



THE IMPORTANCE OF VIRTUAL LABORATORIES IN TEACHING ANALYTICAL CHEMISTRY

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Abstract: This article discusses the experience of using a virtual laboratory in the teaching of chemical sciences and discusses the advantages and disadvantages of using presentations in the teaching of science in the educational process.

Key words: pedagogy, mental ability, information technology, multimedia, chemistry teaching methods.

Аннотация: В данной статье рассматривается опыт использования виртуальной лаборатории при преподавании химических наук, а также рассматриваются преимущества и недостатки использования презентаций при преподавании естественных наук в учебном процессе.

Ключевые слова: педагогика, умственные способности, информационные технологии, мультимедиа, методика преподавания химии.

Annotatsiya: Ushbu maqolada kimyo fanlarini o'qitishda virtual laboratoriyadan foydalanish tajribasi ko'rib chiqiladi, shuningdek, o'quv jarayonida tabiiy fanlarni o'qitishda taqdimotlardan foydalanishning afzalliklari va kamchiliklari ko'rib chiqiladi.

Tayanch so'zlar: pedagogika, aqliy qobiliyatlar, axborot texnologiyalari, multimedia, kimyo o'qitish metodikasi.

The processes of scientific and technical renewal, the rapid adaptation of digital educational technologies to the life of society, which are carried out in our republic, require raising the quality of teaching and personnel training in higher education institutions to the level of modern requirements. One of the forms of training based on digital educational practices is virtual laboratory training. The virtual laboratory is in accordance with the idea of open and distance education, and reduces the actual problems related to material and technical support in the educational process. limited to lighting the application. In our opinion, a virtual learning laboratory includes not only virtual instruments, but also virtual classrooms, technical object design, mathematical and simulation modeling systems, and training and production packages of practical programs. In the process of using virtual laboratories in analytical chemistry: taking into account the psychological, intellectual, personal characteristics of students, as well as the level of training, an opportunity to work with a virtual laboratory is created.

Networked versions of virtual labs have been developed to help the teacher perform the virtual experiment in real time and control its progress, in addition, the networked versions have the possibility of interaction within the group; the use of virtual laboratories in the teaching process, usually significantly reduces the time of performing individual laboratories, which provides a wide opportunity to carry out laboratory experiments. In addition, virtual laboratories allow conducting the most expensive, life-threatening, but necessary for training

chemical experiments even in the conditions of inadequate existing laboratory equipment; The specificity and general rules of using virtual laboratories, including network and non-network versions, in distance education create great opportunities, because, taking into account the possibilities, during the academic year outside the educational institution, using virtual laboratories obtained from external diskettes, the laboratory makes it possible to carry out experiments. Network technologies, for example, using the Internet, allow you to get help from the teacher in the process of virtual experiments. An integral part of the educational process in the study of analytical chemistry is laboratory work and practical exercises, the main task of which is to enable students to work with equipment, perform laboratory work. It is the ability to form practical competencies for obtaining and processing information in the field of work and practical training, to plan the experiment in advance, to analyze and compare the results with literature data. In higher education institutions, virtual laboratories are used directly in the e-learning environment.

E-learning (short for e-learning) is becoming an increasingly popular way of receiving new knowledge in an e-learning environment. E-learning system - its main feature is orientation to maximum knowledge taking into account the needs of users. In some cases, the lack of equipment for laboratory work and practical training, and the obsolescence of jets are reasons for not conducting experiments. The problem of creating virtual laboratory works and their implementation in the educational process is considered one of the urgent problems due to the needs of the times. The improvement of educational materials based on digital educational technologies has led to the modernization of the educational process: lectures are conducted in presentation mode, interactive methods of presenting educational materials are used in practical and seminar sessions, tests and exams are taken using computer control. In the study of chemistry, modern technologies in some cases allow to get away from the real actions of chemical processes without losing the quality of the data obtained. Performance of laboratory work in analytical chemistry can be conditionally divided into two types: work performed by the microanalytical method (in test tubes) and work requiring apparatus design. In the first case, the transfer of laboratory work techniques from the real world to the virtual world is not so complicated, and most of this type of work requires the creation of a certain unified algorithm. In this case, it is possible to conduct laboratory work in a virtual state using multimedia tools. For example, through the multimedia program, it is possible to see and study the process of heat absorption or absorption of a substance and the processes of several substances that change their mass and melt into each other to form new substances. When performing virtual laboratory work, the student works with images of substances and components of equipment that reflect the appearance and functions of real objects. The high level of interactivity of virtual laboratory work in chemistry allows students to maximize the experiential components of the learning process and get closer to reality. The logic of presentation of the material in the virtual laboratory work differs from the real work in the detailed description of the research process, the abundance of tips and recommendations, as well as the presence 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 perform any laboratory work, the student should carefully study the procedure for conducting practical exercises or laboratory work based on the topic, and

observe how it is carried out in the virtual laboratory. The main task of performing laboratory work is to learn new knowledge, develop existing knowledge, and prepare a report of personal conclusions on the work after completing the laboratory task. Laboratory work can be carried out individually, large and small. When performing laboratory experiments on the basis of multimedia technologies, the following should be followed:

1. The teacher must have entered the laboratory sessions into the distance education system in advance, and the student must perform the work from the created electronic educational material.
2. The purpose of the assigned laboratory assignment must be clearly and clearly explained by the teacher to the students.
3. Laboratory assignments are given taking into account the student's aspirations and interests.
4. The laboratory task should have a strict system and consistency
5. The laws needed and used in the performance of laboratory tasks should be easily applied by students.
6. The task should ensure the student's activity.
7. To complete the task, the classroom must be equipped with technical equipment.

In conclusion, it can be noted that virtual laboratory training requires modeling of real laboratory work and allows to cover the material on an interactive basis.

References:

1. Норенков, И. П. Информационные технологии в образовании / И. П. Норенков, А. М. Зимин. – М.: Изд-во МГТУ им. Баумана, 2004. – 351 с.
2. Стародубцев, В. А. Компьютерные и мультимедийные технологии в естественнонаучном образовании / В.А. Стародубцев. – Томск: Дельтаплан, 2002. – 224 с.
3. Усмонов Ш.А. Problems and solutions with working ability children// “Психологическое здоровье населения как важный фактор обеспечения процветания общества” . Ф.: 2020 с. 177-179