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METHODOLOGY FOR IMPROVING LABORATORY COURSES IN THE BIOLOGY OF INDIVIDUAL DEVELOPMENT ON THE BASIS OF A VIRTUAL LABORATORY

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Abstract
In this article the advantages of computer simulation models in teaching biology in higher education institutions , improving the effectiveness of classes, and the creation of simulation models for the application of software tools to the educational process are presented.

Kalit so'zlar: Imitatsion model, biologiya, kimyo, virtual laboratoriya, web texnologiya, elektron darslik, uzluksiz ta'lim.

Introduction

In the decision of the President of the Republic of Uzbekistan dated 12.08.2020 No. PQ-4805 on measures to increase the quality of continuous education in the fields of chemistry and biology and the measures to increase the effectiveness of science, the development of the sciences of chemistry and biology in our country, in these fields improving the quality of education and the effectiveness of science is defined as one of the priorities of the State Program "Year of Science, Enlightenment and Digital Economy".

In accordance with the "Strategy of Actions on the five priority directions of the development of the Republic of Uzbekistan", further improvement of the continuous education system, increasing the possibilities of quality education services, continuing the policy of training highly qualified personnel in line with the modern needs of the labor market, general o Improving the quality of secondary education, in-depth study of foreign languages, informatics and other important and high-demand subjects such as mathematics, physics, chemistry, biology, i.e. modernization of the higher and general secondary education system large-scale work is being carried out on the introduction of modern forms and technologies of education, training of specialists

Literature Analysis and methodology

The following situation can be seen when we analyze the scientific research works of the scientists of our republic in the field of biology on the basis of computer simulation

models (CIM) in creating virtual laboratories, multimedia training manuals and applying them to the educational process.

Sadiqova D.'s article entitled "Essence of effective technologies in the teaching of biology in general secondary schools" shows that the large-scale consistent work on the development of the continuous education and science system in our country is the training of highly qualified specialists. created the basis for providing the necessary conditions for **.[1]**

"Preimushyestva i dostastki ispolzovaniya virtualnix laboratornix rabot po fiziki" by GG Ramazanova , with the development of information technologies in recent years, the need to introduce modern technologies into the educational process arose. In the demonstration of the lecture experience, as well as in the laboratory exercises, old, repeatedly repaired devices are used. The introduction of new technologies into the educational system, as well as comprehensive modernization, are the main issues that receive special attention. The introduction of information technologies into the educational process should effectively complement existing educational technologies or have additional advantages over traditional forms of education. For example, the use of virtual laboratories in physics education makes laboratory activities more lively and interesting, while at the same time improving the quality of education. **[2]**

In Yuldasheva R.'s article entitled "Using information technologies in the teaching of biology", the use of pedagogic and information technologies is defined as an important task in the regulatory documents adopted in order to increase the effectiveness of the teaching process organized in the continuous education system. In fact, in the era of globalization of information, increasing the effectiveness of teaching using pedagogical and information technologies in the educational process is considered an urgent problem. In order to use information technologies in the teaching of natural sciences, including biology, it is necessary to take into account the specific features of the content of biology education. **[3]**

In the article "Teaching biology based on modern technologies" by M. Umarova, in the educational process, under the direct guidance of the teacher, with the help of educational content, methods, tools and forms, the laws of the organic world, the essence of events and events, o "learns its own characteristics and acquires knowledge, skills and competences **.[4]**

Djobbarov HN, Khodzhibayev I.Sh. In the article entitled "Using virtual educational laboratories in biology classes", the concept of virtual educational laboratory, informatization of education, assimilation of information and communication technologies by future personnel, as well as the use of information and communication technologies in the training of personnel in the field of exact science

expressed his opinion about the need to speed up the communication technology. Recently, in the field of using information and communication technologies in education, a new term "Virtual educational laboratory" appeared. The virtual educational laboratory is in accordance with the idea of open and distance education, and it reduces the relevance of problems related to material and technical support in the educational process. **[5]**

Jurayev AX, Tojiboyev SJ in the article entitled "Using simulator programs in the educational process" that special software tools are used in the educational system to create multimedia electronic educational literature, lecture texts, virtual laboratory works and various animation developments, such software tools one explained that it is a pedagogical software tool. **[6]**

Results

Computer simulation models of virtual laboratories in the field of individual developmental biology have not been well disclosed in the scientific studies cited above. In our research work, we have prepared computer simulation models of laboratory processes in individual developmental biology, and they are presented below.

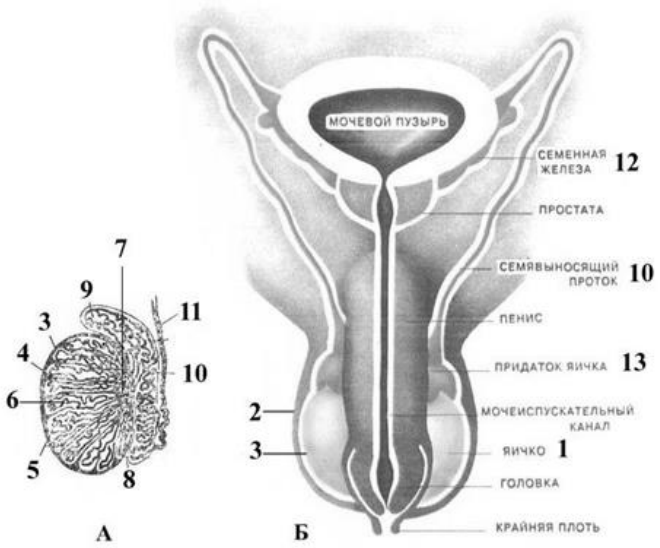

Figure 1 shows the structure of male reproductive cells.

