Stages of student potential development in teaching biology

Abdurahmonova Iqbolkhon Yulchievna –
Named after T.N. Qori Niyazi,
Basic doctoral student of UzPFITI. Uzbekistan

Abstract. *The article is devoted to the stages of identifying gifted students, creating conditions for teaching in accordance with international requirements, the use of modern methods in assessing their knowledge and the development of talent in talented students. Today, the education system pays special attention to gifted students, creates the necessary conditions to support them, stimulates the aspirations of the younger generation to science, realizes their intellectual and creative potential.*

In this regard, it is advisable to systematize talent development through standard and non-standard learning and test assignments and hierarchical assignments that ensure knowledge, understanding, application, analysis and synthesis and summarization learning objectives according to Blum's taxonomy.

Key words. *Blum taxonomy, gifted student, creative-intellectual potential, hierarchical tasks, independent learning activities, cognitive stage, adaptive stage, functional stage, intellectual stage, adequate, abstract knowledge, standard and non-standard learning tasks, induction, deduction, reproductive level, productive degree, partially exploratory degree.*

Large-scale reforms in our country, bringing the education system to the level of international standards, harmonizing the education system of developed countries on the basis of integration, increasing the scientific, creative and intellectual potential of young people, instilling in them knowledge and information aimed at assimilating the values of the Uzbek people, developing a system for selecting young people , creating the necessary conditions for their support, stimulating the aspirations of the younger generation for science, systematic implementation of reforms to realize their intellectual and creative potential.[1]

The Action Strategy for the five priority areas of development of the Republic of Uzbekistan for 2017-2021 sets specific goals for radically improving the quality of general secondary education, in-depth study of other important and demanding subjects such as foreign languages, computer science, mathematics, physics, chemistry, biology[2].

Identification of talented students in the national education system, selection, creation of conditions for teaching in accordance with international requirements, study of problems in the application of modern methods of assessing their knowledge, analysis of the conditions of working with gifted students in the education system.

[1] . "On the system of selection of talented youth and measures to improve the activities of academic lyceums" December 3, 2020, No. PP-4910.

[2.] Decree of the President of the Republic of Uzbekistan dated February 7, 2017 No. PF-4947 "On the Action Strategy for the further development of the Republic of Uzbekistan." Collection of Legislation of the Republic of Uzbekistan, 2017, No. 6, Article 70

Working with gifted students in teaching biology, organizing independent learning activities of gifted students, the ability to think creatively through the collection, processing and analysis of information, the development of natural literacy, the formation of skills to apply knowledge in practice, preparing them for social life is an initial and important task.

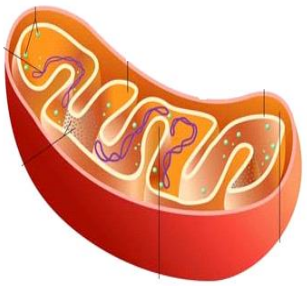
Working with gifted students in teaching biology, the development of students' talents is carried out in the following stages.

