THE ROLE OF VIRTUAL LABORATORY CLASSES IN TEACHING ZOOLOGY

Karomova Dildor Zokirovna
Master's Student in Biology (in the field of science) Bukhara state university,
Bukhara, UZBEKISTAN
Email: karomovadildor@gmail.com

A N N O T A T I O N

To improve the efficiency of the educational process as a whole, using electronic learning tools, visualization methods that are adequate to visual perception and convenient for unambiguous interpretation of the results are of particular importance. This article analyzes the Virtual Lab as completely new approach to learning zoology classes. And examines the role of virtual lab to systematize information about the diversity and characteristics of animals, and many interesting facts.

A R T I C L E I N F O

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Introduction

Today, many educational institutions use innovative technologies in the educational environment, including virtual laboratory work in physics, chemistry, biology, zoology, ecology and other subjects. Informatization of education is one of the most important conditions for the successful development of the processes of informatization of society, since this is the process of preparing a person for a full life in the information society. This process is not only a consequence, but also a stimulus for the development of new information technologies, as it contributes to the accelerated socio-economic development of society as a whole.

Discussion

An important step in an effective educational process is an experiment that stimulates active cognitive activity and a creative approach to gaining knowledge. With traditional forms of the educational process, this possibility is realized in the course of performing the necessary set of laboratory work or practical exercises. However, often due to the lack of sufficient equipment, students' access to the most interesting and unique equipment, technical objects, scientific experiments, which are sometimes of the greatest interest and stimulate the acquisition of knowledge, is limited. This is where virtual labs come in handy.

In a rapidly developing information society, using a virtual lab interface instead of real labs is a must. Virtual labs can also be used for abstract learning environments. Students can build planetary orbits, work with the global economy, or create something completely new. Virtual Labs can be used to model any level of scale, complexity, or abstraction. Using a virtual environment, scientists' various assumptions can be tested, providing them with a safe environment to discover. This gives you the opportunity to correct your misconceptions and compare your assumptions with reality.

Virtual laboratory is a software and hardware complex that allows conducting experiments without direct contact with a real installation. The use of computer technology contributes to the development of

students' independence. Therefore, there is a contradiction between the educational order of society, the level of development of information and communication technologies, the modern information flow and the educational process, which is insufficiently provided with a scientific and pedagogical base for the implementation of high-level general educational training of students in the information society.

In zoology classes virtual laboratories can be divided according to the following features:

Firstly, according to the method of delivery of the educational component: on CDs; posted on the Internet.

Secondly, according to the laboratory equipment used: based on simulation mathematical models; based on real laboratory equipment; based on industrial facilities.

Thirdly, by visualization methods: two-dimensional or three-dimensional graphics; animation; video.

The use of virtual laboratory in the educational process will allow:

- optimize and modernize the learning process;
- carry out diagnostics and management of the educational process;
- use information technology tools that are not available in the traditional educational process, as well as the possibilities of multimedia technologies;
- to organize various forms of students' activities for independent extraction and provision of knowledge to students;
- develop the skills of information analysis, research activities;
- stimulate students' motivation for learning;
- increase their social and professional mobility;
- broaden horizons, contribute to the formation of communicative skills of students.

Interactive lessons for students allow telling and showing about any natural phenomena, even the most complex ones, in a simple and understandable way for the most obtuse student. The effective use of interactive tests and lessons in the educational process not only improves the quality of school education, but also saves financial resources, creates a safe, environmentally friendly environment.

The use of the interactive complex is possible at various stages of the zoology classes: explaining new material, consolidating the topic being studied, conducting and checking independent work, repeating the topics covered, and conducting virtual practical work.

In the simplest sense, zoology is the science of life and the development of animals. Studying the subject zoology at school only at the verbal level does not create a correct idea of the objects and phenomena being studied. Therefore, the main task of biology teachers is the reasonable use of visual teaching aids in the educational process. Under normal conditions, we cannot always observe certain biological phenomena (for example, photosynthesis, protein synthesis, replication, seed germination, etc.) and conduct certain experiments (observation of the reproduction and nutrition of Euglena green, changing the color of animals, etc.). It is very convenient to use virtual laboratory work here, which opens up a lot of opportunities for the teacher and students.

The following were identified as the necessary elements of a virtual learning environment for teaching the course "Zoology":

- library of electronic textbooks, reference books and educational kits;
- a testing system and a library of tests on various topics of the discipline, including training, intermediate and final tests;
- a library of virtual laboratory works proposed for implementation in accordance with the curricula of various areas of specialist training;
- system for conducting the learning process and monitoring results.

