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VIRTUAL LABORATORY ASSISTANCE TO STUDENTS IN LEARNING KNOWLEDGE IN ANALYTICAL CHEMISTRY

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Abstract:

The article is enlightened about the value of virtual laboratory classes in analytical chemistry, the requirements and possibilities of organizing and organizing classes.

Keywords: virtual laboratory, student, digital education, chemistry, virtual instrument, virtual learning laboratory, e-learning.

INTRODUCTION

The process of scientific and technical modernization in the country, the rapid adaptation of digital educational technologies to public life requires raising the quality of teaching and training in higher education to modern standards. One of the forms of teaching based on digital learning practices is virtual laboratory classes. The virtual laboratory is based on the idea of open and distance learning, which minimizes the current problems associated with the existing logistics in the educational process [1]. This will further improve the quality of education.

LITERATURE ANALYSIS AND METHODOLOGY

Many scientists around the world, including L.A. Savchenko, Michael Seery, Stephanie OBrien, K.B. Oralbaeva, L.A. The scientific research of Chernysheva and others deserves special attention. Improving the quality of education in Russia, assessing students' knowledge of chemistry on the basis of information and pedagogical technologies, the advantages of computer technology in the study of science and the introduction of effective teaching methods by combining effective teaching methods Ye.O.Emelyanova, Ye.Yu.Zashivalova, it has been studied in the scientific and methodological works of such scientists as A.A. Siromyatnikov, V.N. Likhachev, A.A. Podgornova, A.S. Artemeva, O.E. Gorbunova, N.S. Mikhailova.

In Uzbekistan, many scientists have conducted research on the use of computer technology in education. M.M. Aripov, A.A. Abdukadirov, A.H. Abdullaev, N.V. Apatova, U.Sh. Begimkulov, M. Lutfullaev, J.O. Tolipova, D. Yunusova on the application of information and pedagogical technologies in the educational process. The research work carried out by E.U. Eshchanov, F.A. Alimova, L.T. Zaylobov, N.A. Anvarova can be noted.

DISCUSSION AND RESULTS

Scientific and methodological work on virtual laboratories is mainly limited to the coverage of virtual instruments and their use in laboratory classes. In our opinion, the virtual training laboratory includes not only virtual tools, but also virtual classrooms, design of technical facilities, mathematical and simulation modeling systems, training and production packages of applications. In the process of using virtual laboratories in analytical chemistry: it is possible to work with a virtual laboratory, taking into account the psychological, intellectual, personal characteristics of students, as well as the level of training. Network versions of virtual labs have been developed to help the teacher perform the virtual experiment in real time and monitor its progress, and the network versions have the ability to interact within the group; The use of virtual laboratories in the teaching process usually significantly reduces the time required for individual laboratories, which provides ample opportunity for laboratory experiments. In addition, virtual laboratories allow for the conduct of the most expensive, life-threatening, but necessary training experiments, even when existing laboratory equipment is insufficient; The specifics and general rules for using virtual labs, including network and non-network versions, offer great opportunities for distance learning, as they allow for laboratory experiments using virtual labs obtained from external floppy disks outside the school during the academic year. Network technologies, such as the Internet, allow for teacher-assisted virtual experimentation. In the study of analytical chemistry, an integral part of the learning process is laboratory work and hands-on activities. the ability to develop practical competencies in its processing, to plan, analyze and compare the results of the experiment with the literature. The use of virtual laboratories in higher education institutions is carried out directly in the e-learning environment. E-learning (e-learning in a short period of time) is becoming an increasingly popular way of accepting new knowledge in an e-learning environment. E-learning system - its main feature is the focus on maximum knowledge, taking into account the needs of users. In some cases, the lack of equipment for laboratory work and

practical training, as well as the obsolescence of reagents, are the reasons for not conducting experiments. One of the most pressing issues is the creation of virtual laboratory works and their application in the educational process. Improvement of textbooks based on digital educational technologies has led to the modernization of the educational process: lectures are presented in a presentation mode, interactive methods of presenting teaching materials are used in practical and seminar classes, tests and exams are taken with computer control [2]. In the study of chemistry, modern technology allows, in some cases, to move away from the actual actions of chemical processes without compromising the quality of the information obtained. The need for virtual laboratory work is primarily related to distance learning and distance learning, as well as to pandemic student access to educational institutions, and the educational conditions of students with disabilities; reactions with nitrogen oxides, halogens, mercury, and arsenic. Thus, each virtual laboratory work must have its own characteristics, to be able to complete the experiments and draw the right conclusions based on the experience. Laboratory work in analytical chemistry can be conventionally divided into two types: work performed by microanalytical methods (test tubes) and work that requires hardware design. In the first case, the transfer of laboratory techniques from the real world to the virtual is less complicated, and most of these types of work require the creation of a known integrated algorithm. In this case, it is possible to conduct virtual laboratory work using multimedia tools. For example, multimedia software allows you to see and study the process by which a substance absorbs or absorbs heat, and the process by which several substances that change their mass dissolve to form new substances. In virtual laboratory work, the student works with images of substances and components of equipment that reflect the appearance and function of real objects. It should be noted that the object of study of chemistry is a substance that has properties that cannot be reproduced by the most modern computer models. Therefore, the best combination of virtual and real experience in the creation of laboratory work in chemistry is a computer model of the process under study, which helps to prepare students to work with real objects, to speed up data processing, create a work report, answer a number of questions and teaches. There are two ways to use digital learning resources in chemistry education. The first is the simplification of mathematical calculations in the preparation of solutions and the use of computer technology to create graphic images, which is now widely used. Such work can be called a classic modern laboratory work. The second area is distance learning for students, the implementation of missed classes, as well as the creation of "absolute" virtual laboratory work that can be used to prepare themselves for real laboratory work. An important factor in assessing the quality of virtual laboratory work is the active and passive user activity [3]. The high level of interactivity of virtual laboratory work in chemistry allows students to maximize the practical components of the learning process and get closer to reality. The logic of presenting material in a virtual laboratory work differs from the actual work in the detailed description of the research process, the abundance of tips and tricks, as well as the availability of animation. Virtual laboratory work requires more clarity in describing the sequence of actions, so it is methodologically reasonable to present this type of work in the form of a certain number of sections - tables, each of which contains its own semantic load. In order to successfully complete any laboratory work, the student must carefully study the procedure of the practical work or laboratory work based on the topic and observe its implementation in the virtual laboratory. There are the following types of chemical experiments: demonstration experiments, laboratory work and experiments, practical training. In the process of conducting laboratory and practical classes in chemistry, it is advisable not only to use the textbook, but also to use additional literature [4]. The main task of laboratory work is to learn new knowledge, develop existing knowledge and prepare a report on individual work on the work after completing the laboratory assignment.

CONCLUSIONS AND RECOMMENDATIONS

Laboratory work can be mass, large or small, individual. When conducting laboratory experiments on the basis of multimedia technologies, the following should be observed:

1. Laboratory classes should be pre-integrated into the distance learning system by the teacher and the student should do the work from the created e-learning materials.
2. The purpose of the laboratory assignment should be clearly explained to the students by the teacher.
3. Laboratory assignments are given taking into account the aspirations and interests of the student.
4. Laboratory assignments should have a strict system and consistency
5. The laws that are needed and used in the performance of laboratory tasks should be easily applied by students.
6. The assignment should keep the student active.
7. The classroom should be equipped with technical means to complete the task.

In conclusion, virtual laboratory training itself requires modeling of real laboratory work and allows to cover the material on an interactive basis.

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