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THE USE OF MODERN INNOVATIVE TECHNOLOGIES IN TEACHING THE CHEMISTRY OF COMPLEX COMPOUNDS

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A B S T R A C T	**K E Y W O R D S**
The article provides information on virtual and 3D teaching technologies, V-academia, simulators used to teach chemistry in the education system, and the application of simulators to the teaching process. Educational institutions also discuss 3D modeling, 3D scanning, ideas on the importance of 3D printing drawings in improving the quality of the learning process in chemistry education, and its application in chemistry education.	3D information technology, annimation, programming, virtuality, 3Dmodeling, 3D scanning, V-academia, 3D printing drawings.

Introduction

The chemistry of complex compounds is a science of chemical elements and the structure and properties of their units, and it involves explaining to students the properties of chemical elements using the concepts of theoretical chemistry, relying on modern information about the structure of mode based on periodic law and periodic system. Advances in the field of science and technology and information technology will enable mankind to solve a variety of new problems. The Action Strategy for the Further Development of the Republic of Uzbekistan sets out "Improving the quality and efficiency of higher education institutions by establishing international standards for evaluating the quality of education and teaching" as a priority in the preparation of future chemistry teachers in this regardthe technology, methodology of organizing the learning process based on electronic software, The system of competencies related to activities and the PF-4947 Order of the President of the Republic of Uzbekistan, February 7, 2017, "On the Action Strategy for the Development of the Republic of Uzbekistan" [1], April 20, 2017, PQ-2909, "On measures to improve the public education system", To assist individuals desiring to benefit the worldwide work of Jehovah's Witnesses through some form of charitable giving, a brochure entitled Charitable Planning to Benefit Kingdom Service Worldwide has been prepared.

Elevating the educational process to the level of world standards in terms of quality of organizing the learning process in the education system, creating a methodology for the widespread introduction of modern pedagogical and information technology in our country is one of the most complex methodological issues. One of the most important aspects of reforming the education system is the systematic modernization of the educational process of chemistry using information and communication, or 3D technologies. The use of modular education, virtual education, 3D technologies

in conducting chemical processes, lectures, laboratories, and practical workshops in the organization of day-to-day and extracurricular education in chemistry education will help improve the quality of the learning process and is characterized by the development of science and manufacturing integration. Imagined memory of a computer is accepted as virtual memory, which physically does not correspond to any separate memory carrier, i.e. virtual memory is the result of the functional interaction of computer elements. With the software tools that create virtual memory, a person will be able to use a huge amount of information. All of the modern computers in action are equipped with a special Java virtual machine.

Filmmakers had mounted a hand-cranked camera on the advance of life's east and trained it on the new world translator. Computer technology makes a quality turn in the creation of virtual reality-based educational resources by integrating movement and sound-related information into a single complex, enabling learners to actively influence (communicate) the processes being observed. The emotions that arise during computer communication (e.g. using virtual shlems) are very close to a person's feelings in the process of communicating with the existing real thing, and sometimes when compared to these emotions, there is also a clear indication of the autism of the first. Special effects of deep penetration into the mind in computer gaming technology can also be used effectively in teaching. (Matthew 24:14; 28:19, 20) In this sense, given that the human mind initially interprets various tasks, images, and imaginations based on imaginary deeds, it is understood that it itself has a virtual nature.

Virtual reality is an artificially generated information environment that focuses on replacing the normal imagination of the environment with information generated by a variety of technical means. Creating information visualization tools aimed at developing virtual reality tools for educational purposes can yield pedagogical results that cannot be achieved using other technical tools.

