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Research Article

DIDACTIC POSSIBILITIES OF DEVELOPING PROFESSIONAL TRAINING OF STUDENTS USING VIRTUAL LABORATORIES IN PHYSICS IN HIGHER EDUCATION COUNTRIES

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ABSTRACT

In this article, the author talks about the content and possibilities of didactic opportunities for the development of professional training of students using virtual physics laboratories in higher educational institutions.

KEYWORDS

Physics, virtual laboratory, professional competence, professional training, electronic textbook, abilities, temperament, motivation, essence of activity, motivation, 3D model, informational, operational, component, experimental, principle.

INTRODUCTION

Currently, the priority task of higher education is the formation of modern innovative educational technologies. The relevance of this task is that, in accordance with the new generation of state educational standards, the share of interactive presentation of material using computer technologies is increasing dramatically. It is related to the integration into the European and international educational community. The priorities of the education policy are reflected in the documents related to the Bologna process, in the "Concept for the development of the higher education system until 2030". Currently, the society of Uzbekistan is moving to an innovative model of science, technology and technology development in accordance with the Bologna agreement. At the same time, it was recognized as a priority that the direction of information and

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telecommunication technologies and electronics should have the highest place.

In the educational process, it should cover such an important component as informed virtual laboratories, including laboratory practice. Along with traditional educational methods, computer technologies help to present the educational material more clearly and clearly, and form the competences necessary for further qualification. Modeling of laboratory work helps to better understand the processes that occur in real electronic devices. . Experiments based on modeling, in contrast to traditional experiments, allow to slow down or accelerate the development of the studied processes, which allows for a deeper understanding of their nature. In measuring devices, there is no difference between real and virtual elements and devices in terms of assembly and connection of various circuits. This opens wide prospects for the use of electronic virtual laboratories. Wide use of virtual computer technologies in the educational process is a modern global trend of higher education.

Virtual laboratory practice is increasingly used in laboratory work, its essence is to replace real-world research with mathematical modeling of physical, chemical and other processes being studied, which significantly expands the possibilities of information provision of the computer education process. In general, a virtual laboratory is an information environment that allows conducting experiments without direct interaction with the object of research. Virtual laboratory work is an information system that interactively models a real technical object and its properties necessary for learning using computer visualization tools. Laboratory simulators make it possible to find optimal parameters for conducting experiments, acquire initial experience and skills at the preparatory stage, and facilitate and speed up work with real experimental devices and objects.

So, let's focus on the didactic possibilities of Internet tools, which provide the opportunity to perform virtual laboratory work.

Virtual laboratory works provide the following opportunities:

-replaces the study of a natural object;

- clearly guarantees the achievement of experimental results;

- ensures protection from harmful properties of living organisms;

- focuses on highlighting the main aspects of the object under study;

- reduces the time of experiment.

Currently, research is being conducted on the creation of media materials (audio and video files) and didactic materials (electronic exhibition materials and animations), photo galleries, control programs and additional materials supplementing the lesson content of physics laboratory classes. . Also, special attention is being paid to the organization and conducting of virtual laboratory classes together with various information technologies used in the practice of physics education [1].

The concept of "virtual laboratory" consists of a set of hardware and software tools added to a regular computer, providing the opportunity to work on a computer with the help of a virtual tool that is part of it (like working with an ordinary electronic device). An

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important part of the virtual instrument and the virtual laboratory is an effective graphical user interface (that is, providing a convenient, interactive way of interaction of the user with the computer), a software tool with a graphical menu system in the form of illustrative graphic samples in the usual subject area. [2].

We can be sure that the advancement of computers will create opportunities for the teacher to conduct lessons and laboratory activities in a more efficient way. As it was mentioned above, the knowledge and skills that need to be imparted in physics are mostly implemented using the capabilities of the computer to make the material interesting, colorful, unrepeatable, and most importantly understandable.

