

## ПРИМЕНЕНИЕ СПЕЦИАЛИЗИРОВАННЫХ ПРОГРАММНЫХ СРЕДСТВ В ПРОЦЕССЕ ОБУЧЕНИЯ БИОЛОГИИ

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**Аннотация:** в работе рассматривается проблема применения специализированных программных средств (СПС) в процессе обучения биологии. Освещены основные подходы, информационные и коммуникационные технологии (ИКТ) в различных областях современной системы образования. Показаны области, в которых можно значительно облегчить и ускорить работу преподавателя-биолога. Рассмотрены специализированные программные средства для решения задач вычислительной биологии. В частности, приведены возможности пакетов расширения Bioinformatics Toolbox и SimBiology.

**Ключевые слова:** информационные технологии, биология, вычислительная биология, биоинформатика.

## APPLICATION OF SPECIALIZED SOFTWARE TO THE PROCESS OF BIOLOGY TRAINING

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**Abstract:** the article discusses the problem of using specialized software (SS) in the process of teaching biology. The basic approaches to information and communication technologies (ICT) in various areas of the modern education system are covered. Areas in which the biologist's teacher can be greatly facilitated and accelerated are shown. Specialized software for solving problems of computational biology are considered. In particular, was given the possibility of Bioinformatics Toolbox and SimBiology extension packages.

**Keywords:** information technology, biology, computational biology, bioinformatics.

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The modern period of development of a civilized society that entered the twenty-first century is accompanied by an intensive development of information resources. The introduction of new information telecommunication technologies in various areas of the modern education system is becoming more and more complex and complex [1].

One of the priorities for modernizing education is the use and use of modern ICT tools. A significant gap in the professional development of modern school teachers remains their lack of professionalism in the field of ICT. First of all, such unprofessionalism affects the significant decrease in the effectiveness of schoolchildren's education.

In this regard, the teacher should not only have knowledge in the field of information and telecommunications technologies, but also be an expert in their application in their professional activities. Achievement of this goal should be facilitated by the training and retraining of teachers in the field of computerization of education [2].

It is important to inform the future and already working teachers that informatization of education ensures achievement of two strategic goals. The first of them is to increase the effectiveness of all types of educational activities based on the use of information and communication technologies. The second is to improve the quality of training specialists with a new type of thinking that meets the requirements of the information society.

To date, there has been accumulated a certain scientific and pedagogical experience of understanding the nature of such areas, there have been quite a few publications on these problems, including the teaching of

biology. Various authors point to the possibility and even the strategic importance of using information technology in the teaching of biology, devoted to the problems of the computerization of education [3].

The paper examines various aspects of the use of information technology tools in biology classes: lessons, clubs, circles, etc. The ways of using information technology tools in the teaching of biology are shown. The SS is considered for solving problems in computational biology. SS for mathematical and simulation modeling allow us to expand the boundaries of experimental and theoretical studies, supplement the physical experiment with a computational experiment.

ICT can be successfully applied to improve the effectiveness of extracurricular and extra-curricular activities of schoolchildren, in the organization of leisure students. To achieve the goals of informatization of extracurricular and after-hour activities of schoolchildren, it is necessary to organize extracurricular activities with the use of ICT tools (circles, club of programmers, bioinformatics club, virtual laboratories of computational biology etc.).

For researchers in the field of computational biology and bioinformatics, MathWorks products help to better understand and predict biological changes. This will help the tools of data analysis and mathematical modeling. MathWorks offers a single environment for work in the field of bioinformatics, system biology, bioimaging and biostatistics.

Bioinformatics Toolbox is a MATLAB extension package containing a set of special functions and algorithms for processing biological data, research in bioinformatics, genetic engineering and drug development. SS Bioinformatics Toolbox supports the presentation formats of gene and protein data, contains special tools for visualization and analysis.

This allows you to abandon the use of various, often-incompatible tools for importing, analyzing and sharing results. Researchers are provided with the following options:

- conducting various analysis options, including analysis of nonlinear models with mixed-type effects, sequencing, micro-matrix analysis, and gene ontology;
- import of data from a different source, including from databases, files of various formats and hardware;
- parallelization of calculations in the analysis of data to reduce the time of the account;
- automation of analysis, batch processing of continuous processes.

In the software environment, models can be analyzed to predict and study the characteristics of biological systems. The tools of graphic and software modeling in SimBiology provide researchers with the following options:

- analysis and visualization of external data, identification of pharmacokinetic models, adjustment of the model in accordance with external data;
- implementation of the reaction scheme for studying the dynamics of the system;
- combination of models (for example, pharmacokinetic model and biomechanical scheme);
- Sharing results using automatically generated reports.

Thus, the connection between biology and information technology will be strengthened in the near future, therefore the problem of further teaching of computational biology and bioinformatics acquires special importance.

#### ***References / Список литературы***

1. *Grigoriev S.G, Grinshkun V.V.* Informatization of education is a new academic discipline. / In the collection. Materials of the XVI International Conference "Application of new technologies in education". Troitsk: MOO FNTO "Baitik", 2005. P. 102-104.
2. *Grigoriev S.G, Grinshkun V.V.* The use of information and communication technologies in general and secondary education // [Electronic resource]. URL: <http://www.ido.rudn.ru/nfpk/ikt/vved.html/> (date of acces: 28.03.2018).
3. *Nazarova I.P.* ICT and the method of projects at the lessons of biology / Pedagogy: traditions and innovations (II): materials of the international scientific conference (Chelyabinsk, October 2012). Chelyabinsk, 2012. P. 91-93.