

METHOD OF USING MODERN DIGITAL TEACHING AIDS IN PREPARING FUTURE BIOLOGY TEACHERS FOR PROFESSIONAL ACTIVITY

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Abstract: *This article provides information on the use of virtual laboratories in the formation of students' skills in microbiology and immunology, their capabilities, and effectiveness.*

Keywords: *Microbiology, virology, immunology, immunity, virtual laboratory, individual, differential.*

Microbiology (from the Greek “mikros” - small, “bios” - life, and “logos” - study) is the science of small, simple, invisible single-celled organisms. This science studies the life activity of microbes and the patterns of changes occurring in the organisms of humans, animals, and plants under their influence.

Immunology - a branch of biology, the study of immunity. Immunity is understood as the body's ability to protect itself from genetically foreign information from the body and substances. Immunity protects the body not only from microbes, but also from cells and tissues that differ only by one gene of histosubstance. In addition, one of the main functions of immunity is the fight against benign and malignant tumors[1].

Therefore, the in-depth study of these disciplines and the formation of students' skills is one of the urgent problems of microbiological and immunological education today. One of the ways to solve this problem is the creation of virtual educational platforms for the subject of

microbiology and immunology, designed for the global Internet, which can be achieved by placing virtual educational technologies related to the subjects of microbiology and immunology and using them in the educational process. Virtual laboratories, which are a product of creativity, provide teachers and students with high-quality solutions to their professional tasks in virtual life. The virtual learning resource creates a number of conveniences for teachers and students in the learning process, that is, it is a very convenient tool for saving time and activating independent work activities. Virtual laboratories intended for the global Internet are educational and scientific information auxiliary tools placed on the global Internet in electronic form for the effective organization of the educational process, supplementing high-quality teaching methods. Therefore, the ability to apply virtual educational technologies in laboratory classes in microbiology and immunology is an important part of the knowledge and skills of professors and teachers of higher educational institutions. The conducted research shows that the formation of students' understanding of microbiology and immunology within the framework of requirements, the widespread use of specific rules, laws, a system of aspects, means of consistency, factors, and pedagogical conditions of pedagogical technology has an effective impact on achieving the goal. To develop skills in microbiology and immunology in higher education institutions, the following tasks and requirements should be set for professors and students: to train highly qualified personnel in the field of biology education, who can demonstrate their creative abilities in our developing society; training biology teachers, i.e., ensuring that high-level personnel are aware of modern and foreign innovations in the

disciplines of microbiology and immunology and are prepared for new changes in higher education institutions; formation of the professional worldview of future biology teachers; involvement of students in the process of personal formation in the field of education; to provide students with accurate information about the basic principles and responsibilities of professors and teachers in the introduction of new information technologies in the disciplines of microbiology and immunology; to consolidate students' theoretical, laboratory and practical knowledge in their specialty, to form skills and abilities in solving basic pedagogical and creative problems for independent activity; generalization and classification in the search for knowledge, skills, and competencies; application of acquired skills in biological processes, planning and organizing teaching in disciplines belonging to the category of biology; formation of theoretical and scientific knowledge in the field of microbiology and immunology, formation of processes in our society, formation of an independent personality; formation of knowledge and skills in the field of biology; preparing students for independent work in higher education institutions. There are two ways to develop students' skills in microbiology and immunology:

1. Individual - educational work is carried out according to one individualized methodological program of all forms.
2. Differential - dividing students into groups according to their capabilities, abilities, interests, working through various programs

With the help of virtual educational technologies, the formation of individual characteristics in students is simplified.

How to use virtual laboratories?

"VR-Labs" or virtual laboratories - a web application that allows conducting experiments and research using virtual tools in such subjects as biology, physics, chemistry, robotics, drawing. Any computer with a virtual laboratory browser is considered safe and easy to use (Fig. 1).