Also, the high-quality implementation of virtual laboratory classes in physics, the programming of the necessary equipment, and the organization with the help of a computer make it convenient both scientifically and aesthetically. It is important to save the time of the teacher and student in the educational processes organized by means of virtual laboratory training, and it also helps them master the educational materials with the help of the necessary educational literature. Therefore, with the help of virtual laboratory technologies, it provides opportunities for visual description and feedback of events and processes in plants by means of video, multimedia, animations.

Virtual education, as well as the education of a person in general, serves to determine his place and achievements in the real world, including the virtual content.

In the informatization of education, in addition to training future personnel in the use of information and communication technologies, it is necessary to accelerate the training of personnel in the field of specific sciences with the help of information and communication technologies. Therefore, the "Virtual Laboratory" was useful in the educational process.

The creation and development of the information society implies the wide use of information and communication technologies (ICT) in education, which is determined by a number of factors.

First, the introduction of information and communication technologies (ICT) into education significantly accelerates the transfer of knowledge and accumulated technological and social experience of mankind not only from generation to generation, but also from one person to another.

Secondly, modern information and communication technologies allow a person to more successfully and quickly adapt to the environment and social changes by improving the quality of teaching and learning. It gives everyone the opportunity to acquire the necessary knowledge both today and in the future post-industrial society.

Thirdly, the active and effective application of these technologies to education is an important factor in the process of creating an educational system that meets the requirements of the information society and reforming the traditional education system based on the requirements of the modern industrial society.

Today, many educational institutions are using innovative technologies in the educational environment, including virtual laboratories to work on physics, chemistry, biology, ecology and other subjects, because the educational institution has many

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learning events and experiments are very difficult or impossible.

ICT capabilities in organizing the educational process using virtual laboratories. The quality of student training is determined by the educational content, technology of the lesson, its organizational and practical direction, environment, therefore it is necessary to use new pedagogical technologies in the educational process. The goals of using information technologies: to develop the personality of the student in the conditions of the information society by developing constructive, algorithmic thinking due to the specific features of communicating with a computer, preparing for independent production activities. share of reproductive activity, formation of information culture, ability to process information (using spreadsheet processors, databases); realization of social order at the expense of informatization of modern society: - preparing students for independent knowledge activities with the help of information technologies; motivation of the educational process (increasing the quality and efficiency of the educational process by implementing the possibilities of information technology, identifying and using incentives for increasing cognitive activity).

What is the impact of the use of information and communication technologies on the student?

- ICT helps increase cognitive interest in science;

- ICT contributes to the growth of students' achievements in science;

- ICT allows students to express themselves in a new role;

- ICT forms the skills of independent production activity;

- ICT helps create a state of success for every student.

The use of ICT in the educational process provides teachers with additional didactic opportunities, in particular:

- rapid communication that allows interactive communication between the user and ICT tools;

- computer visualization of educational information, including the possibilities of modern means of visualization of objects, processes, events (both real and "virtual"), as well as their models, in the dynamics of development, in time and space. action while retaining the possibility of dialog communication with the program;

- computer modeling of the studied objects, their relationships, events, processes that happen both in reality and "almost";

- with the possibility of automating calculation processes, searching for information, processing the results of an educational experiment, repeating the fragment that actually happened and "almost" presented on the screen, or the experiment itself several times, which allows us to provide information gives the results of the experiment, changing the values of the parameters (for example, physical quantities) in accordance with the conditions of the experiment, forming the hypothesis of the experiment, checking it, changing the situation under study according to the results. predicting the results of the experiment, research;

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- activation of various types of activities intended for students who have acquired sufficient knowledge of science to think independently, argue, reflect, learn, and obtain necessary information independently;

- automation of processes of organizational management of educational activities and monitoring of learning material acquisition results: creation and distribution of organizational and methodical materials, their download and transmission over the network.