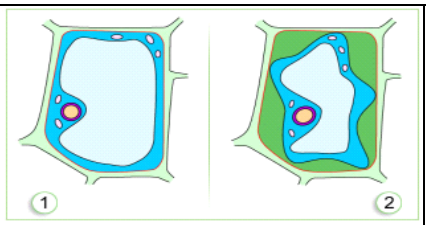
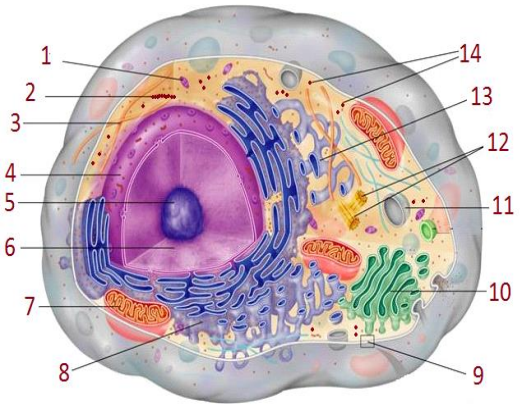
1st cognitive stage
Use basic knowledge of everyday content in explaining simple scientific phenomena, conduct research elements in accordance with instructions given by no more than two objects, identify simple cause-effect or correlation links that require low skill in visual, verbal and visual information, interpret, scientifically explain a local problem in a familiar situation must choose the answers given for. Information is assimilated at the reproductive level. The content of the tasks given at the reproductive level strengthens the ability of students to memorize without processing the learning material.
Form of teaching: course.
According to Blum's taxonomy, knowledge and understanding are standard and non-standard learning and test assignments that ensure the achievement of learning objectives.
2nd adaptive stage
Students will be able to adapt to the environment on the basis of the acquired knowledge, to explain and interpret the information scientifically based on everyday content and basic methods, to know the problems that can be solved through simple experiments; be able to draw adequate conclusions from a simple set of data based on their natural scientific knowledge; to demonstrate basic cognitive skills through familiarization with questions studied through natural scientific methods. At the productive level, independent work assignments prepare students for drawing conclusions by analyzing, synthesizing, comparing, and applying in practice and generalizing previously learned life processes.
Form of teaching: lessons, extracurricular activities.
According to Blum's taxonomy, knowledge, understanding, and practical application are standard and non-standard learning and test assignments that ensure the achievement of learning objectives.
3rd functional stage
The student can use complex abstract knowledge to explain a sufficiently complex, new situation and process, conduct experiments on two or more objects, substantiate a plan of experiment based on cognitive methods and techniques, interpret data, draw conclusions from data analysis and justify their conclusions. These partially exploratory-level learning tasks require creative thinking through the application of previously acquired knowledge, skills, competencies, basic and scientific competencies in new and unexpected situations, analysis, synthesis, comparative comparison, generalization of life processes.
Form of teaching: lessons, extracurricular activities, extracurricular activities.
Standard and non-standard learning and test assignments that provide knowledge, understanding, practical application, analysis, and synthesis according to Blum's taxonomy

to achieve learning objectives.
4th intellectual stage
Biology is based on interrelated natural science ideas, laws and concepts in the fields of physics, chemistry, geography and astronomy in the formation or prediction of hypotheses about new phenomena, events and processes, relative in content; be able to distinguish between relevant and irrelevant information when interpreting facts and scientific evidence; be able to independently apply and rely on knowledge gained outside the school curriculum, distinguish ideas based on scientific facts and theories from ideas based on other sources; conducting complex experiments and research, evaluating and justifying their choice by proposing an alternative version of a computer-modeled system. In this process, students' creative application of previously acquired knowledge, skills, competencies, basic and scientific competencies in solving unexpected learning problems, mental (analysis, abstraction, synthesis, comparative comparison, modeling, generalization, inference) , requires logical operations (induction, deduction, distinguishing the main problem);
Forms of teaching: scientific circles, elective courses, optional classes.
Standard and non-standard learning and test assignments that provide knowledge, understanding, practical application, analysis and synthesis and summarization according to Blum's taxonomy to achieve learning objectives.

The use of learning tasks, the level of complexity of which is gradually increasing, contributes to the development of elements of talent in students. Through hierarchical tasks, students have the opportunity to structure and control learning activities and the ability to perform learning and mental operations such as object, event, process comprehension, classification, comparison, generalization, analysis, modeling, and inference.

The following is an example of a system of tasks based on a hierarchical task map.

Theme		The cellular level of life
1	1) single-membrane organoid; 2) has chromatin; 3) forms crystals; 4) has ribosomes; 5) has the property of division. From the list above, identify the properties that correspond to the organoid description described in the figure and write the corresponding sequence numbers._____	
2	In what ways are bacteria prokaryotes? 1) does not have a core; 2) has a cytoplasm; 3) has ring DNA; 4) has a cytoplasmic membrane; 5) does not have mitochondria; 6) has a ribosome. Identify the correct points and write the corresponding numbers in sequence.	
3	Identify the correct options from the ones given below and write the corresponding numbers in sequence. Which of the following structures is common to human and plant cells? 1)	