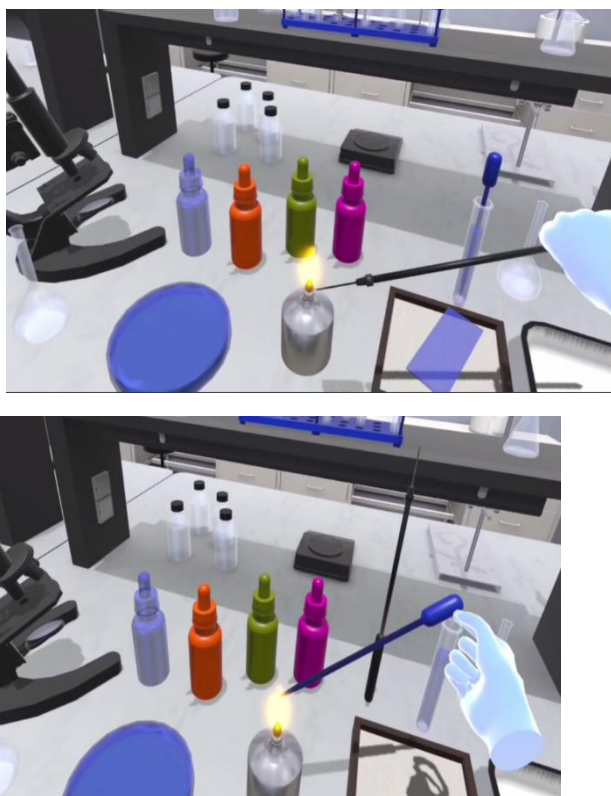


Figure 1. The process of staining bacteria in a virtual environment

The professor-teacher does not spend excessive time preparing visual experiments in class, but uses virtual laboratory equipment to show students the laboratory process, that is, the structure of bacteria, their staining, immune cells. This can also be called performing lessons in a safe way. (Figure 2)

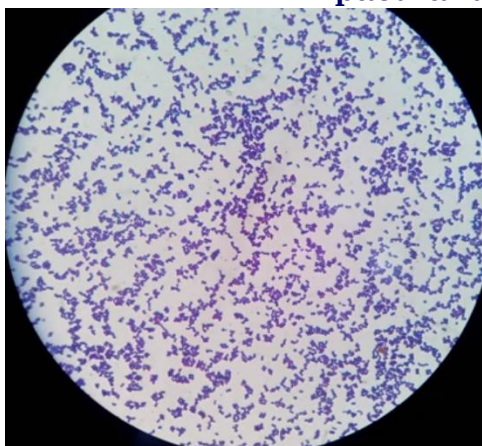


Figure 2. Microscopic view of stained bacterium

If individual characteristics are taken into account when designing virtual educational technologies, it will help to select individual information in teaching, summarize information units in the direction, and form the student's skills. Because the student's interest in different types of learning varies and can help find the optimal norm [2,3]. Today, higher educational institutions are equipped with computer technologies, they are connected to the global Internet, and there is an opportunity to organize classes using virtual laboratories and assess their knowledge online. For the formation of students' skills in the subjects of microbiology and immunology, it is necessary to develop virtual learning technologies with a 3-D system related to this subject and apply them in biology education. M.L.Kazaryan, M.A.Shakhramanyan believe that 3-D modeling is the most relevant and promising technology and is considered a modern tool for presenting educational resources in 3-D visual form [3,4]. High efficiency can be achieved by ensuring the necessary level of information in the student without exaggeration. Thus, another feature arises in the creation of virtual educational technologies - the student's individual perception. When creating, the main attention should be paid to the uniformity of

methods and the student's reception of information from the source.

Virtual educational technologies, taking into account didactic, technical, and organizational approaches, provide for the activation and diversification of unlimited pedagogical influence, since it includes information in various electronic forms (pictures, drawings, tables, diagrams, audio and video files, virtual presentations).

In conclusion, the importance and educational potential of forming students' skills in microbiology and immunology in higher educational institutions is great. In the course of microbiology and immunology, students develop scientific skills based on virtual educational technologies by acquiring microbiological and immunological knowledge about the interaction of antigens with antibodies, their functions in diseases, bacteria and their structure, and phagocytosis processes.

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