Virtualization of education combines the best features of full-time, part-time, distance and other forms of education and can be considered as an objective process of transition from full-time education to distance education to virtual education in the developing information society. Also, this process, the process of educational informatization, is objective, logical and related to a number of factors:

• rapid development of telecommunication and information systems opens up new didactic opportunities for improving the educational system itself;

• internal needs of the educational system related to providing the population with access to high-quality, affordable, mobile, fundamental education.

The process of virtual education takes place in a pedagogical system, the elements of which are the goals, content, students, teaching and technological subsystem of virtual education. It is a purposeful, organized process of interaction between students and teachers and with learning materials, independent of their location in space and time. This whole design is based on logistics and regulatory framework.

Virtualization of the educational environment presents new, unexplored, perhaps intangible, and currently unrealized opportunities for education. Scientifically based use of elements of the technological system of virtual education, in our opinion, leads not to reconstruction, radical improvement, but to the formation of a radically new educational system.

Virtual education also includes an ethical component - computer technology will never replace communication between students. It can only support the potential for collaborative discovery of new resources and is suitable for use in a variety of learning situations where students engage in peer-to-peer dialogue on the material being studied.

Virtual technologies are a method of preparing information, including visual, multi-programming of various situations.

When conducting a lesson using virtual tools, the main principle of didactics is observed - a view that ensures optimal mastering of the material by students, increases emotional perception and develops all kinds of thinking in students.

Didactic possibilities of using the virtual laboratory in classes (Fig. 1):

• demonstration use (before real work): showing the sequence of real work actions from the front, on a large monitor screen or through a multimedia projector; realistic qualitative and semi-quantitative models are preferred;

• generalizing (after real work) use: frontal mode (demonstration, clarification of questions, formation of conclusions and consolidation of considered things) or individual (mathematical side of experiments,

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analysis of graphs and numerical values, study of the model as a method). reflect and express reality; quantitative, parametric models are preferred).

• experimental use (instead of real work): doing individual (in small groups) tasks without doing real work in a virtual laboratory, computer experience. It can be done with both realistic semi-quantitative 3D models and parametric models.