	plastids 2) cell membrane consisting of cellulose 3) Golgi complex 4) mitochondria 5) ribosomes 6) vacuole filled with cell sap
4	Identify the points that were mistaken and write the corresponding numbers in sequence. 1) The selective property of the cell membrane is called semi conductivity; 2) the animal cell is surrounded by a cytoplasmic membrane similar to a bacterial cell; 3) there are special holes in the plant cell membrane, where the endoplasmic reticulum of neighboring cells are connected to each other; 4) lipids are synthesized in the granular endoplasmic reticulum membranes of sebaceous gland cells; 5) the inner membrane of mitochondria is smooth, the outer membrane forms crystals; 6) The nucleus, endoplasmic reticulum, centriole and chromosomes are the membrane structures of the cell._____
5	Group the following organisms into groups: penicillin, ulotrix, yeast fungus, elodea. In grouping, you took into account what features of the organisms.
6	Give 3 examples of common aspects of animal and bacterial cell structure. 1. 2. 3.
7	 1. What process is shown in the picture? Express your opinion in one sentence. 2. Explain the reason for this process. Express your opinion in one sentence.
8	Type the cell parts. 

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№	Structures	Animal cell	Plant cell	Fungal cell	Bacterial cell
1.	Cell wall				
2.	Cell center				
3.	Endoplasmic reticulum				
4.	Ribosome				

5.	Golgi complex					
6.	Mitochondria					
7.	Plasma membrane					
8.	Vacuole					
9.	Plastid					
10.	Lysosome					

Determine in which cells the structures given in the table meet and put a + sign in the appropriate cells.

10

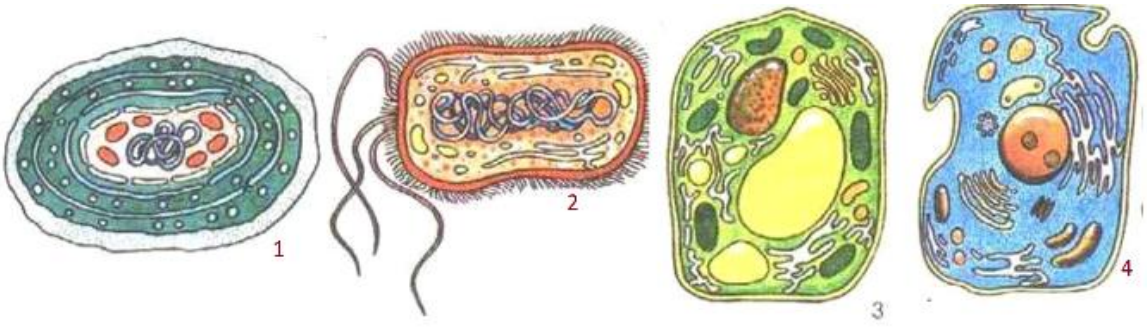
№	Organoid	№	The function of the organoid
1.	Mitochondria	A	Plays an important role in cell division
2	Golgi complex	B	Synthesizes ATF
3	Plastida	C	Provides cell stability
4	Ribosome	D	Participates in photosynthesis
5	Lysosome	E	Delivers the synthesized product to the Golgi complex
6.	Vacuole	F	Participates in the digestion of substances within the cell.
7	Donador endoplasmic reticulum	G	Collection and distribution of synthesized products
8	Smooth endoplasmic reticulum	H	Participates in the synthesis of carbohydrates and lipids
9	Centriola	I	Synthesizes protein
10	Leukoplast	K	Participates in the formation of disaccharides

The correct answer	1-	2-	3-	4-	5-
	6-	7-	8-	9-	10-

11 Mitochondria are thought to be derived from prokaryotes. Give a proof of this assumption.

12 If we think of a cell as an enterprise, which organoid would you give the following definition?
1. Warehouse of finished products -
2. Information center -

13 Create a problem assignment for this picture.



14	There are several hypotheses about the origin of eukaryotic cells. Give a single argument that refutes the hypothesis of symbiogenesis.
15	If we imagine a cell as a manufacturing enterprise, how would you describe the following organoids? 1. Chloroplast - 2. Lysosome -

The system of assignments given to students in the course of biology lessons, extracurricular activities, scientific circles, elective courses, elective classes. Opportunities to develop students' independent thinking, direct them to research activities, develop their abilities create great opportunities.

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