

Biology Teaching Methodology at Secondary Schools

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Abstract: At the present stage of the socio-economic development of society, fundamental changes have been made to the goals of personal development, which led to the emergence of new categories, methodological approaches and goals in many areas of activity. Secondary education, in particular the professional methodological unit, cannot remain aloof from these trends. With this regard, we analyze and discuss some issues of teaching biology at secondary schools.

Keywords: Biology, healthy lifestyle, methodology, secondary schools, multimedia, ICT, hybridization, polyploidy and mutagenesis, field experiments and observations, practical tasks.

Introduction. Biological knowledge is the most important component of human culture - without knowledge of biology it is impossible to develop an ecological style of thinking, to ensure an understanding of the scientific principles of interaction in the "Man – Nature" system. The formation of a healthy lifestyle is based on biological knowledge. The preservation of life on Earth in all the diversity of its systems, the survival and development of mankind in modern conditions are possible only if the entire population is biologically literate.

The goal of innovative teaching of biology in secondary schools is a qualitative change in the pupil's personality in comparison with the traditional system. This becomes possible due to the introduction into professional activity of didactic and educational programs unknown to practice, which involves the removal of the pedagogical crisis. The development of the ability to motivate actions, independently navigate the information received, the formation of creative thinking, the development of children by maximizing their natural abilities, using the latest achievements of science and practice, are the main goals of innovation

Results and analysis. Many biological processes are complex. Children with imaginative thinking have a hard time assimilating abstract generalizations, without a picture they are not able to understand the process, to study the phenomenon. The development of their abstract thinking occurs through images. Multimedia animation models make it possible to form a complete picture of the biological process in the pupil's mind, interactive models make it possible to "design" the process on their own, correct their mistakes, and self-learn.

The main breeding methods include selection, hybridization, polyploidy and mutagenesis [3; p. 92]. Recently, new methods have also been widely used in breeding - cell and genetic engineering.

Mutagenesis. Artificial mutagenesis makes it possible to develop new varieties of plants and animal breeds, as well as to improve existing breeds and varieties. Mutations occur when organisms are exposed to various mutagens (ultraviolet rays, ionizing radiation, some chemicals). When exposed to a mutagen, mutations can occur, both lowering and increasing the viability of the organism.

Polyploidy. When breeding new varieties in plants, a significant place is given to polyploids. This is due to the fact that in nature many plant species are polyploids, while among animals polyploids are very rare. There are three reasons for the emergence of polyploidy: doubling of chromosomes in non-dividing cells, fusion of somatic cells or their nuclei, disruption of the meiosis process, in which gametes with a diploid set of chromosomes are obtained.

Cellular engineering makes it possible to hybridize somatic cells cultivated on artificial media outside the body, not only with each other, but also with cells of another type. For example, mouse and human cells, normal and cancer cells, cells of various plants are hybridized. Methods have been

developed with the help of which a whole plant can be restored from a group of plant cells (tissue culture) contained in a test tube on an artificial medium [5; p. 266].

Genetic engineering is a set of methods that make it possible to obtain new traits from organisms by changing genes. Genetic engineering methods have been used to synthesize biologically active substances and preparations in modified cells of microorganisms. Bacteria with the ability to synthesize insulin, growth hormone, interferon, etc. have been obtained.

Discussions. Practical tasks could be given as following: Consolidation of the received theoretical knowledge and practical skills in plant breeding and seed production for solving scientific and production problems [2; p. 247].

- Accumulation of experience in practical work in the field and mastering the skills of organizing and managing scientific research, independently conducting experimental research on various crops. Mastering the skills of laboratory analysis, office processing and data analysis using information technology, methods of mathematical statistics; drawing up a scientific report, recommendations.

- Acquisition of skills in planning, organizing and in the practical implementation of scientific and production processes in the field of plant seed production. Mastering modern methods of screening genotypes, expanding the genetic diversity of the source material and producing high-quality seed material, as well as methods for analyzing and summarizing experimental data.

- Promotion and implementation of scientific achievements and best practices. Conducting scientific research on a topic proposed by the supervisor. Collection of material for the final qualification work.

Methods for assessing the economic value of breeding material - methods for assessing material in test nurseries and primary seed production, methods and technology for the production of high-quality seed material, methods for accelerated reproduction of new varieties, biotechnological methods in breeding and seed production [1; p. 224].

Carrying out field experiments and observations. In the field, observations and measurements are carried out both under the guidance of a teacher and independently; scientific and scientific-production tasks are solved. Records, observations and analyzes are carried out to assess the gene pool of plants. Evaluation of productivity and condition of crops. The study of the phytosanitary state of the soil. [4; p.40].

Interactive technologies are gaining more and more recognition today and are used in teaching various academic disciplines. Interactive interaction involves real-time operational feedback between a person and a person or between human-machine systems (ICT).

For example, when conducting laboratory work "The structure and methods of movement of ciliates - shoes", the computer makes it possible to consider the structure of ciliates - shoes, a fragment of the film demonstrates the wave-like movement of cilia, irritability of the body. Working in secondary school, when studying the topics "Environmental disasters and its consequences", I traditionally hold a lesson-conference. Pupils choose topics, prepare projects, create wonderful presentations, booklets, flyers [6].

Conclusion. At the present stage of development of school education, the problem of using computer technology in the classroom is of great importance. Information technology provides a unique opportunity to develop not only the pupil, but also the teacher. The computer will not be able to replace the living word of the teacher, but new resources make the work of the modern teacher easier, make it more interesting, effective, and increase the motivation of pupils to study biology.

Advanced video filming technologies and the use of specially designed computer graphics make it possible to follow the work of organisms, as it were, "from the inside", to discover their features and mysteries. That causes a great emotional upsurge and increases the level of assimilation of the material, stimulates initiative and creative thinking. And the result is prize-winners at olympiads and rallies.

Thus, the use of ICT in the process of teaching biology increases its effectiveness, makes it more visual, rich (the intensification of the learning process increases), contributes to the development of various general educational skills in schoolchildren, improves the quality of education, and facilitates work in the classroom.

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