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Effectiveness of using innovative technologies in teaching the morphology of bacteria

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Annotation. One of the important requirements for the organization of advanced modern education today is to achieve high results in a short time without spending too much mental and physical effort. Based on the delivery of specific theoretical knowledge to students in a short period of time, the formation of certain activity skills and competencies, control of their activities, assessment of the level of theoretical and practical knowledge acquired by them requires the teacher to demonstrate high pedagogical skills, a new approach to the educational process. requires.

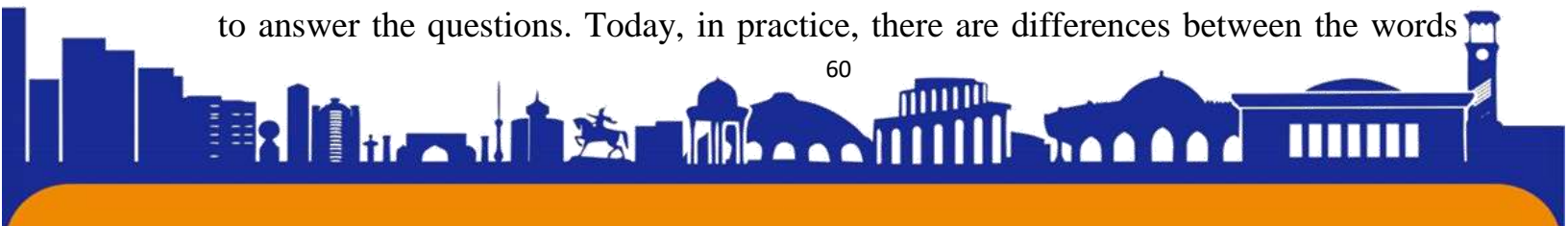
Keywords. Streptococci, bacteria, bacilli, creativity, ability, research, analysis, intelligent, quick thinker, flexibility, originality, approach, methods, creative thinking.

Reorganization of the educational system in our society in the direction of healthy humanism, raising it to the level of modern requirements, educating mature, spiritually rich, morally pure, perfect people cannot be delayed, it is important for the state and the future of the nation. is a valuable task. The teaching of "Microbiology and Virology" in higher education institutions should also serve to fulfill this important task.

Today, developed countries have accumulated a lot of experience in the use of pedagogical technologies that increase the educational and creative activities of students and guarantee the effectiveness of the educational process, and interactive methods form the basis of this experience.

It is known that the use of innovations and advanced foreign experiences in the process of teaching "Microbiology and Virology" in the higher educational institutions of our country is one of the urgent issues of today.

First of all, what is new in science? What is innovation in science? it is necessary to answer the questions. Today, in practice, there are differences between the words



novelty and innovation. innovation is the latest achievements, knowledge, methods in this science. These achievements, knowledge, and methods become innovations when they are applied in practice. The ability to correctly use the following innovations and educational technologies in teaching the topic "Morphological structure of bacteria" today increases the effectiveness of education.

Strategies for developing critical thinking

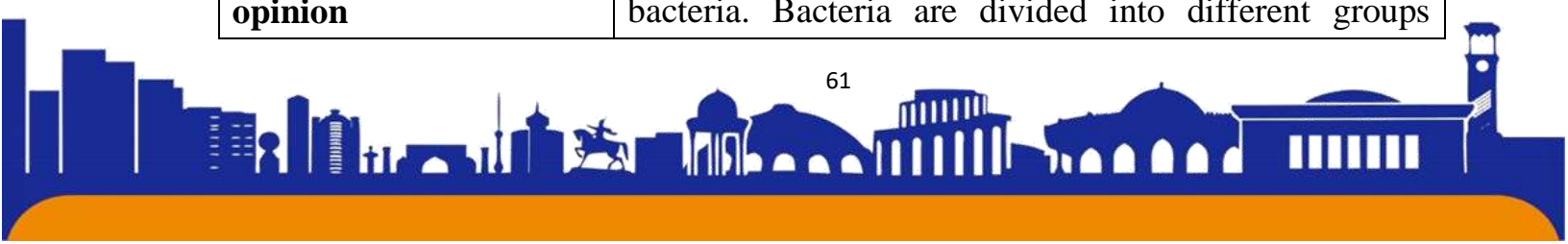
Below are the technologies of interactive methods:

FSMU technology

- (F) – Express your opinion;
- (S) – Give a reason for your statement of opinion;
- (M) – Give an example that explains (proves) the stated reason;
- (U) – Summarize your opinion.