The term "virtuality" is derived from the Latin word for "virtualis," which means "a process that occurs or may occur under certain circumstances," or a process that does not exist but is likely to be realized. Because this term meets in many areas of human activity, there are sufficient grounds for bringing it into the education system. The development of the virtual universe was greatly influenced by the development of a three-dimensional environment and the advanced capabilities of Internet technology. As a result, virtual reality began to be used in various fields. Virtual education in a broad sense is understood by the process and its results, which are built on the interaction of its main subjects at the time of direct learning and giving between teachers and students. Virtual education cannot be imagined without the relationship between the main objects of education and the student-teacher, who is considered its subjects. In other words, the virtual environment in education is created not by classrooms, their equipment, textbooks, or teaching techniques, but only through the harmony of objects and subjects participating in the same teaching process. It is noteworthy that in some places in the programs there are cases of presentation of educational materials without adequate consideration of the level of real learning of students and the relationship between educational entities. Virtual learning is not only a unique aspect of remote telecommunications but also has the ability to manifest itself in the relationship between teachers, students, and objects studied in all forms of education, including day-to-day forms. Remote technologies serve to expand day-to-day learning opportunities based on virtual learning. The main purpose of virtual education is to ensure that a person's virtual and other capabilities are harmonious—to understand the underlying nature of his or her place in reality. Today, the 21st century is a century of high-tech technology, and the concept of computer graphics is closely related to our lives. Many programming products, such as 3D virual, 3D life three-dimensional

modelling, ZBrush, Blender, 3D Max, Nazzar.uz, play a role in our society." The term D is derived from the English word dimensions, which means "dimensions." 3D technology is the world's most advanced method of visual and sound transmission of images. All intelligent people have full concepts such as 3-dimensional imagery, three-dimensional graphics, and three-dimensional modeling. Modern cinema, architectural design, even taking the field of education, can observe real processes through a variety of 3D special effects.3D when technology is used to organize virtual laboratory classes in chemistry education, will achieve great efficiency in teaching science. In this way, virtual chemistry laboratory rooms are created in a web environment, and it is explained to students that experiments can be done as much as they want. Experiences that are at risk of explosion, experiments of toxic nature can also be performed in a virtual chemistry laboratory.