Figure 1. Male sexual cells structure

Work process. Testicles are very different in structure. We will get acquainted with their structure on the example of mammals. The testicles or testes (A, 1) are not suspended in the abdomen, but in a bag called the scrotum (2). Due to their location and a special blood supply device (counter-flow heat transfer system), the level of the

testicles is several degrees lower than the abdominal cavity. It is very important for normal spermatogenesis.

From the surface, the testis is covered with membranes consisting of mesothelium and a protein shell (3). Its interior is divided into pieces by dense connective tissue pieces (4), each of which is filled with a strongly coiled tube (5). The spaces between the convoluted tubules contain loose connective tissue and interstitial cells (Leydig cells) (6), which synthesize the hormone testosterone. These cells are often found in groups.

Convoluted seminiferous tubules pass into short seminiferous tubules (7), then into a network of anastomotic channels - testicular networks (8). From this network, the germ cells are collected in the vas deferens, and then through the duct (9) of the testicular appendage, which is strongly convoluted, into the vas deferens (10), which opens into the genitourinary duct (11). At the distal end of the vas deferens is a glandular enlargement known as the seminal vesicle (12). there is Before , this on the ground sperm ejaculation waiting for they believed that it will be stored . Now we know that they are stored in appendix (13) and vas deferens (10) . And seminal vesicles are glandular organs is sperm _ movement and to eat help giving secretion harvest does _

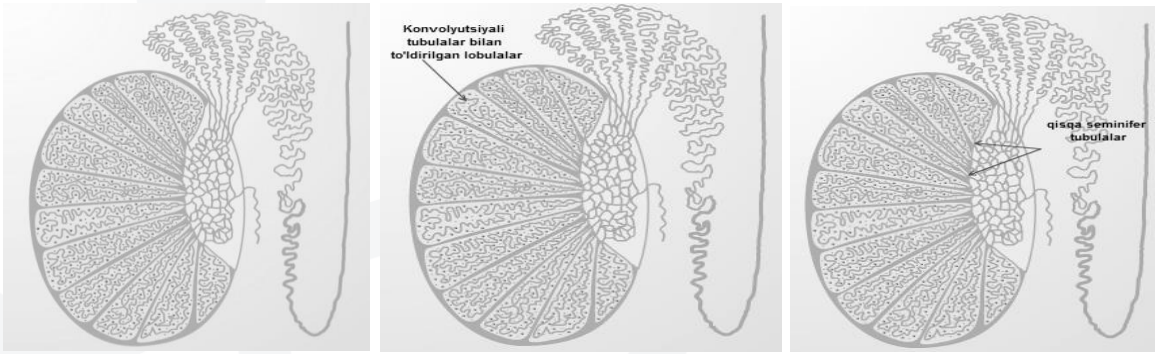

Figure 2 (A). The structure of male reproductive cells is explained on the basis of multimedia tools.

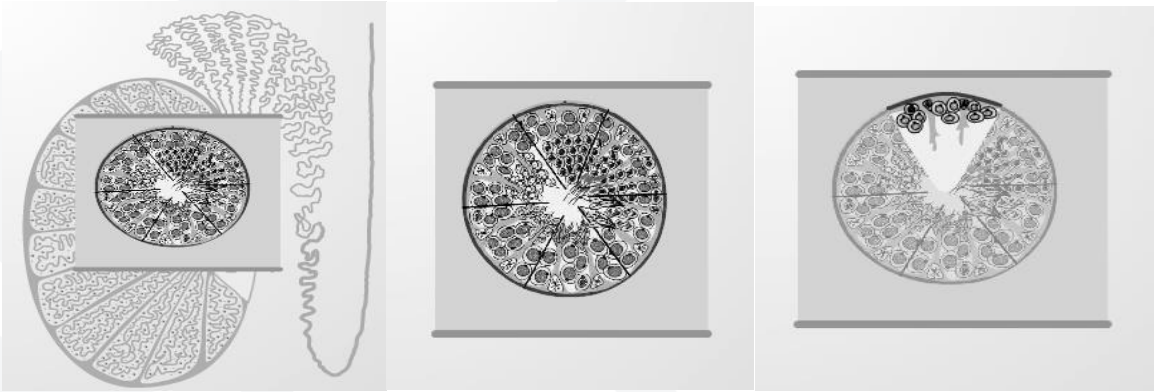

Figure 2 (B) . Illustration of the process of training a male germ cell based on a computer simulation model.

The main purpose of this simulation model is to show the male germ cell.

Figure 3. An enlarged view of the male reproductive cell based on a computer simulation model .

The main task of the simulation model here is to show the elements of the structure of the male sex glands (testicles), genitals step by step, and to demonstrate their classification by animation.

Summary

In conclusion, the issues of improving the educational process based on virtual laboratories in higher education institutions, the issues of creating virtual laboratories on the topics of certain subjects were researched and attention was focused on improving the educational process of higher educational institutions based on them .

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