In order to increase their activity using the FSMU method, students are asked a question on the topic: What role do chivchins play in the life of bacteria. What is the importance of the location of the khivchins?

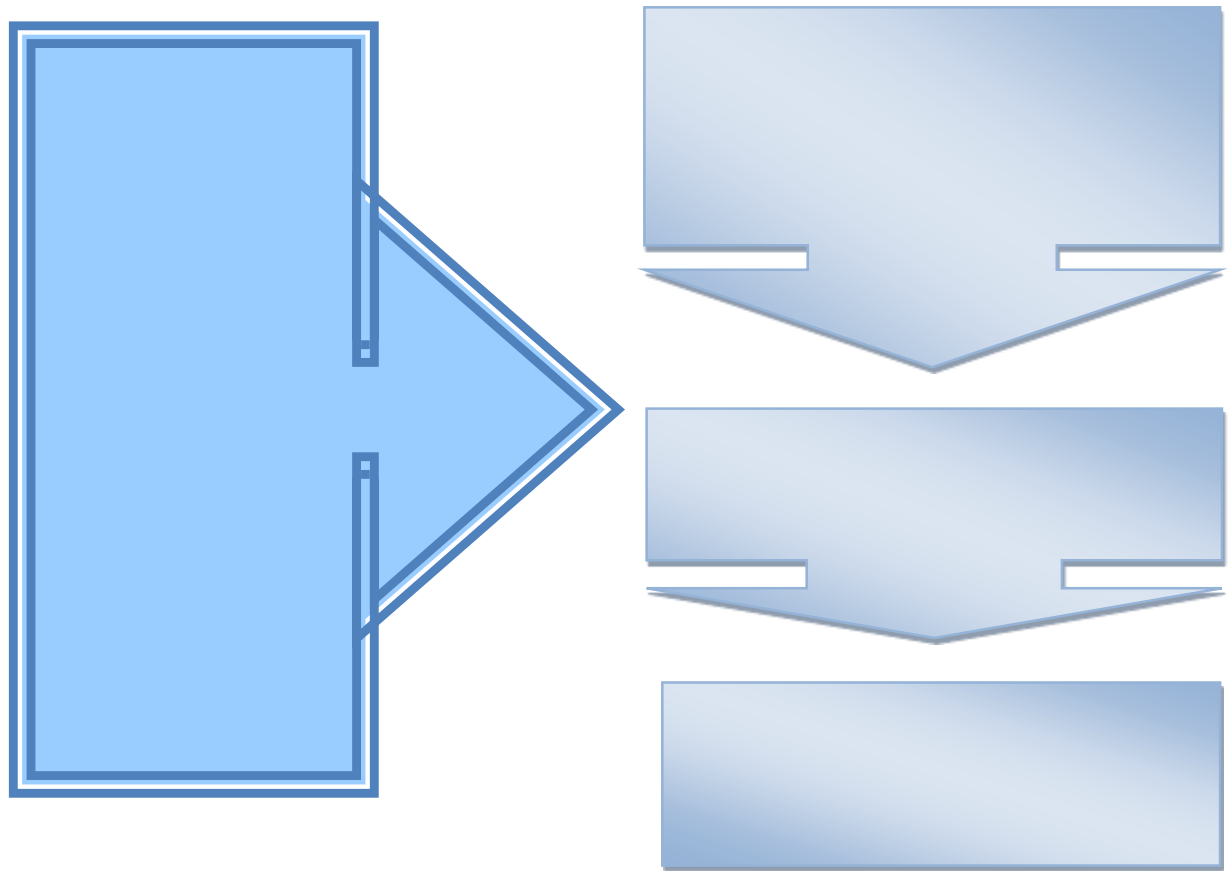
F – Give your opinion	Cells are organoids that ensure the movement of bacteria. Bacteria are divided into different groups
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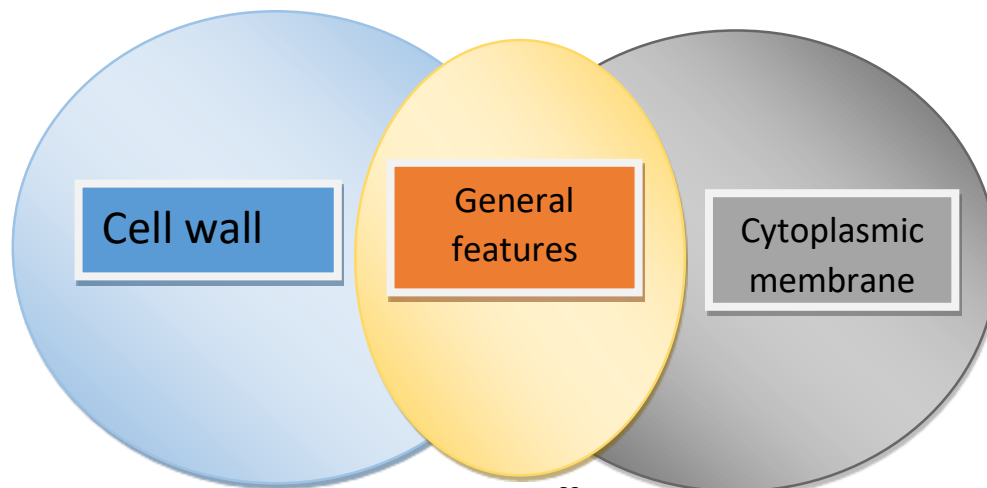
	according to the number and location of their cells. khivchins will be located in a certain order.
Q - Give a reason for your opinion	The reason depends on living conditions.
M - Give an example to prove your point	The number of khivchins is also different. Spirillas have 5-30, vibrios have 1, 2 or 3 xivchins, which are located at the cell poles. Some rod-shaped bacteria, such as Proteus vulgaris, Clostridium tetani, have 50-100 cells. The width of the cells is 10 - 20 nm, the length is 3 - 15 μm .
U - Summarize your opinion	So, chives are of great importance in the life of bacteria living in water. They are divided into different groups according to their number and location. Monotrichs - one xivchin at one end of the bacterial cell, Lophothrix - one ball of xivchin at one end of the cell, Amphithrix - two balls of xivchin at both ends of the cell. On all sides of the peritrichous cell there is a hivchini.





