



IMPROVING LABORATORY CLASSES IN CHEMISTRY IN HIGHER EDUCATIONAL INSTITUTIONS BASED ON INFORMATION TECHNOLOGY

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ANNOTATION

The article discusses new forms of teaching chemistry in universities. The most natural way is to use a computer based on the characteristics of chemistry as a science. This, in turn, is a simulation of chemical processes and phenomena, laboratory use of a computer in interface mode, computer support for the process of presenting educational material and monitoring its assimilation.

KEYWORDS: *informatization, modeling of chemical processes, personal scientific laboratory, computer technology.*

INTRODUCTION

The informatization of society has led to the deep penetration of information technologies into the educational industry. Not only has the material and technical level of providing training in various subjects changed fundamentally, but also new digital information tools have appeared, which inherently make it possible to organize modeling, emulation and experimentation and do not require additional special equipment.

It is impossible to implement new approaches to solving important problems in teaching chemistry without the use of new methods and tools. The formation of a competent, developed personality, capable of making adequate independent decisions, with a desire to constantly improve their training, cannot be achieved without making changes to the teaching methods of chemistry. These changes will contribute to the further implementation of the continuity and independence of modern education and will determine its advanced nature. Currently, digital technologies are increasingly being introduced into the educational process of schools.

LITERATURE REVIEW

Laboratory digital teaching tools allow you to conduct various educational experiments as part of laboratory work. Examples of laboratory digital teaching tools are various software tools that implement models of various processes (chemical, physical, etc.) and allow you to change the parameters of the models to obtain experimental results.

Multimedia digital educational tools allow you to use the maximum number of channels for perceiving information by transmitting information in multimedia form using computers

and office equipment, thereby significantly increasing the effectiveness of learning. The need to use digital educational tools, which, as audiovisual means, can affect various senses, is undeniable. It is also due to the significant complication of learning objects - it is impossible to demonstrate a complex technical device, microcircuit or technological process only by verbal means and with the help of chalk and a blackboard.

Information technologies of higher education - the use of computer technologies and computer technology in educational, research work, management of the educational process for the training of specialists at various levels.

To better reveal the connection of the object being studied, to identify patterns of processes that cannot be shown in the educational laboratory, a chemistry teacher in his classes, when studying certain topics and experiments, uses computer methods for modeling chemical processes and phenomena.

METHODOLOGY

Computer technologies in teaching chemistry are used to control and process data from a chemical experiment, instilling in students skills in research activities, creating cognitive interest, increasing motivation, and developing scientific thinking.

Independently, using a specific program, the student can set different values for the concentration of reacting substances and monitor changes in the volume of gas released. Students are of great interest in building models of inorganic and organic substances, studying phenomena by changing parameters, comparing the results obtained, and analyzing them.



Each educational program is compiled based on the purpose of the lesson, its content, and the sequence of presentation of educational material. In chemistry, computer software can be divided into groups:

- Manuals on basic topics of chemistry;
- Solving calculation problems in chemistry;
- Performing experimental work on certain topics;
- Performing laboratory work;
- Assessment and control of knowledge in the form of test tasks and control questions.

When studying models of chemical reactions, chemical production and many chemical instruments, if it is not possible to get acquainted with the technological processes being studied or carry out laboratory work in real conditions, you can use the programs “Chemistry for Everyone - 2000”, “ChemClass”, ChemLab, IR and NMR Simulator .

When studying the following sections: types of chemical bonds, structure of the atom, structure of matter, mechanisms of chemical reactions, theory of electrolytic dissociation, stereochemical concepts - the programs “1C: “Assemble a Molecule”, CS Chem3D Pro, “Chemistry for Everyone”, Tutor, Chemistry are used, Crystal Designer, ChemLand, “Organic Reaction Animations” [1].

Thus, we can note the advantages of teaching software in chemistry classes:

1. The ability to assimilate a large amount of material covering various sections of the chemistry course.
2. Improving the clarity of the presentation of material through the use of object movement, sound design of the material and color images.
3. The ability to demonstrate chemical experiments and technological processes that cannot be carried out in real conditions.
4. Acceleration of the pace of lectures due to the support of computer programs by 10–15%.
5. Showing interest in the subject and easier assimilation of the material (the quality of knowledge increases).
6. Increasing the level of individualization of training.
7. Operational organization of control over the acquisition of knowledge in the discipline.
8. Formation of basic concepts of the macro and microworld.
9. High degree of clarity and ease of use.
10. Formation of general educational, experimental skills and knowledge [2].
11. Generalization and deepening of knowledge in all areas of chemistry.

The peculiarity of chemistry as a discipline for students of non-chemical specialties is that in a small course it is necessary to use information from almost all branches of chemistry.

DISCUSSION

The solution to this problem is facilitated by the introduction of modern innovative technologies into the educational process using multimedia equipment in classrooms and elements of distance learning during self-training of students, in particular this applies to chemical disciplines.

Employees of the Department of Chemistry and Plant Protection of the Stavropol State Agrarian University have been introducing new information teaching aids in the disciplines “General Chemistry”, “Inorganic and Analytical Chemistry”, “Organic Chemistry”, “Physical and Colloidal Chemistry” for several years in a row [3].

All material for classroom training is concentrated in an electronic educational and methodological complex, which has the following structure:

- work program in chemistry for each agricultural engineering specialty;
- an electronic textbook, including lecture notes and a complete interactive chemistry course on CD “Open Chemistry” with lecture demonstration multimedia experiments;
- interactive periodic table with general and specific data on each element;
- workshop in chemistry with experiments;
- test materials for current and final control of knowledge in blank and computer versions;
- methodological recommendations for organizing self-control on given topics;
- a problem book with solutions, teaching aids and reference materials [3].

The use of an electronic educational and methodological complex makes it possible to more effectively carry out the educational process in chemistry for students of agricultural engineering specialties.

In their free time from classes, students can independently use the material, which is located on the website of the chemistry teacher’s electronic office [4].

In the electronic classroom, the chemistry teacher has the opportunity to electronically arrange all educational information for each discipline taught. This can be a work program, lecture notes, recommendations for performing practical and laboratory classes, methodological recommendations and assignments for completing tests for correspondence or distance learning, a solubility table and the periodic table of chemical elements, reference manuals, a list of abstract topics, a glossary, a list of sample program questions for passing a test or exam, tests for testing students, literature on the entire discipline and any other necessary information for a student in this chemical discipline.

Teachers of the Department of Chemistry and Plant Protection use new innovative forms of lecturing in their classes. Each lecture is accompanied by the use of multimedia equipment; corresponding audio-video clips, three-dimensional and two-



dimensional graphics of models of crystal lattices of metals and models of atoms of chemical elements are demonstrated for specific chemical phenomena.

CONCLUSION

The results of the study allow us to conclude that the previously stated hypothesis was confirmed and the goal and all objectives of the study were achieved. Based on the research materials, the following conclusions were made:

- The use of digital learning tools ensures the implementation of an activity-based approach in school education;
- Teaching aids, when used rationally, lead to the intensification of the educational process and make it possible to prepare students for work and life in the conditions of the emerging information society;
- Digital learning tools are a pedagogical tool in the hands of a teacher, which he must be able to use, based on the premises underlying their use.

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