TEACHING CHEMISTRY IN HIGH SCHOOLS.

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Annotation:*The rapid growth of scientific knowledge should lead to the natural variability of the educational process in the school, and improving the quality and efficiency of the educational process, in turn, will increase the rate of growth of scien*

Аннотация: *Быстрый рост науч ных знаний должен привести к естественной вариативности образовательного процесса в школе, а повышение качества и эффективности образовательного процесса, в свою очередь, повысит темпы роста научных знаний.*

Key words: *Chemistry, teaching methodology, chemistry knowledge, advanced specialists, scientists who contributed to chemistry, origin of chemistry, terms related to chemistry. Principles and criteria of teaching chemistry.*

Ключевые слова: *химия, методика обучения, химические знания, продвинутый уровень. Специалисты, ученые, внесшие вклад в химию, происхождение химии, термины, связанные схимия. Принципы и крит.*

The main concept of the article “Teaching chemistry in secondary school” is the presentation of one's own pedagogical experience, providing assistance to teachers in the methodology of teaching chemistry at school. Perhaps, with more or less success, it can be applied to the teaching of other natural sciences (physics, biology, geography) and mathematics. In the vast majority of cases, the effective implementation of professional activities requires both the ability to carry out this activity and the desire to carry it out (motivation).

We live in an era of rapid growth in scientific knowledge. From the point of view of system analysis, the educational process in secondary school and scientific knowledge are complex, endless, interacting systems, and the educational process is included as a subsystem in the system of scientific knowledge. Therefore, the

rapid growth of scientific knowledge must inevitably lead to a natural variability of the educational process in secondary school, and improving the quality and efficiency of the educational process, in turn, will increase the growth rate of scientific knowledge.Increasing the effectiveness of the lesson is one of the urgent tasks of improving the quality of the educational process.

Who is a modern teacher today: a source of information, a carrier of innovations, a consultant, a moderator, an observer, a resource, a guide, an adviser - the one who teaches others or constantly learns himself? What is a modern teacher like: creative, self-critical, enterprising, stress-resistant, knowledgeable, psychologist?

The times of encyclopedists, who possessed an extensive but constant store of knowledge, have passed. In the age of information technology, with constantly growing market conditions, specialists who are able to find, using multimedia tools, and analyze rapidly changing information are valued. Therefore, the goal of modern education is not to memorize a large amount of factual data, but to teach effective ways to obtain and analyze available information. Given that learning is a purposeful process of interaction between a teacher and a student, discourse is an active principle in the pedagogical system. The “teacher-student” system has the potential to increase the activity of students, and the effectiveness of the educational process depends on coordination, synchronization in the actions of both parties. One of the conditions for improving the effectiveness of teaching is the establishment of a favorable psychological climate in the learning process, that is, it is necessary to change the position of the teacher in the educational process. The main task of the teacher is not the transfer of knowledge, but the organization of the activities of students. The teacher should act as a mentor and organizer of a continuously changing learning environment, and not as a mere carrier of information. The role of the student becomes more complicated, since he must turn from a passive consumer of ready-made knowledge into an active researcher who is interested not so much in obtaining specific knowledge as in new technologies and methods of research and obtaining the desired result. These can be interactions

“teacher - student”, “student - student”, “student - educational book”, “teacher - student - educational material”.

New knowledge is better perceived when students have a good understanding of the tasks facing them and show interest in the work ahead. Setting goals and objectives always takes into account the need of students to demonstrate independence, their desire for self-affirmation, the thirst for new knowledge. If there are conditions in the lesson to meet such needs, then students

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My experience in high school has shown that one cannot rely entirely on the content of the material being studied in developing interest in a subject. Reducing the origins of cognitive interest only to the content side of the material leads only to situational interest in the lesson. If students are not involved in vigorous activity, then any meaningful material will arouse in them a contemplative interest in a subject that will not be a cognitive interest.

At school, students come to my lesson with switched attention, so the main task for me as a teacher is to switch the brain path to the perception of chemical material. The student's brain is arranged in such a way that knowledge rarely penetrates into its depths, often they remain on the surface and therefore are fragile. A powerful stimulus in this case is the interest. The development of cognitive interest is a complex task, the solution of which determines the effectiveness of the student's educational activity. Conscious work begins with the understanding and acceptance by students of the educational tasks that are set before them. Most often, this situation is created by repeating the previously

studied. Then the students themselves form the goal of the upcoming work. In connection with the need to improve academic performance, the development of students' cognitive interests in the learning process is of great importance for any academic subject. The desire of every teacher is to instill interest in their subject, but a chemistry program in high school that promotes memorization does not always develop students' creative thinking.

No matter how good the knowledge of the subject, the high erudition of the teacher, the traditional lesson does not contribute much to the emotional mood of the students for further perception of the educational material, the activation of their mental activity, the development and realization of their potential mental abilities. The most active forms, means and methods of teaching (frontal experiments, research activities, competition lessons, computer technologies) contribute to the removal of fatigue, better assimilation of the subject, the development of scientific interest, the activation of students' educational activities, and the increase in the level of practical orientation in chemistry.

Every student has a passion for discovery and exploration. Even a poorly performing student finds interest in a subject when he manages to discover something. Therefore, in my lessons I often have to conduct frontal experiments. For example, students in grade 9 on the topic “Chemical properties of oxygen” experimentally find out and discover the conditions for better combustion of some simple and complex substances. The venue for the frontal experiment is not an end in itself for me, but it is aimed at the mental actions of students. Frontal observations convince students that each of them can make a discovery of something that experience gives impetus to.