VENN DIAGRAM

Differences and similar features of cell wall and cytoplasm membrane of prokaryotes





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Graphic organizers increase the opportunity for students to master the topic more clearly and independently. Using the T-chart graphic organizer to explain the topic "Morphological structure of bacteria" is highly effective.

T-chart graphic organizer

A T-chart is a universal graphic organizer for writing double answers (yes/no, for/against) or comparing and contrasting answers during a debate. For example, after asking the question "Structure and function of bacterial spores", a pair of students could make a T-chart as shown below and after five minutes, on the left side of the chart, write as many reasons as they can think of in five minutes for the beneficial properties of spores. Then they have five minutes to give as many reasons as possible against this idea. At the end of this time, they have another five minutes to compare their T-plots with the other pair's plots.

T-scheme

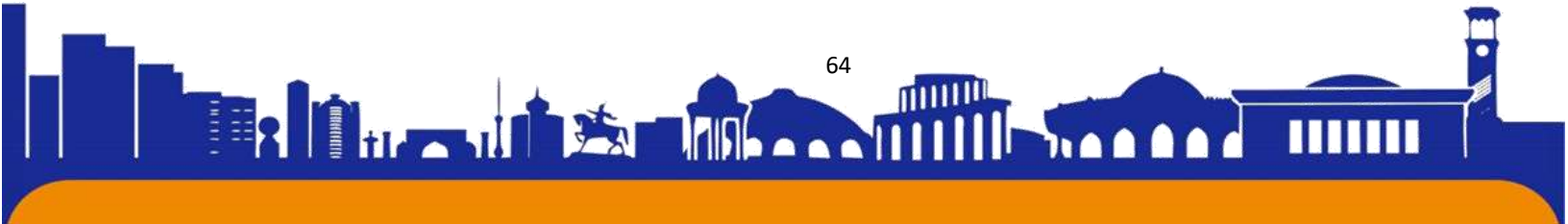
The structure and function of bacterial spores