At the same time, it was assumed that students, actively using the resources of the course, are able to

successfully master the theoretical foundations of the discipline and complete the tasks provided for by the curriculum. Control of the success of the educational process is implemented by a computer method based on the use of test control.

Working on the Internet or with pre-prepared programs allows not only to form, but also to consolidate the knowledge, skills and abilities of students. The use of Digital Laboratories contributes to:

- Increasing interest in the subject;
- Development of skills to work with interesting and modern technology, computer programs;
- Formation of experience in research work, experience in information retrieval;
- Presentation of research results.

Results

Apply modern information technologies to process the results of a natural science experiment. Conducting experiments with the help of the use of the laboratory allows you to solve interdisciplinary problems - to master the natural sciences in a complex, as a single scientific picture of the world.

There are following pluses of virtual laboratory:

Firstly, obtaining data not available in traditional training experiments;

Secondly, possibility to perform convenient processing of the results of the experiment;

Thirdly, automation of data collection and processing saves students time and effort and allows them to focus on the essence of the study;

Fourthly, increasing the level of knowledge in zoology, chemistry and biology through the active work of students in the course of experimental research work;

Fifthly, disclosure of the creative potential of students.

Also, virtual laboratories can be used at extracurricular activities, to prepare students for scientific and practical conferences. The virtual laboratory makes it possible to assemble various devices, installations from constituent elements, take measurements, enter observations in the "Laboratory Journal", "take a picture" from the screen using a virtual camera, and draw up reaction equations. From the side of the program throughout all stages there is control.

The main goal of using a virtual laboratory, as the use of information technology, is to achieve a new quality of education, provide methodological support for the educational process with the help of modern, mostly interactive, means and forms of education, as well as increase the educational independence and creative activity of students.

It is recommended to use it as follows:

- fascinating interactive lessons and laboratory work can be carried out with a child at home in various sciences of physics, biology, chemistry, ecology;
- virtual labs can be demonstrated in the classroom during a lecture as an addition to lecture materials.
- carry out in a computer class over the network, followed by an analysis of the student's progress.
- by changing parameters in the interactive laboratory, the user sees changes in the 3D environment as a result of his actions.

Today, there are plethora of selection of resources including virtual labs, videos, case studies, and lab datasets in studying zoology. They are followings:

1. LabXchange (virtual laboratory and other materials). LabXchange is Harvard University's free platform for science studies. There are following resources on the platform: virtual laboratories, videos, interactive pages and tests, experimental simulations, stories in which scientists share their professional experience, electronic textbooks, cases, examples of trajectories for working with the platform.

2. EduWebLabs (virtual labs). This is a site where students can conduct experiments in online labs. The following subjects are supported: general chemistry, chemistry (advanced), general biology, earth sciences, physics.

3. STAR (Software Tools for Academics and Researchers) is a Massachusetts Institute of Technology (MIT) program to develop virtual laboratories for research and education. The activity of the program is to develop educational and research applications in general biology, biochemistry, genetics, hydrology, in the field of distributed computing. Most applications are implemented in java or html.

4. VirtuLab is a project to develop virtual laboratory work for students in physics, chemistry, biology, and ecology. Virtual labs are implemented using Flash technology. They differ in narrow specialization, in most cases, the linearity of experience (the entire sequence of actions and the results of the experiment are predetermined).

The logic of presenting material in virtual laboratory of zoological work differs from real work in a more detailed description of the research process, an abundance of hints and links, as well as the presence of animation. Virtual work of zoology requires greater clarity in the description of the sequence of actions, therefore it is methodologically justified to present this kind of work in the form of a certain number of sections - tabs, each of which carries its own semantic load:

- theoretical material.
- Work description.
- The order of the work.
- Laboratory setup.
- Report.

For the successful completion of zoological laboratory work, the student must carefully work out the theoretical material on the research topic, therefore, in a virtual laboratory work, a section with the same name should be presented in more detail than in a classical workshop.

In the “Description of work” section, the purpose of the zoological laboratory work is formulated, the installation diagram, calculation formulas are given, and work with graphs is described.

In the “Order of the work” section, the student receives step-by-step instructions for performing zoology laboratory work.

In the “Laboratory setup” section, the student performs an zoological experiment.

In the “Report” section, the student fills in the relevant sections, fixing the values obtained during the experiment of the measured values, performs calculations and errors.

Conclusion

To help students in learning zoology, increase their interest in this professional field, and also improve their understanding of the material, virtual laboratory complexes are needed, which not only allow you to visually explain and show work on complex equipment (even at home). Thus, a virtual laboratory workshop is one of the progressively developing types of laboratory classes, the essence of which is to replace a real laboratory study, reduce the time of experiments, the possibility of self-study and activation of the educational process.

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