

FORMATION OF METHODS OF TEACHING CHEMISTRY SCIENCE ON THE BASIS OF INTERDISCIPLINARY COMMUNICATION

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ANNOTATION

This article the problems of implementation modern technology of integration lessons in teaching chemistry-biology, chemistry-ekology, chemistry-physics, as well as chemistry-mathematical disciplines. The content and scope of the material used in the integrated lessons are determined by the curriculum. The teacher is responsible for the content of the interdisciplinary material.

Keys words: *integration, integration lessons, interdisciplinary communication, presentation, attention, memory, speech.*

Currently, the role and importance of integrating the sciences of the natural-mathematical cycle is growing. This is especially true of school chemistry courses, which have multidimensional links with other subjects. When used skillfully in the learning process, these relationships enrich and deepen knowledge and help shape students' scientific outlook. Why is there a need for integrated lessons?

First, the world around children is perceived by them in its unity and diversity and often the subjects of the school cycle are focused on exploring the individual relationships of that unity, not having an idea of the whole phenomenon, but of its parts that differ from each other.

Second, integrated lessons develop students' potential, help them to actively know the reality around them, understand and find cause-and-effect relationships, and develop logic, thinking and communication skills, which is the goal of collaborative pedagogy. [1]

Third, integrated learning is non-standard and fun. The use of different types of activities during the lesson keeps the students' attention at a high level, which allows them to talk about the effectiveness of the lesson.

Integrated lessons offer great pedagogical opportunities. Such classes relieve students' fatigue, over-stress by changing activities, increase interest in knowledge, and develop students' imagination, attention, thinking, memory and speech.

Fourth, integration in modern society explains the need for integration in education. Modern society needs highly qualified, well-trained professionals. To meet this need, preparation should begin in the elementary grades, which is facilitated by the integration of disciplines.

Fifth, integration frees up class time so that it can be used, for example, for student development activities.

Sixth, integrated lessons allow the teacher to understand himself, to show his creative abilities, to reveal his pedagogical abilities. All areas of modern science are closely interrelated, so it is possible to separate school subjects.

Integration is a didactic condition and a means of deep and comprehensive learning in school. The establishment of interdisciplinary links in the school chemistry course helps to deepen the knowledge, to form scientific concepts and laws, to improve and optimize the educational process, to form a scientific worldview, the concept of unity. The relationship of events in the surrounding world, nature and society. In addition, integration helps to increase the scientific level of students' knowledge, develop logical thinking and creative abilities. The implementation of interdisciplinary links eliminates duplication in the study of educational material, saves time and creates favorable conditions for the formation of general educational skills and abilities of schoolchildren. For example, in chemistry, physics and biology, laboratory work (use of exercise scales, rules of gravity, rules of working with alcohol lamps and other experimental skills) develops skills in working with instruments and reagents. Integration increases the effectiveness of polytechnic and practical education. [2]

The content and scope of the material used in the integrated lessons are determined by the curriculum. The teacher is responsible for the content of the interdisciplinary material.

There are two types of connections between disciplines: temporal (chronological) and conceptual (ideological). The first implies an agreement on the timing of the completion of different course programs and the second implies the same interpretation of scientific concepts based on general methodological rules. Interdisciplinary relationships can be identified through the generality of research methods (experimental method in chemistry and physics, model method in chemistry and mathematics, etc.). A chemistry teacher has to deal with three types of temporary connections: anterior, posterior and prospective.

One of the key questions facing chemistry teachers in higher education institutions is: "Where should integrated classes be in a school chemistry course?" The chemistry teacher discovers the relationship of chemistry with other disciplines, extracurricular information and concludes that children value not only the knowledge gained in a particular subject, but only in combination with other knowledge. This is how the whole picture of the world is seen. [3]

An integrated lesson still requires careful planning. Students have to create a generalized picture on a specific topic, which requires certain intellectual efforts. The course work consists of three main stages:

Preparatory stage - the goals and objectives of the lesson are defined, based on the need to integrate with other school subjects, a lesson plan is developed. Students will select additional literature, illustrations, audio and video materials, prepare presentations on a specific topic, and receive individual assignments.

The main step is to organize and conduct the lesson within the recommended types. (lesson - game, lesson with elements of analysis and comparison of different sources of information, lesson - problem solving, lesson - reflection, lesson - discussion, lesson - conference, lesson - presentation, lesson - portrait, lesson - excursion).

The final stage is when the teacher summarizes the lesson with the students. Composes questions for independent work on the topic under study. Provides an opportunity for participants to exchange views on the possibility of conducting integrated classes in the future.

The role of the teacher in the integrated lesson is changing, its main task is to organize the learning process in such a way that students know the interdependence of all areas of knowledge acquired in school science lessons and as a result additional sources of information hard work with. [4] In the process of preparing and conducting an integrated lesson, two or more learning disciplines interact and here the child plays a new, more active and meaningful role for himself or herself. Increases the respect for and understands the need to fill the knowledge load outside the textbook material.

The main task of the student is to develop an individual way of acquiring and applying knowledge. The following requirements are set for a child attending an integrated course:

- ability to find and use data using a variety of sources;
 - skills of critical review and comprehension of information received;
 - ability to present and discuss conclusions based on the information obtained, to enter into discussions;
 - listening to and taking into account the reasonable conclusions of others;
- Speak in public, express yourself verbally.

Let's look at some specific examples of the use of integration in chemistry lessons.

The entire cycle of integrated courses can be devoted to the biographies of scholars, many of whom were multifaceted. Such acquaintance is, of course, important in a variety of positions, including in the field of education. In traditional lessons, this is difficult: it is important to show a great person in all its diversity, but there is not enough time for that.