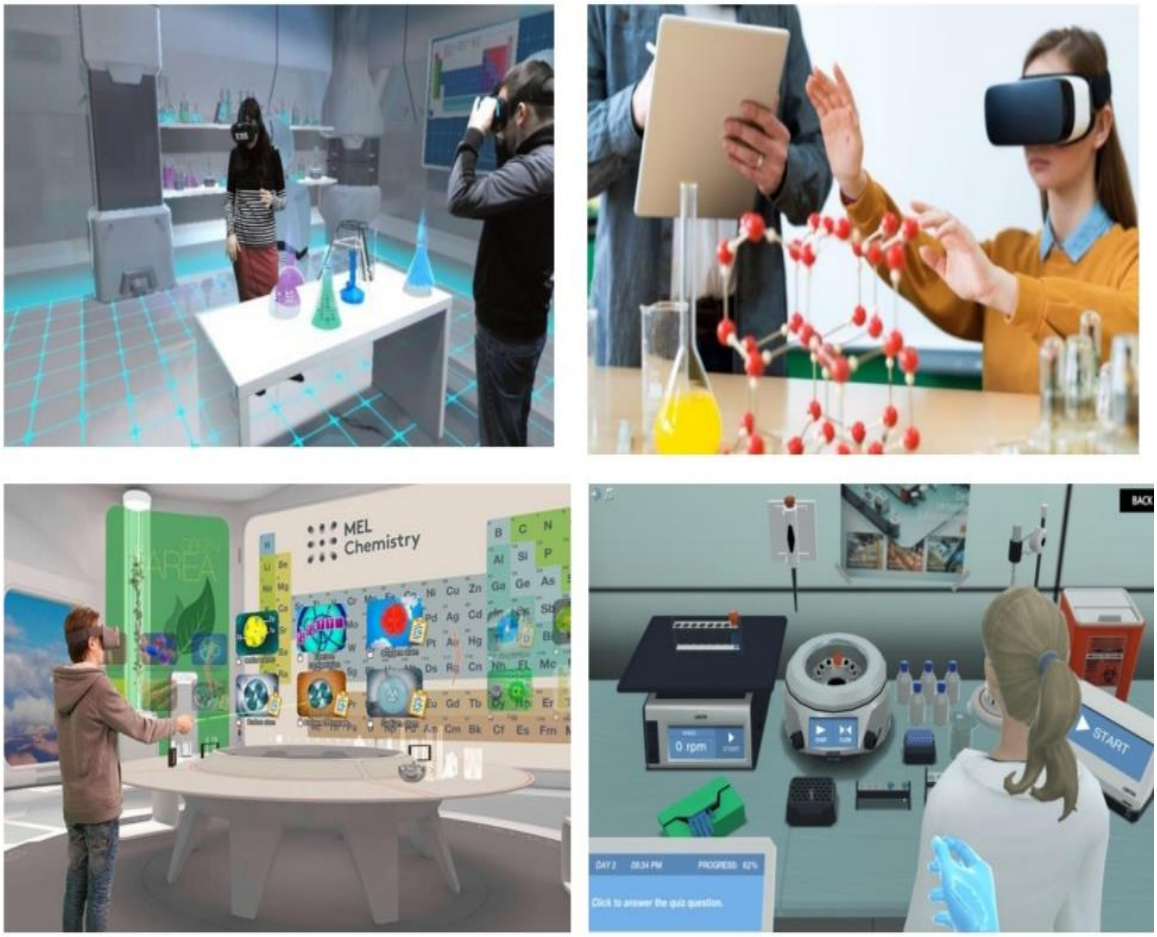
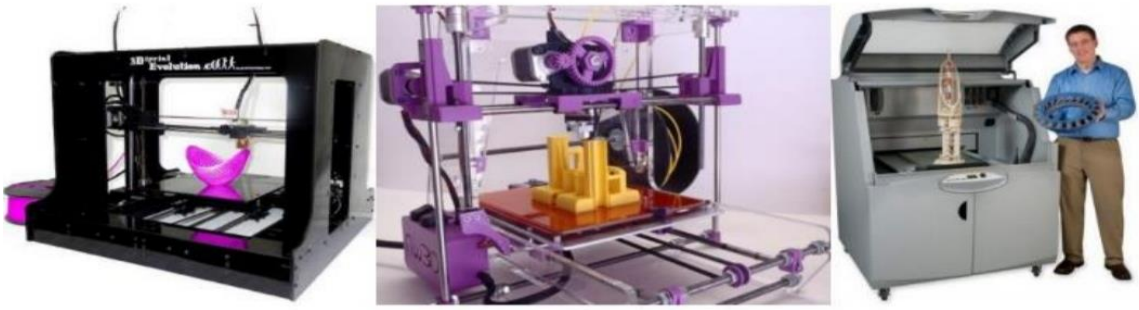


Figure 1. A chemistry room and chemistry laboratory that reflect virtual existence.

Today, it is possible to make three-dimensional statues, shrinking models of large objects (cars, planes, buildings), as well as models of various scientific papers. Of course, 3D printers are being used to do this.



(Figure 2).

3D printers are "printing" printers based on three-dimensional drawings. (Matthew 24:14; 28:19, 20) Currently, if such developments are being carried out in a narrow range, it will be possible to extract a pair of sneakers, clothing, or rollercoaster items, for example, from a homemade 3D printer in the near future. Given the decline in the price of three-dimensional printed products, the demand for this technology is increasing. Today, Boyeing is developing more than 200 details of its aircraft based on 3D printing technology (Fig. 2).

In the creation of virtual reality, information technology cannot be formed without computer graphics, real-time and programming technologies. Currently, computer graphics libraries such as OpenGL, Direct 3D, Java 3D, and VRML, as well as programming, are being used in C++, Perl, Java, Delphi, and Python.

Virtual reality-based educational resources can be classified as follows:

• The first level is to achieve full virtuality through specialized technical equipment (shlem-display, special gloves, etc.);• the second level is to produce a large image using three-dimensional (or stereoscopic) monitors or projector and special glasses; and the third level is to demonstrate virtual reality based on a computer's standard monitor or projection tool.