I also conduct research lessons with students, where the subject of their research is the rediscovery of what has already been discovered in science, and the students' research work is knowledge for them of the not yet known. During the lesson, students themselves accumulate facts, put forward a hypothesis, set up experiments, create a theory. Tasks of this nature arouse increased interest among the children, which leads to a deep and lasting assimilation of knowledge. The

result of the work in the lesson is the conclusions independently obtained by the children, as an answer to the problematic question of the teacher. For example, we reveal the essence, mechanism and cause of the occurrence of ion exchange reactions, based on the theory of electrolytic dissociation with 9th grade students. Since an integral part of chemistry is the implementation of practical work, I almost completely departed from the textbook and its instructions and suggest that the guys themselves suggest the order of work and all the equipment necessary for this. If it is difficult for the student to complete the work, then he can use the textbook. I believe that this teaches children to think independently, and to consider the lesson as a research method.

In order to correlate new information with the system of previous knowledge, I work with generalizing diagrams and tables in the lessons. For example, studying the topic “Special chemical properties of nitric and sulfuric acids” in grade 9, we draw up diagrams with the help of which, using the comparison method, we explain the oxidizing properties of these acids depending on their concentration when they interact with non-metals and with metals of various activity.

In chemistry there are lessons related to problem solving. I teach children to solve problems according to the algorithm and compose it themselves. For example, in grade 11, students solve all problems on the topic “Solutions. Ways of expressing the concentration of solutions” according to the algorithm. I pay special attention to solving qualitative problems in organic and inorganic chemistry, where children learn to think and apply knowledge in practice. I think that even in weak classes a good result is visible. One of the ways to develop cognitive interest, I see the use of various types of knowledge such as crosswords, rebuses, chainwords in a generalizing lesson.

Such tasks contribute to the assimilation of certain chemical quantities, concepts, laws, memorization of the names of scientists, names and purposes of instruments and laboratory equipment. To enhance the cognitive activity of students in the classroom and develop their interest in learning, I conduct lessons-competitions. Such lessons contribute to the improvement of academic

performance, since not wanting to lag behind their comrades and let down their team, students begin to read more on the subject and train in solving problems. Such lessons lead to a variety of learning process.

In order for students to have the sufficiency of supporting knowledge, without which they cannot advance in their studies, I use work with supporting notes. Supporting notes allow the student to draw up a plan for studying a chemical phenomenon or law, and also, if necessary, to quickly complete and repeat the material covered in the following courses. For example, a summary on the topic “Chemical Kinetics” can be used in both 9th and 11th grades.

In order to check and correct students' knowledge on any topic, I work with test cards. They allow me to see the degree of learning of students, their level of preparation. One of the interesting forms of organizing the collective and cognitive activity of students, I consider a public review of knowledge, which is a test for them. The review develops the active cooperation of children in their main work - teaching, contributes to the creation of an atmosphere of goodwill in the youth team, the education of mutual assistance, the formation of a responsible attitude not only to their studies, but also to the success of their classmates. Reviews of knowledge deepen the knowledge of the children on the subject, serve to consolidate large topics or the most complex sections of the chemistry course. For example, in the 11th grade, I conduct reviews on the topics “Main classes of inorganic compounds”, “Periodic law and the Periodic system of chemical elements of D.I. Mendeleev”, “Structure of the atom and chemical bond”; in grade 10 - “Hydrocarbons”, “Oxygen-containing organic compounds”; in the 9th grade - “Theory of electrolytic dissociation”, “Metals”, “Non-metals”.

The best place to establish a dialogue between a teacher and students is also a lesson using computer technology. It is in such a lesson that it is possible to ignite the feelings of students. And this is our relationship with the guys to each other, to study, to the family, to the team, to knowledge. Our emotional relationship to the world is what constitutes beliefs, the soul of a person, the core of his personality. The computer as a learning tool is now becoming an indispensable tool for

teachers. This problem seems to be relevant, since the pedagogical capabilities of a computer as a learning tool in many respects far exceed the capabilities of traditional means. The use of computer technology makes it possible to produce a significant number of visual aids, print the texts of lessons, test papers, tests and much more, and increase the visibility of the material being studied. For example, when studying the topic “Structure of the Atom”, you can use a fragment of the “Chemistry, Grade 8” program, which allows you to consider the structure of the atom, the model of the distribution of electrons over energy levels, as well as the mechanisms for the formation of chemical bonds, models of chemical reactions and much more. This use becomes even more relevant when studying the course “Organic Chemistry”, which is based on the spatial structure of many organic substances. This seems to be extremely important, since students usually do not form an idea of molecules as spatial structures. The traditional image of the molecules of substances in one plane leads to the loss of a whole dimension and does not stimulate the development of a spatial image. A significant achievement of computer technology in this matter is also the fact that the structure of molecules can be viewed from different angles - in dynamics.

The use of multimedia programs makes it possible to make a chemical experiment more accessible. For example, there are no experiments with harmful substances in the school curriculum in chemistry, although the demonstration of some of them has educational value: there are experiments that formed the basis of historical discoveries and are necessary to form a complete picture of the development of chemical knowledge (obtaining oxygen, hydrogen), the properties of individual substances need to be known not in words, since they form the rules of correct behavior in extreme situations (the interaction of sulfur with mercury). The use of CDs to demonstrate a chemical experiment also makes it possible to reduce the time for demonstrating a long experiment (oil distillation), and to facilitate the preparation of equipment. This does not mean at all that the experiment should be completely replaced by a demonstration. So, before starting practical work, I prepare for them with students using the “analyst” program

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The state, as I believe, should be interested in making the most efficient use of human potential, i.e. that the respective positions be filled with people who can properly use the respective duties. When it comes to pedagogy, one must understand that on the scales are the fates of specific people who, perhaps, are placed on the “Procrustean bed” of the existing educational system.

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