Integrated lessons can clearly solve this problem. In studying the topic "Law of conservation of mass of matter" it is useful to acquaint students with its inventor M.V.Lomonosov and consider the role of this historical figure in mathematics, chemistry, physics, poetry.

It is natural to talk about the author of D.I.Mendeleev's study of the periodic table of chemical elements. [5]

The most important indicator in organic chemistry is A.M.Butlerov, this may also be a reason to conduct an integrated course.

The topic "The structure of the atom" allows you to combine the knowledge gained in the physics course.

In studying the structure and properties of water, it is important to emphasize its role in the life of living organisms: it is recommended to take into account its biological meaning, the etymology of the word "water", to suggest the choice of proverbs, sayings and sayings riddles on this topic.

In the 9th grade chemistry course, D.I.Mendeleev's there are many such examples. The study of organic chemistry combines knowledge in biology, geography, literature and chemistry. Knowledge of mathematics is the basis for solving computational problems in any chemistry course from 8th grade to 11th grade.

From the point of view of modern innovations, information and communication technologies, the use of educational resources of the Internet also serve as a basis for the preparation of integrated lessons.

The implementation of interdisciplinary links eliminates duplication in the study of educational material, saves time and creates favorable conditions for the formation of general educational skills and abilities of school children. For example, in chemistry, physics and biology, laboratory work (use of exercise scales, rules of gravity, rules of working with alcohol lamps and other experimental skills) develops skills in working with instruments and reagents. Integration increases the effectiveness of polytechnic and practical education.

Previous interdisciplinary links are those that are based on previous knowledge in other disciplines (biology, geography, physics, natural history) when studying chemistry. Linkages are connections that take into account the simultaneous study of a number of issues and concepts in chemistry and other sciences. Prospective connections are used when the study of material in chemistry is preceded by its application in other disciplines (e.g., the study of fats and carbohydrates in chemistry occurs earlier than in biology, in which the biology teacher relies on his knowledge of chemistry lessons). It is important that the chemistry teacher directs the students to study the subject in depth, which will be useful for them to learn other subjects in later grades.

An important step in the success of integration is the initial training of the teacher. It includes an analysis of the program, school textbooks, methodological literature, determining the level of reflection of the program in them. This allows the teacher to identify issues on the topic, which should be addressed using interdisciplinary links. It is important to study the material from related textbooks, to coordinate the study of chemistry with basic knowledge in other disciplines. The amount of material taken from other objects should be as small as possible. Here are some things to look for:

- which textbook contains material (question, text, picture) related to this topic;
- when the given material is studied in the relevant subject;
- a summary of the relevant topic material (facts, examples, laws, figures);
- what method or technique should be used to involve relevant materials in chemistry lessons (notes, repetition, comparison, historical excursion, comparison, assignments for independent work, work with drawings or graphs, problem solving, etc.);
- in which science the chemical material can be used in the future.

Having a well-planned integration material, the teacher takes it into account when preparing the syllabus and thinks deeply about how to use it effectively. You can suggest the following techniques:

Homework from other subjects. Students will be given a homework assignment to review previous material in their respective subjects to help them understand the issues to be covered in the next lesson. The task of repeating the material must be clear. The organization of repetition of such material has its own peculiarities. So, when giving assignments, you should first explain how to work with the reference (read and study, compare how the described event is described in the chemistry textbook, write a description in a notebook, answer the questions, etc.). For example, in eighth grade, before studying the structure of the atom, students are asked to do their homework: review this material in a physics textbook.

Solving problems of interdisciplinary nature. It is recommended to solve one or two problems to strengthen the material, in which case students will be allowed to use textbooks in other subjects. For example, after studying "Electrolysis" you can ask questions using Faraday's laws (physics). The test may include an interdisciplinary question or assignment.

Involve visual aids and tools on other topics. Integration depends on the content of the material and the format of the lesson. In other disciplines, lessons learned are often used as basic knowledge to raise an issue or to deepen and consolidate knowledge. In any case, the material used should be repeated, if possible, using the words and symbols entered in the appropriate course. If other characters are needed, they should be compared to the usual ones and identified.

Integrated generalization courses have a great opportunity to systematize knowledge and skills. They can take the form of interdisciplinary seminars, conference classes, role-plays, research classes, etc. Such classes are usually prepared jointly by two or three science teachers.

For example, a chemistry, biology and physics teacher prepared a seminar on "The Origin of Life on Earth", Scientific-practical conference "Proteins - the basis of life" - a teacher of chemistry and biology; Heat Engines and Nature Conservation - Physics and Chemistry teacher, etc. When integration is used, the whole educational process is restructured, generalized knowledge in a particular field is combined and a single subject is combined. This solves the contradiction in the science system between the need for students to master their scattered knowledge of science and the need to apply it comprehensively in practice, work, and human life.

The advantages of integrated lessons are:

1. These lessons help to increase learning motivation, to form students' interest in learning.
2. Contribute to the formation of a holistic, scientific system of the world and to consider the phenomenon from several angles.
3. Compared to regular lessons, they help to develop speech, to develop students' ability to compare, summarize, draw conclusions.
4. Integrated lessons help to intensify the learning process, relieve stress and overload.
5. This type of lessons not only contributes to a deeper understanding of the subject, broadening the worldview, but also to the formation of a well-rounded, intellectually developed person.
6. Integration is a source of new facts that confirm or deepen students' specific conclusions, observations in different subjects.
7. An integrated lesson is an alternative model for future communication.

Thus, the task of integration is to help teachers integrate the individual elements and parts of different disciplines into a coherent whole. Integrated teaching is driven by the need for modern school education to ensure a holistic worldview for students.

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