Simulators, on the other hand, allow you to make and test computers and netvork devices in a virtual state without such real equipment and equipment. This in itself does not only save a large amount of money, but also does not give them a need at all. The fact that simulators do not require nearly any financial assets makes it possible for students to do research over and over again hundreds of times, if necessary, thousands of times. Another advantage of using simulators is that they are safe. The rapid development of modern science and technology makes it difficult for real-life research equipment to go along with this development. Simulators, on the other hand, do not have such barriers, and even these "virtual research facilities" add additional speed to the speed of science and technology development.v-Academia is a three-point education close to real life in the world's only vitrual environment. Classes written in 3D are no different from actually. The virtual environment of v-Academia provides a high opportunity for any non-computer literacy teacher to conduct classes.v-Academia allows a higher education institution to enrich their learning with a quality new generation of electronic resources. The virtual environment of v-Academia will enable students to receive new high-quality alternative education instead of classroom activities.v-Academia virtual environment will enable them to ensure high quality of education through training, various games, simulators, master classes. For the implementation of virtual learning technologies, as follows:

First, evaluate the positive and negative consequences that virtual learning technologies can have when applying them to our educational environment based on world experience;
Second, pay special attention to the preparation of manuals for the effective use of virtual teaching technologies in Uzbek;

Third, conduct scientific research and promote research-based software and devices to create national virtual learning environments and devices;
Fourth, it is possible to make conclusions and suggestions, such as the introduction of government incentive mechanisms for virtual education resource developers.
We will consider the available possibilities of the Crocodile Chemistry program, simulators used in chemistry below. Through the Crocodile Chemistry program, you can study the chemical and physical properties of all the elements present in the D.I.Mendeleyev periodic table. It is usually impossible to observe the conversion (molecular level) of the molecules involved in the reaction during the occurrance of chemical reactions into another molecule. Through this application, it is possible to model chemical processes, conduct different reactions and, most importantly, do so safely. Through this application, it is possible to use containers in the optional form to perform a chemical reaction by mixing various reactants among themselves. During a chemical reaction, the color of the reactants, the share of substances, the ability to see the chemical reaction formulas in a special window allows the program to be used as a powerful pedagogical weapon. Such possibilities of the Crocodile Chemistry program have led to a revolutionary change in the teaching of chemistry (Fig. 3).
Figure 3. Created in Crocodile Chemistry application environment chemical reaction process
We Nazzar.uz incorporating another 3D technology in the article, which is now widely available. about the program. Nazzar.uz is an innovative program that can couple extended reality elements into any material environment. In this case, Nazzar.uz your smartphone on the screen. When you show it to the icon, the image of the real object appears on the smartphone and is filled with various effects. The static picture in the media "comes to life" and the video becomes a piece.. The photos and images on the screen will be three-dimensional, allowing you to see them in all aspects and from every perspective. The audio is heard using a smartphone speaker. "Learn more" from the picture, which appears on the smartphone screen while watching. Animate photos is an innovative solution in the field of photography. The live photos you give to yourself and people allow you to take many moments that happen not only to the photo itself, but also before and after photos. With this service, we can observe the activity of the state of molecules of chemicals. This technology was used in the process of teaching important topics of chemistry. Oxides, acids, foundations and salts as well as formulations of organic compounds allow you to see the photos live. (Figure 4)
Figure 4 Figure 4: Nazzar.uz program to see molecules move, we emphasize that if the reading process is organized using the aforementioned programs, students (students) will be interested in science, it is no secret that it is very difficult to interest young people in natural sciences now, especially when it comes to chemistry. If the learning process is organized using the above-mentioned programs, students (students) will be encouraged to study chemistry in depth. Also, it is the same for chemists today to develop a virtual 3D space for the electronic education environment in higher education institutions, to organize the learning process in this environment, and to improve the quality of education.

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