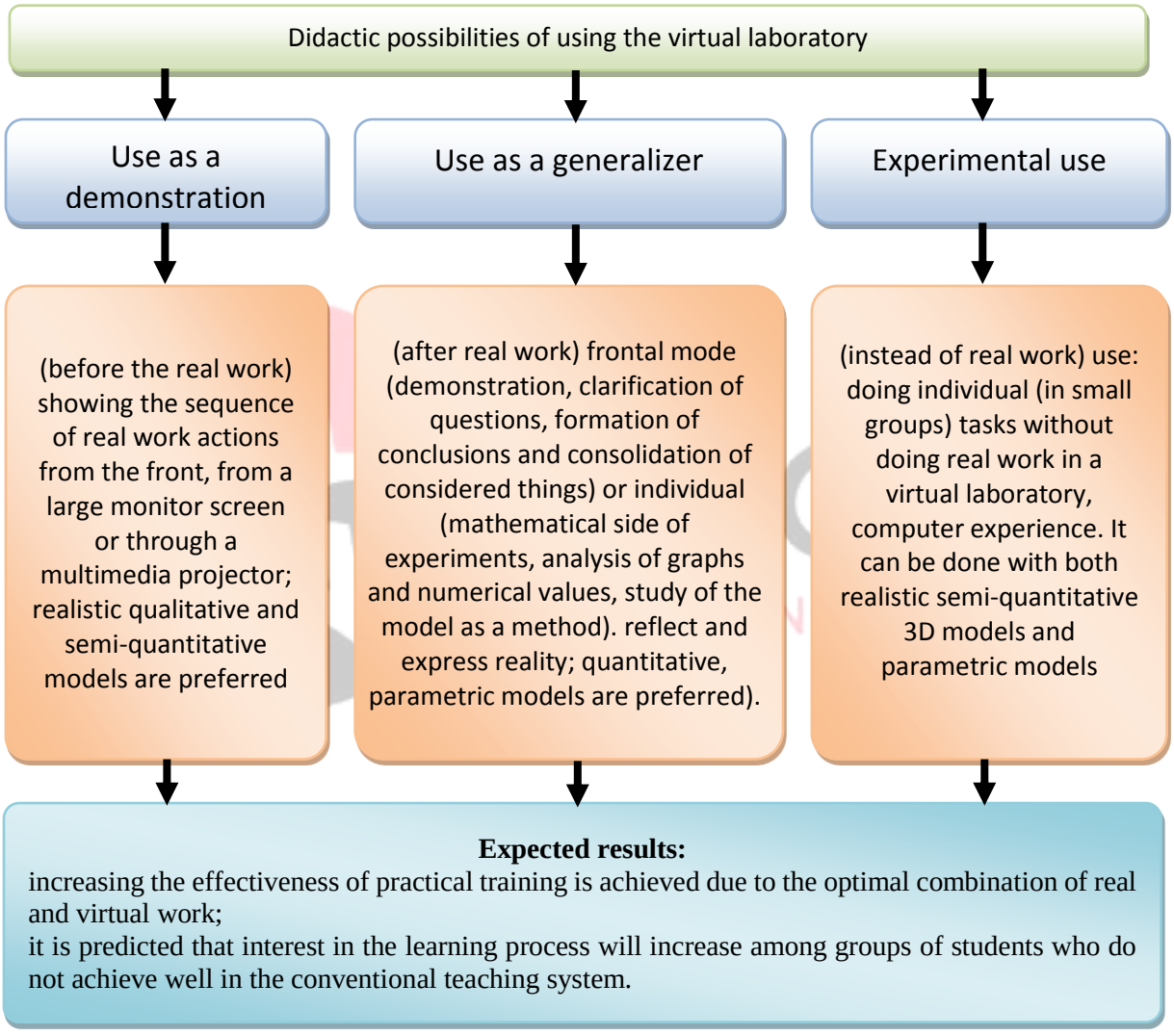

Figure 1. Didactic possibilities of using the virtual laboratory in classes

Expected results from the introduction of the virtual laboratory as a virtual educational tool:

• creating and implementing workshops with high realism and a hidden mathematical basis, which are the

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object of scientific research of students, becomes one of the bases for developing critical thinking and independence;

• due to the optimal combination of real and virtual work, it is possible to increase the effectiveness of practical training;

• it is predicted that interest in the educational process will increase among groups of students who do not achieve good success in the usual education system.

The use of virtual learning technology allows you to completely reproduce the interface of a real device in the form of a virtual model, while preserving all its functionality. The student manages the virtual laboratory on his computer, which significantly saves time in practical training. In addition, the development of the emulator uses device models that work according to the same principles as the real ones. Their parameters and operating principle can be easily changed, observing how they affect the measurement results. As a result of the use of virtual laboratories, we provide high-quality training for students to perform laboratory work and work with equipment, which allows students to deeply study physical phenomena and visualize the work being done.

The basis of the practical process in the virtual laboratory is the educational package of practical programs or their industrial analogues. When creating them, the main attention is usually focused on mathematical modeling, alternativeization of the studied process or objects, and reporting. Students are required to have special professional qualifications in the educational work related to the package of practical programs.

The formation of virtual educational content is based on the selected theory of the organization of educational content, as in the traditional educational system, and takes into account the relevant principles.

CONCLUSION

In conclusion, we can say that the pedagogical education system is developing, offering new, scientifically based models and technologies of the modern education system to prepare future teachers for professional and innovative activities that meet the requirements of the time. The increasing status of the field of pedagogy in modern conditions and the increasing demand for qualified specialists in this field determine the need to modernize their professional and pedagogical training in the integrated system of higher pedagogical education. The process of improving the preparation of future teachers for pedagogical and innovative activities in higher education is based on the general rules of modernization of the continuous education system.

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