

FORMING CREATIVE THINKING THROUGH PROBLEMS AND EXERCISES FROM MOLECULAR BIOLOGY IN PROVIDING PERSONAL DEVELOPMENT IN THE EDUCATIONAL SYSTEM

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Annotation

This article deals with the issue of teaching the basics of molecular biology within the subject of biology to general secondary school students in the educational system, ensuring the personal development of pupils and students in teaching molecular biology in higher education institutions, and the role and importance of using exercises in the development of creative thinking, and methodology explained.

Keywords: Knowledge, object, biological object, subject, exercise, problem solving, memory, perception, lesson, information, reading, thinking, imagination, attention.

Introduction

Today's school textbooks on Biology provide information aimed at forming the initial concepts of Molecular Biology. The content of information aimed at forming basic concepts of molecular biology is given on the basis of theoretical information, information given on the basis of the sequence of processes, quantitative data, tables, pictures. It is important to organize learning activities aimed at developing the existing abilities of students of the general secondary school in the acquisition of information in the subject of Biology. Modern pedagogues in the teaching of biology in general secondary schools classify educational methods based on two indicators: aimed at forming students' independent learning activities (explanatory-illustrative method, partial research, preliminary research methods) and according to the method of implementation (oral, visual methods, methods based on practical training).

Main Part

The use of exercises in teaching theoretical information to students in the formation of initial concepts of molecular biology is an important factor in achieving high efficiency. In this case, the student will find the homework to be done at home based on the textbook, based on the content. Breaks the found topic text into parts. When dividing the subject text into parts, he determines the parts of the subject that are difficult for him to master. In addition, importance is given to the parts of the topic, that is, the text of the topic is divided into parts based on the theoretical information, quantitative data, and information about the processes

related to the topic. Uses exercises to repeat the information given in the parts of the subject after the initial learning process.

When using exercises, a quiz to determine prior knowledge performs an exercise based on the answer. Based on the answer to the question, it is determined which part of the subject that is intended to be studied has not been studied. After identifying the unlearned part of the subject, exercises are used to repeat the unlearned part. It is recommended that the student work on problems in order to turn the knowledge he acquired based on the exercises into skills and abilities. The knowledge gained by working on the problem is repeated several times. By finding hidden information in the content of the problem, the previously acquired information is generalized.

Students require the use of problems and exercises related to Biology in performing extracurricular tasks, the use of problems in monitoring and increasing the effectiveness of students in acquiring knowledge. By working through the problems, students develop the skills to understand the quantitative change of the process. Failure to use problems and exercises to teach students about protein biosynthesis from the concepts of molecular biology will cause the student to simply memorize the topic. This causes the reader to quickly leave the mind.

Allows the student to fully explain the topic by using problems to understand a biological process and explain what they have learned to another student.

A student who has the ability to work with problems and exercises will understand the role and importance of problems and exercises in the study of Molecular Biology, which will be taught in a higher education institution in the future. A student who learns to solve problems and exercises has a well-developed creative thinking. A student with the characteristic of creative thinking has no difficulty in finding a new solution to a problem.

Creative thinking is finding innovative (new, innovative, original, non-standard, unusual, etc.) and effective (practical, effective, economical, optimal, etc.) solutions, acquiring new knowledge, developing ideas aimed at effective expression of imagination. , is the ability to effectively participate in the evaluation and improvement process. If it were not for the creative thinking of primitive people, two flints would not have struck fire, Thomas Edison would not have invented the electric lamp, and Leonardo da Vinci would not have invented the parachute.[1]

By teaching students in general secondary schools to think creatively, they can use problems and exercises to come up with new ways to learn molecular biology as students in higher education. In the study of molecular biology, they find solutions to new types of problems based on creative thinking without difficulty. Malumki requires students to have a certain skill in dealing with problems related to molecular biology. When working on the problem, it is necessary to first understand the condition of the problem, to be able to distinguish the limits of the stages that occur during the biological process, and to have the skills to transfer the quantities into the language of mathematical symbols during the process.

Simple and complex problems are a useful tool for developing students' thinking skills, teaching planning processes, and usually contain "hidden information". It teaches how to search for information, independently turn from a problem solver to analysis and synthesis, compare facts, generalize, etc. Using these ways of knowing is one of the important goals of teaching pupils and students to think creatively.[5]

By solving biological problems, pupils and students develop the following skills. Learning independent thinking according to the stages of the problem. Work on the issue begins with mastering its content. When the text of the problem is read a couple of times by the students, they remember the structure of the biological object and concepts related to the process.[4]

Preliminary analysis of the problem (the ability to separate the known from the unknown). Separating the known from the unknown, the important from the unimportant, opening the connection between what is given and what is sought in the matter is one of the most important skills. Without such skills, you cannot learn to solve problems independently.

Ability to write a short issue. After verbally working on the text of the problem, it is necessary to transfer its content to the language of mathematical terms and define the mathematical structure in the form of short writing (pictures, drawings, schemes, tables).[2]

It should be noted that in all cases, the analysis of the condition of the issue is carried out simultaneously with the execution of the short record. In fact, this is the purpose of short writing. In fact, the short writing of the problem condition is a basis for the students' memory, allows to understand and separate the numerical data, while their rational writing allows to explain in detail what is given and what to look for in the problem.[2]

Ability to verify problem solving. The verification of the problem solution is used in the following ways:

- a) match the received answer with the condition of the problem;
- b) creating and solving an inverse problem;
- c) solve the problem in other ways;
- g) determining the limits of the answer (recalling the answer);
- d) graphic inspection.[2]

Formation of students' and students' skills in teaching biology allows to develop their creative thinking. Pupils and students learn the processes that occur in biological objects by solving problems and exercises, and acquire skills and competencies related to science.

Conclusion

In conclusion, it should be noted that in the education system, in the teaching of natural sciences, in particular, molecular biology, in general secondary schools and higher education institutions, issues and exercises in ensuring the personal development of pupils and

students use allows to effectively organize the learning process, consolidate the subject, and increase the efficiency of organizing extracurricular activities. We can see that the use of problems and exercises in teaching the basics of molecular biology in general secondary schools has the possibility of ensuring the personal development of students based on the formation of creative thinking in students.

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