water, the calcium and magnesium bicarbonate salts of metals break down to form hard-to-soluble carbonates that settle on the bottom of the kettle:



2. The scale consisting of carbonates is converted into soluble salts by the action of acids:



2. Heroes of Jules Verne's novel "Captain Grant's Children" were only going to have dinner with the meat of a wild lama (guanako) shot by them, when suddenly it turned out that it was not edible at all. "Maybe it lay too long? - One of them asked puzzledly. "No, it was unfortunately running too long! - Paganel, a geographer, answered: "Guanako's meat tastes good only when an animal has been killed while resting, but if it takes a long time to hunt for it and the animal runs for a long time, then its meat is inedible. It is unlikely that Paganel would have been able to explain the reason for the phenomenon he described. But today it is not difficult to do it at all.

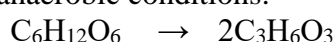
Questions:

1. How can we explain the cause of this phenomenon from the chemical side?

2. Write down the corresponding equations of reactions.

(Answer: It was lactic acid that made the meat of an animal shot by the heroes of Jules Verne not tasty.

During exercise in the muscles of animals and humans, glucose decomposes into lactic acid in anaerobic conditions:



Glucose Lactic acid

3. You've probably noticed that mosquitoes attack some people and others as if bypassing other ones? Explain the reason.

(Answer: The reason lies in the genetics and chemistry of the potential victim's body. Now there is no doubt that mosquitoes choose their prey based on the chemicals that excrete human skin and the bacteria that infect it. Here is one of them:

Increased sweating

If you are besieged by mosquitoes during outdoor training, you will have to move your classes to the room. This is because lactic acid, which is released during exercise, is a good bait for insects. The mosquitoes also feel the warmth of a hot body. And the closer the insect gets to your body, the more you attract them.)

4. Nettle. Besides to its obvious benefits, this plant also has harmful internals. The first is related to its burning properties. Stinging hairs are located on leaves and stems. They are necessary for plant for survival and protection from herbivorous animals. When such a hair gets on the skin, it is intentionally attached to its scales and breaks, spreading in layers of the epidermis a huge number of chemical compounds. These substances also cause itching, burning and pain. The skin swells, whines and itches for a long time. Small urticaria burns are even considered to be useful, as they increase blood circulation and serve as an excellent training for immunity. But if the burn is very severe, the temperature may rise and it can course serious deterioration. In some cases (especially with children) you even have to go to a hospital. [1]

Question: Explain the phenomenon chemically

(Answer: A huge amount of chemical compounds such as formic acid, as well as histamine and choline, flow out of the scales. They cause allergic reactions.)

5. Aspirin (acetyl salicylic acid) has anti-inflammatory, antipyretic and analgesic effects, so it is used in fever and rheumatism. Aspirin suppresses pain sensitivity and helps from headaches. However, this miracle - drugs are contraindications, namely: it can not be used for stomach ulcer.

Question: why?

(Answer: Gastric juice contains strong inorganic acid - hydrochloric acid. And the acidic environment that aspirin creates when reacting with water can aggravate the course of ulcer diseases.)

4. And the last step is homework. As mentioned earlier, homework should not be boring, compelling. I suggest several variants of homework on the topic of carboxylic acid.

1. Pour some milk in the glass and pour a few drops of lemon juice on it? What do you see? (A clot is a milk protein that is coagulated by acid.) Why do you think it is not advisable to eat milk and fruit at the same time?

2. Pour some stationery glue into the glass (the glue is silic acid salt) and add lemon juice to it. What do you see?

3. Make conclusions about the properties of the studied acids. What do you think is the reason for the similarity of properties of mineral and organic acids?

And in conclusion - the process of learning, built on the basis of similar methods, allows students to master the system of knowledge and skills to use them in professional activities and self-education, promotes the development of personal activity in the educational and research process, the formation of cognitive interests, cognitive independence. [6]

It is important to develop skills and abilities of students in such a way that the applied methods of activity are not limited to the thinking of students, but, on the contrary, lead students directly to the creative solution of various educational tasks. In this case, the very process of skills development in students can be considered as a way to achieve the ultimate goal - the formation of a creative personality. At the same time, a high level of skills development should be the basis for the development of a person's creative abilities.

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