BENEFIT	DISADVANTAGES
1.Ensures the survival of bacteria in the conditions. 2. When favorable conditions arise, the bacterium can continue to live again. 3. The exine layer of the spore protects the cytoplasm from the influence of external factors, and the intina helps the spore to grow.	1.Bacteria belonging to the asporogenous race lose their ability to form spores if they are repeatedly grown in the same artificial nutrient medium. 2.If they are heated at 1200C for several hours, the spore-wrapped bacteria will die.

Using a conceptual table organizer in teaching the topic "Morphological structure of bacteria" is very effective.

Conceptual table

This method is especially useful when three or more aspects or questions need to be compared. The table is structured as follows: the objects to be compared are placed





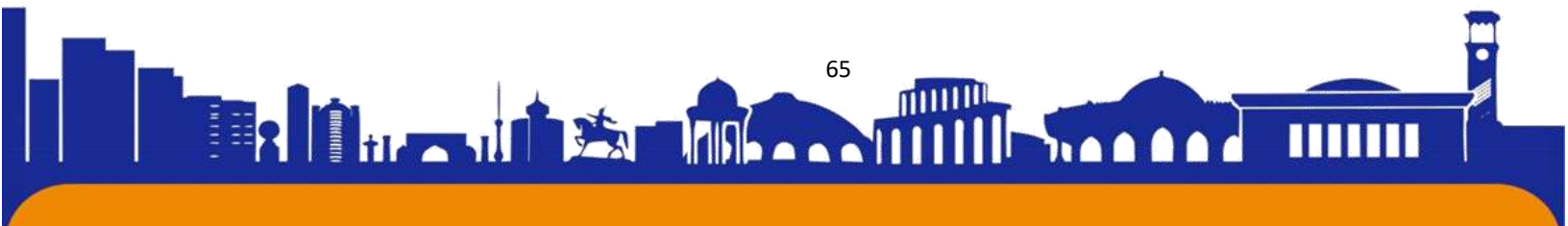
vertically, and the features and properties with which this comparison is made are placed horizontally.

For example, a conceptual table can be used to compare the types of bacteria according to their shapes.

Layers	What groups are divided into	Characteristics of body structure	Location of cells
Cocci Spheroids.	1. Monococci 2. Diplococci 3. Tetrads 4. Streptococci 5. Sarcinae 6. Staphylococci	Spherical	1. Alone 2. From 3. Out of 4. Chainlike 5. From 8-16 in groups 6. Irregular grapes in the form of shingles
Bacilli	1. Bacteria 2. Bacilli 3. Clostridium	Rod-shaped	1. Singular and multiple 2. Single and without chain 3. Alone
Vibrios	1. Vibrios	Twisted, twisted	1. Two, three or even five

Fill in the B\BX\B table based on the lab work we did during the lesson.

No	Topic questions	I know	To know i want	I found out
1	What is the body structure of rod-shaped bacteria?			
2.	Preparation methods from Bacillus subtilis			
3.	Methods of preparation of preparations from the genus Treponema			
4.	Preparation methods of Spirillum genus			





5.	Differences between different prepared bacteria			
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In the lessons of microbiology and virology, the teacher explains the educational material on the basis of visual aids in order to form certain concepts in the students, the teacher imagines, perceives, and remembers the information received by the students through their senses as a result of information or independent work. and should achieve practical application.

Summary. Such methods, by their essence, increase the learning activity of students studying the topic "Morphological structure of bacteria", encourage them to work in small groups and teams, and encourage their personal views on the studied topic and problems. , is of particular importance due to the ability to freely express, defend their opinions, justify them with evidence, listen to their peers, enrich their ideas, and encourage them to choose the most optimal solution among the available opinions. Appropriate, purposeful and effective use of interactive methods by teachers (pedagogues) in the process of education and training improves the learner's openness to communication, teamwork, logical thinking, synthesis of existing ideas, analysis, various provides a wide opportunity to develop the ability to find logical connections between views.

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